Studies in the crystallisation behaviour of Potassium Nitrate

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Synopsis

The work detailed in this report forms part of a continued effort in the area of industrial crystallisation research carried out within a multi-disciplinary project group. The Universal Instrumentation and Automation of Crystallisers (UNIAK) group is a co-operation between the Chemical and Mechanical Engineering departments, based in the Laboratory for Process Equipment at Delft University of Technology.

Until now UNIAK has based all of its kinetic and design models on experiments run over the past 13 years with ammonium sulphate. In order to generalise these models to be useful throughout the process industry it was necessary to look at a new model compound.

This work set about to investigate the growth behaviour of potassium nitrate in a two-litre batch crystalliser. Knowledge of potassium nitrate behaviour on the small-scale would be helpful in the preparation of the large-scale experiments. Incorporation of the results obtained from the two- and 1100-litre crystalliser experiments into the existing UNIAK models would aid the broadening of their applicability.

The small-scale experiments were carried out in a jacketed, two-litre, draft tube baffled crystalliser and were run in batch, cooling mode with a saturation temperature of 50 °C. A water bath, with linked computer, facilitated the cooling of the crystalliser contents at a user-defined rate. Crystal growth was monitored using on-line particle sizing, density and temperature measurements.

These reproducible experiments showed that potassium nitrate crystal growth at 50 °C is diffusion limited. Impurities in the potassium nitrate source did not significantly affect the growth rate while those in the water source did. Crystals in tap water grew twice as fast as those grown in demineralised water. The overall growth rate constants for the two systems were found to be $(4.9 \pm 0.1)\cdot 10^{-7}\ ms^{-1}$ and $(1.01 \pm 0.04)\cdot 10^{-6}\ ms^{-1}$ for demineralised and tap water respectively. The growth rates fall between the fastest and slowest face specific growth rates reported in literature. The two growth rate determination methods used in this work report significantly different results and both neglect the possibility of size dependent growth.

UNIAK's large-scale crystalliser is an 1100 litre, draft tube baffled evaporative crystalliser that can be run in batch or continuous mode. It was operated at a temperature of 50 °C and a pressure of 100 mbar and is equipped with a number of sizing instruments and strategically placed pressure, temperature, density and flow measurement devices that allow for fine control of the equipment.

Large-scale crystallisation of potassium nitrate on the 1100 litre crystalliser at 50 °C proved successful. For the first time in 13 years a second model material was introduced into the crystalliser. Significant findings were that inline measurement of the potassium nitrate supersaturation was possible, that the impeller speed had a significant affect on the particle size and that the behaviour of the potassium nitrate crystals was significantly different to that of ammonium sulphate crystals. It is hypothesised that the last two of these findings could be due to the brittleness of the potassium nitrate crystal.

Recommendations for future work on the 2-litre experiments fall into three categories.

1) Experimental improvements: Retain the crystal mass at the end of an experiment as a check for the mathematically calculated third moment. Improve the crystal sampling method to preserve the quality of the sampled crystals.
2) Experimental analysis: Account for the possibility of growth rate dispersion in the growth rate determination calculations
3) Further experimentation: Investigate crystal growth at constant supersaturation; the growth of undamaged seeds and the effect that the type of nucleation has on the growth rate.

Recommendations for future work on the 1100-litre experiments fall into two categories:

1) Experimental improvements: Samples of the potassium nitrate crystals should be taken and examined with scanning electron microscopy and compared with ammonium sulphate crystals taken under similar conditions.
2) Further experiments: The effect of each of the major variables (impeller speed, heat input, residence time and fines flow rate) on the product quality should be examined. A further model compound with a very different character (perhaps an organic substance) should also be investigated.

In order to achieve the overall UNIAK aim, both the small- and large-scale results should be simulated with the gPROMS model based on ammonium sulphate. Adaptation and modification of the model would allow its wide application.

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Nomenclature

Roman symbols

symbol	definition	units
A	Surface area of crystal	m^2
B	Birth rate	$m^{-3}m^{-1}s^{-1}$
B_0	Initial birth rate	$m^{-3}s^{-1}$
c	Solute bulk concentration	wt%
C_v	Particle concentration	m^3m^{-3}
c*	Equilibrium concentration	wt%
D	Death rate	$m^{-3}m^{-1}s^{-1}$
D	Coefficient of diffusion	m^2s^{-1}
d_I	Mean crystal size in class size I	m
G	Overall growth rate	ms^{-1}
G_L	Linear size dependent growth	ms^{-1}
h	Classification function	-
h	Step height	m
I(t)	Intensity of refracted beam	Wm^{-2}
I_0	Intensity of incident beam	Wm^{-2}
k_g	Growth rate constant	ms^{-1}
k_d	Coefficient of mass transfer by diffusion	ms^{-1}
k_m	Overall coefficient of mass transfer	ms^{-1}
k_r	Coefficient of mass transfer by reaction	ms^{-1}
K_G	Overall growth coefficient	ms^{-1}
L	Particle length	m
l	Path length	m
l_0	Size of nuclei	m
L_{50}	Median crystal size	m
m	Mass of solid deposited	kg
m_j	j^{th} moment	m^jm^{-3}
M_T	Total mass of solids	kg
n	Particle number density	$\#m^{-3}m^{-1}$
n	Growth rate index	-
N(i)	Number of particles in size class I	$\#m^{-3}$
obsc	Obscuration	%
p	Slope of the crystal surface	-
q	Step flux	s^{-1}
R_G	Mass deposition rate	$kg \cdot m^{-2}s^{-1}$

Roman symbols cont.

symbol	definition	units
S	Solubility	wt%
T	Temperature	°C
t	Time	s
u	Step velocity	ms^{-1}
v	Face specific growth rate	ms^{-1}
ΔV	Volume percent crystals in size class I	-
V	Volume	m^3
x	Particle size	m

Greek symbols

symbol	definition	units
α	Volume shape factor	-
β	Surface shape factor	-
ϕ_v	Volumetric flowrates (in and out)	m^3s^{-1}
δ	Length of diffusion path	m
ρ	density	kgm^{-3}
λ	Distance between steps	m
σ	Relative supersaturation	-
θ	Angle of crystal surface	°

Indices

symbol	definition
c	Crystal
s	Solid
v	volumetric

Abbreviations

abbreviation	definition
CCD	Charged coupled device
CCG	Constant crystal growth
CSD	Crystal size distribution
DT	Draft tube
DTB	Draft tube baffled
FC	Forced circulation
gPROMS	Programming language developed by Imperial College, London
GRD	Growth rate dispersion
Helos	Helium neon laser optical diffraction spectrometer
KNO_3	Potassium nitrate
Opus	On-line particle analysis by Ultra-Sonic extinction
PBE	Population balance equation
RF	Random fluctuations
rpm	Revolutions per minute
SEM	Scanning electron microscope
Uniak	Universal instrumentation and automation of crystallisers

Chapter One

Introduction

Crystallisation is the conversion of a substance from the amorphous solid, liquid, or gaseous state to the crystalline state. It is one of the oldest of the chemical engineering unit operations and is used widely within the chemical process industry. Both the vast number and enormous quantities of crystalline substances produced commercially verify this fact. For instance, substances such as sodium chloride, ammonium sulphate and sucrose each have world-wide production rates in excess of 100 million metric tons per annum.

Crystallisation is particularly valuable as a thermal separation process for either concentrating or preparing substances in a pure state. This separation can be from solutions, melts or the gaseous phase. Its advantages over other separation processes are the relatively low energy consumption, the high purity of product per separation stream, the absence of extractant or absorbent as extra phase and the mild process conditions.

Today there are few sectors of the chemical industry that do not, at some stage, use crystallisation as a method of production, purification or recovery of solid material. Distillation is the only separation or purification technique used more frequently.

Growing interest over the last number of years has led to a much deeper investigation into the complex sub-processes that make up this separation process. Much work has been carried out recently but the field can still be regarded as far from complete.

The work presented in this report forms part of the continued effort being carried out in this area by a multi-disciplinary research project set up at Delft University of Technology in the Netherlands. The Universal Instrumentation and Automation of Crystallisers (UNIAK) project is located at the Laboratory for Process Equipment. There are four different research groups represented in the project:

Industrial Crystallisation (Laboratory for Process Equipment)
Particle Technology (Chemical Engineering Department)
Measurement and Control (Mechanical Engineering Department)
Process Systems Engineering (Chemical Engineering Department)

The project started in 1986 and is at present unofficially in its fourth phase. This phase has two particular objectives. The first is the improvement and generalisation of the observation and control systems for crystallisation processes, which is vital if automatic control systems are to be implemented in industrial plants. The second is to improve the performance and controllability of industrial crystallisers by better design.

For its experimental work the UNIAK-3 project has worked with three crystallisers and a growth cell. The crystallisers are: a 22 litre Draft-Tube (DT) crystalliser, a 150 litre forced circulation (FC) crystalliser and an 1100 litre draft tube baffled (DTB) crystalliser.

Up until this stage the UNIAK project has based all of its kinetic and design models solely on the results from ammonium sulphate experiments. In order to generalise such models it was necessary to examine the crystallisation behaviour of a new model compound. It was with this in mind that this project was undertaken.

The primary goal of this work is to investigate the growth behaviour of potassium nitrate in a small-scale batch crystalliser. The growth kinetics of this model material and its tendency towards scaling and agglomeration will be investigated. This will be helpful in the preparation of the 1100 litre crystalliser experiments and particularly useful in the generalised modelling of the crystalliser kinetics in the large-scale plants.

Once this has been achieved the 1100 litre DTB crystalliser will be run with potassium nitrate. Incorporating the results of these further 1100 litre experiments into the existing models will broaden their applicability. This will take us closer to the development of generic models for the design and control of industrial crystallisers.

The organisation of this report is as follows:
Chapter 2 discusses crystallisation theory. General crystallisation concepts and crystal growth theories are described. This is followed by a description of the literature available on topics associated with potassium nitrate crystal growth. The chapter ends with a discussion of the two methods used for the determination of overall growth rate in this work.

Chapter 3 is dedicated to the development of supersaturation measurement. The chapter first deals with the calibration of the density meter used to measure solution concentration and then focuses on the generation of applicable equilibrium concentration or solubility curves.

Chapter 4 combines the theory of Chapter 2 with the supersaturation measurements from Chapter 3 and presents the experiments carried out in the 2 litre growth cell. It reports the determined growth rate constant and mechanism of growth for potassium nitrate.

Chapter 5 describes the 1100 litre crystalliser set-up and gives the results of one of the first experiments to be run with potassium nitrate in this crystalliser.

Finally, in Chapter 6 conclusions are drawn from the work carried out as part of this project.

The report ends with recommendations for work in the future.

Chapter Two

Literature Review

2.1. Crystal Growth theories

Crystal growth is a secondary process that is preceded by crystal birth, otherwise known as nucleation.

The spontaneous nucleation process is classed into two groups according to its mechanism: primary and secondary nucleation. Primary nucleation occurs in a highly concentrated solution in the absence of both crystals and other foreign particles. A primary nucleus forms when a critical number of molecules or solute ions form a cluster.

Secondary nucleation requires a suspended particle that will either catalyse cluster formation or physically contribute to the nucleation by processes such as attrition. Since it is rare for a solution to be completely particulate free, most nucleation events are considered to be secondary nucleation.

It is commonly accepted that secondary nuclei formed by attrition are only stable above a certain critical size. When smaller than this size the nuclei tend to dissolve far more often than they grow whereas stable nuclei (nuclei that are above this limit) begin to grow into crystals of significant size. What is in debate however, is exactly how big (or small) this critical size is. It is difficult to fix a universal standard (Kramer, 1999) but Gahn and Mersmann (1999) accept that this critical size lies within the range of 10 to 40 μm.

Many mechanisms for growth have been proposed over the years. A few of the more widely accepted theories are discussed briefly below under their generic headings.

2.1.1. Surface energy theories

In the late 19th century, Gibbs (as cited by Nielsen, 1964) suggested that crystal growth is governed by a special case of the principle stating that an isolated droplet of fluid is most stable when its surface free energy is at a minimum. He stated that the total free energy of a crystal in equilibrium with its surroundings at constant temperature and pressure would be a minimum for a given volume. Hence, if a crystal were allowed to grow in a supersaturated solution, it would do so in such a manner as to ensure that the crystal had a minimum total surface free energy. This would result in each crystal type having a characteristic "equilibrium" shape for a given volume.

Gibbs acknowledged that his simple analogy had limitations since a liquid droplet is very different from a crystalline product, simply in the way that its atoms or molecules are arranged.

In 1901 Wulff proved that the equilibrium shape of a crystal is related to the free energies of its faces. Since a face's free energy determines its growth rate and each face could have a different free energy, a multi-facetted crystal often has a range of growth rates on its different faces.

An ideal crystal is defined as one that maintains its characteristic geometric pattern with growth. An "invariant" crystal like this is shown in Figure 2-1a. Notice that, in order to keep its shape, the three equal A faces need to grow at an equal linear rate, the smaller B faces must grow faster and the C face must grow fastest of all. However crystals do not always maintain geometric similarity as they grow. Figure 2-1b shows an "overlapping" crystal where the smaller, faster-growing faces disappear completely.

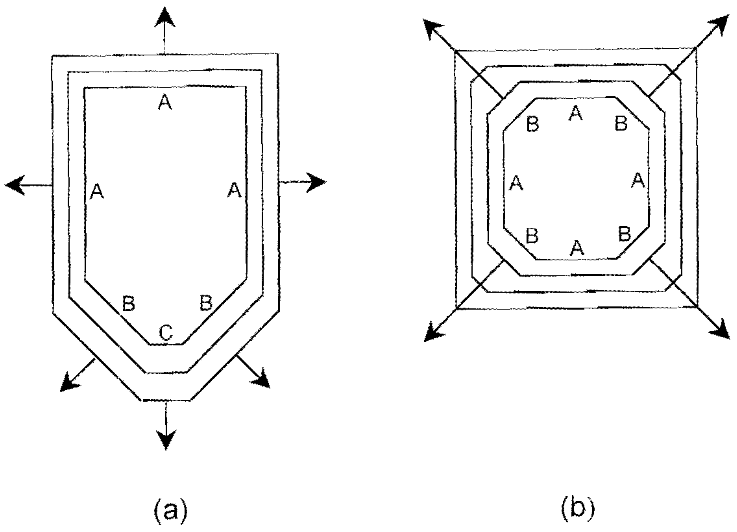

***Figure 2-1**: Velocities of crystal growth: a) invariant crystal, b) overlapping (Mullin, 1993)*

Although the surface energy theories still attract attention they are not generally accepted as they have little quantitative evidence to support them. Their main downfall is that they fail to explain the well-known effects of supersaturation and solution movement on the crystal growth rate.

2.1.2. Adsorption layer theories

Volmer and Weber (1926) were the first to propose a crystal growth mechanism based on the existence of an absorbed layer of solute atoms or molecules on a crystal face. Their thermodynamically based theory states that units of crystallising substance do not immediately integrate into the lattice as they arrive at the crystal surface. In fact, they merely lose one degree of freedom and form a loosely adsorbed layer at the interface and are free to move over the crystal surface.

Integration of the atoms, ions or molecules into the lattice will occur where the attractive forces are greatest. Under ideal conditions this process will continue in a step-wise manner until the whole plane face is completed (Figure 2-2a and 2-2b). Another layer is initiated by a two-dimensional nucleation site, or "monolayer island nucleus" as Volmer and Weber named it, and crystal growth proceeds (Figure 2-2c).

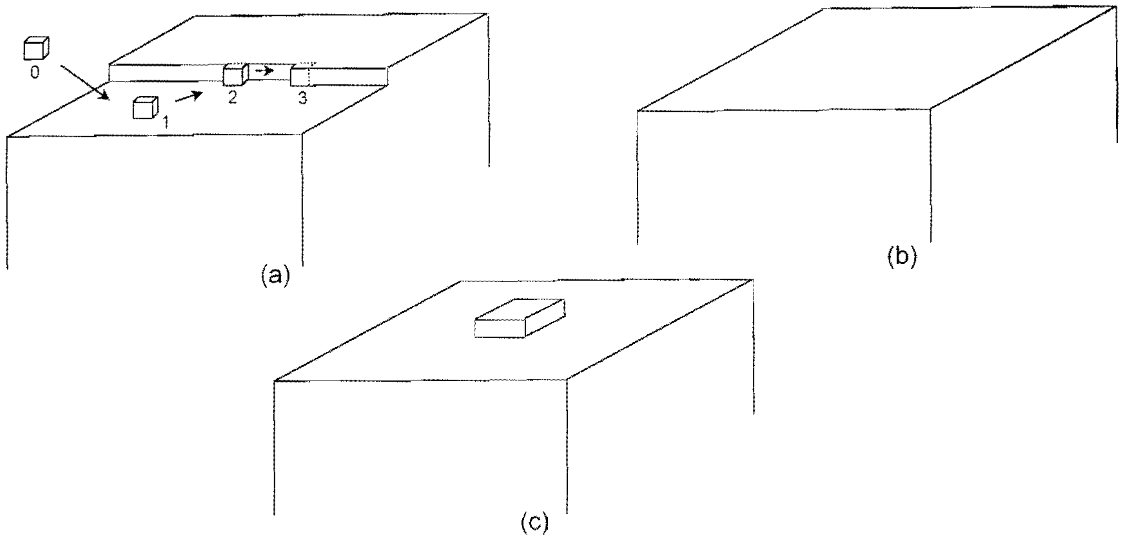

Figure 2-2: *A mode of crystal growth without dislocations: a) movement towards the desired site, b) a completed layer, c) a monolayer island nucleus (Nielsen, 1964)*

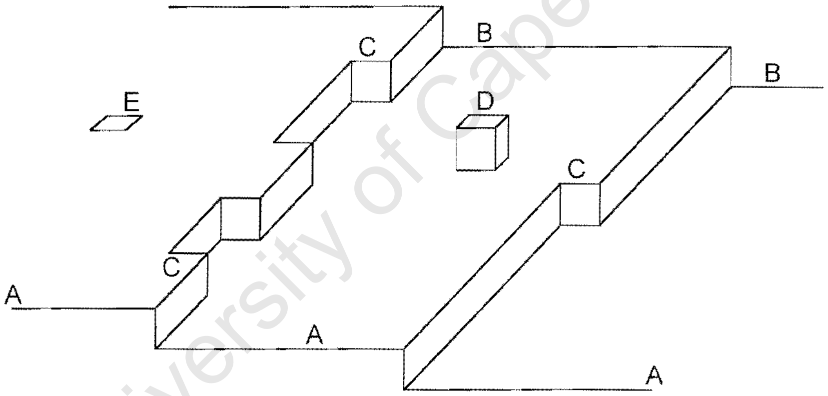

Figure 2-3*: Kossels model of a growing crystal surface showing flat surfaces (A), steps (B), kinks (C), surface-adsorbed growth units (D) and surface vacancies (E) Kossel (1934).*

Figure 2-3 depicts the Kossel model of a growing crystal face (Kossel, 1934). He saw an apparently flat crystal face as being made up of moving layers, or steps, of monoatomic height. Each step could contain one or more kinks. The surface also has loosely adsorbed growth units and vacancies. Growth units can be atoms, molecules or ions. Inclusion of growth units happens most easily at the kinks that move along the step until the face is completed. New steps generally are formed by surface nucleation at the corners. Kossel's theory however, failed to explain how crystals grow rapidly at low supersturations far below those needed for surface nucleation.

Frank (1949) postulated that few crystals ever grow ideally in the layer-by-layer fashion described by Kossel's theory without imperfections occurring in the pattern. He stated that most crystals develop dislocations that promote growth by forming steps on the crystal's faces. The best recognised of these dislocations is the screw dislocation (Figure 2-4) which is self-propagating and thus negates the necessity for surface nucleation. Once formed on the surface, the spiral could conceivably continue growing perpetually. Often quite complex spirals can develop when several spirals grow together. Walton (1967) has shown excellent photographic examples of crystal growth by the "screw mechanism".

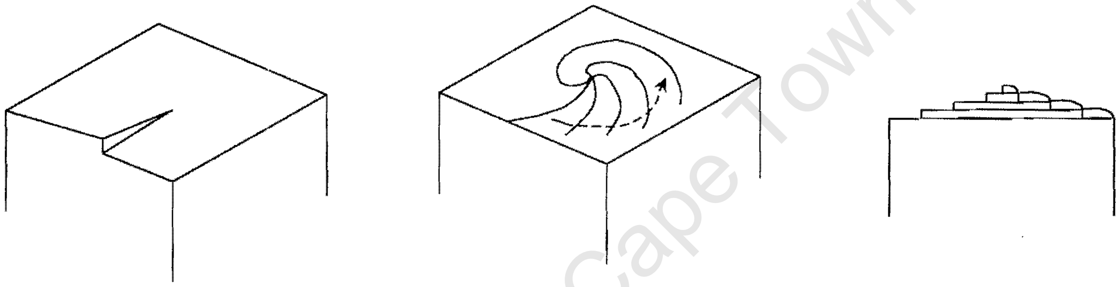

***Figure 2-4**: The development of a growth spiral starting from a screw dislocation (Mullin, 1993)*

Nielsen (1964) and Ohara and Reid (1973) have been foremost in developing the last group of adsorbtion layer theories that will be presented in this section. These theories deal with the spread of monolayers. Many theorists that have done similar work have dubbed their models with different names such as the "nuclei upon nuclei" model, the "two-dimensional nucleation" model or the "polynuclear growth" model but here the term "birth and spread" will be used.

The birth and spread model describes the formation of two-dimensional nuclei on the crystal surface, which grow into islands as they spread laterally across the surface. Two variations occur: i) where the island covers the whole surface before another island is formed on top of it (the mononuclear model) or ii) where islands are allowed to nucleate all over the surface, including on top of incomplete layers still growing laterally. The second model, depicted in Figure 2-5, is more realistic.

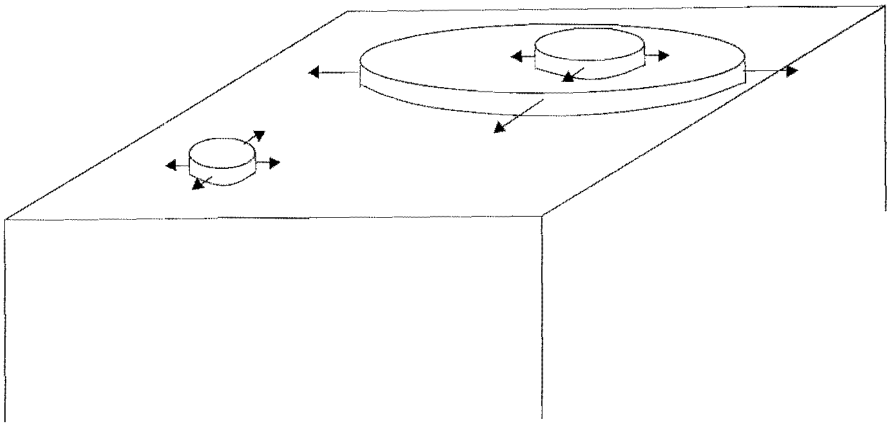

Figure 2-5: Crystal growth by birth and spread (van Rosmalen, 1997)

2.1.3. Kinematic theory

This theory hypothesises that the two key processes involved in layer growth are i) the generation of steps on the crystal face and ii) the movement of layers across the face. Frank (1949) developed his kinematic theory after considering the movement of unevenly spaced macrosteps. All previous theories had assumed that steps were evenly spaced across the surface of the crystal. He described his theory as follows.

The step velocity, u, depends on the proximity of the other steps because all steps are competing for units to incorporate into the crystal lattice. This gives,

$$u = q / n \qquad [Lt^{-1}] \qquad (2\text{-}1)$$

where q is the step flux (the number of steps passing a point at a given time) and n is the density (the number of steps per unit length in a given region). The distance between steps (λ) is thus inversely proportional to the step density:

$$\lambda = n^{-1} \qquad [L] \qquad (2\text{-}2)$$

The slope of the crystal surface, p, with reference to the flat ledges is given by

$$p = \tan\theta = hn \qquad [-] \qquad (2\text{-}3)$$

and the face growth rate, v, perpendicular to the reference surface given by

$$v = hq = hnu \qquad [Lt^{-1}] \qquad (2\text{-}4)$$

where h is the step height.

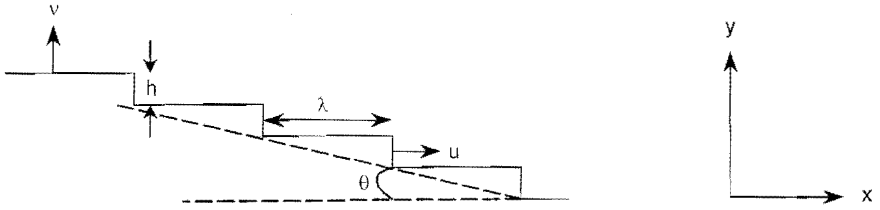

***Figure 2-6**: Steps on a crystal face (Frank, 1949)*

Following this approach it can be seen that, as the steps move further apart (θ→0), the diffusion fields interfere less and less with each other and the velocity of each step, u, will be a maximum. The opposite has reverse effect; as the steps move closer together, the slope increases and u decreases to a minimum at hn=1 (i.e. where θ=45°). It can thus be seen that as the slope, θ, increases, the face growth velocity, ν (=utanθ), increases to a maximum and then decreases to zero again. The shape of this ν(p) curve is an important characteristic of the growth process.

2.1.4. The diffusion-reaction theories

Noyes and Whitney (1896) began the thinking towards the diffusion-reaction theory when they incorrectly considered that the deposition of solid on the face of a growing crystal was essentially a diffusional process. They also falsely believed that crystallisation was the reverse of dissolution and that the rates of both processes were dictated by the concentration difference between the solid surface and the bulk of the solution. They proposed that Equation 2-5 described crystallisation and dissolution kinetics.

$$\frac{dm}{dt} = k_m A(c - c^*) \tag{2-5}$$

where	m	mass of solid deposited	[kg]
	t	time	[s]
	A	surface area of the crystal	[m^2]
	c	solute concentration in the supersaturated solution	[kgm^{-3}]
	c^*	equilibrium saturation concentration	[kgm^{-3}]
	k_m	coefficient of mass transfer	[ms^{-1}]

Nernst (1904) assumed that there would be a thin stagnant film of liquid covering the surface of the crystal. He proposed that, in order for the crystal to grow, molecules would have to diffuse through this stagnant layer and so modified Equation 2-5 to the form:

$$\frac{dm}{dt} = \frac{D}{\delta} A(c - c^*) \qquad (2\text{-}6)$$

where D is the coefficient of diffusion of the solute and δ is the length of the diffusion path.

The thickness of the stagnant film, δ, depends on the turbulence at the crystal surface-solution interface. Stagnant layers of up to 150 μm have been measured for stationary crystals but these values drop down to a few micrometers in vigorously agitated systems. This would imply that almost infinite growth rates were possible in turbulent systems. Thus it is clear that diffusion alone is not sufficient in describing crystallising systems. Furthermore, crystallisation is not the reverse of dissolution. Under the same conditions of temperature and concentration a substance tends to dissolve faster than it crystallises (Mullin, 1993).

Considerable modification of the diffusion theory began with the important discovery that the concentration of solutions at the surface of the growing crystal were not saturated but supersaturated. Mullin (1993) cites Berthoud (1912) and later Valeton (1924) as suggesting that there must be two processes governing crystal growth: first a diffusion process where molecules are transported from the bulk to the crystal surface; and then a type of first-order reaction where they integrate themselves into the crystal lattice. These two stages can be represented separately due to the different driving forces.

$$\frac{dm}{dt} = k_d A(c - c_i) \qquad \text{(diffusion)} \qquad (2\text{-}7)$$

and

$$\frac{dm}{dt} = k_r A(c_i - c^*) \qquad \text{(reaction)} \qquad (2\text{-}8)$$

where k_d is the coefficient of mass transfer by diffusion, k_r is the mass transfer coefficient by reaction and c_i is the solute concentration in the solution at the crystal-solution interface. Figure 2-7 represents this idea diagrammatically. The two driving forces are seldom of equal magnitude however, and the concentration drop across the stagnant film is not necessarily linear.

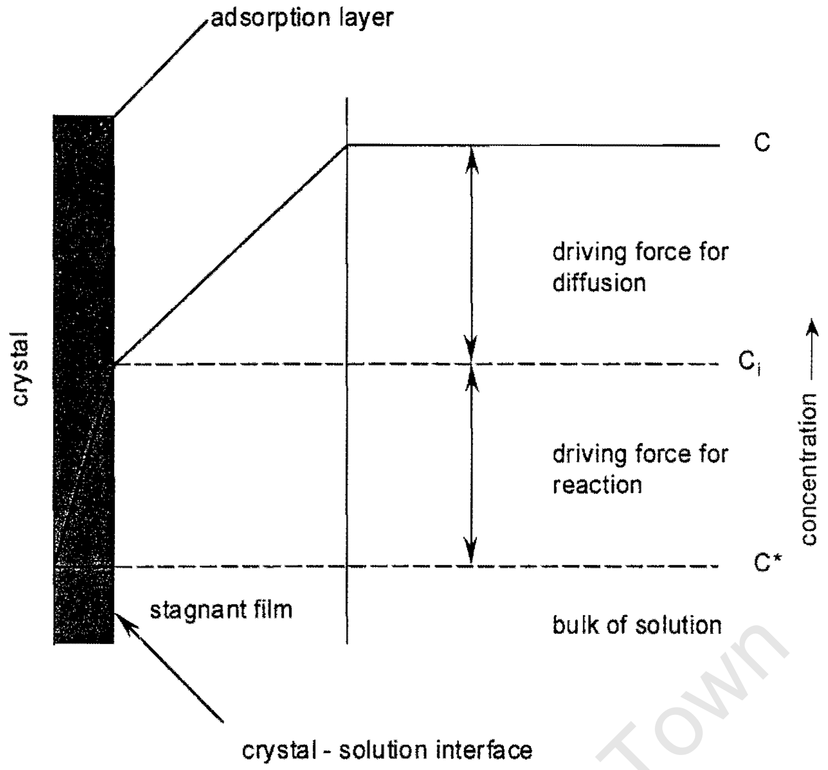

Figure 2-7: *Concentration driving forces in crystallisation from solution*

The difficulty in measuring interfacial concentrations makes using Equations 2-7 and 2-8 impractical. Using an overall concentration driving force (c-c*) eliminates this problem and a more general equation can be written:

$$\frac{dm}{dt} = K_G A(c - c^*)^g \tag{2-9}$$

where K_G is an overall crystal growth coefficient. The exponent g is referred to as the order of the overall crystal growth process. When g=1 and the surface reaction (Equation 2-8) is first order, it is possible to eliminate c_i from Equations 2-7 and 2-8 to give:

$$\frac{dm}{dt} = \frac{A(c - c^*)}{1/k_d + 1/k_r} \tag{2-10}$$

This implies that:

$$K_G = \frac{k_d k_r}{k_d + k_r} \tag{2-11}$$

which can also be written as:

$$\frac{1}{K_G} = \frac{1}{k_d} + \frac{1}{k_r} \tag{2-12}$$

Equation 2-12 shows that, for cases where there is extremely fast reaction (when k_r is large), $K_G \approx k_d$. Thus the crystallisation process is controlled by the diffusion step. In the same way, if the diffusional resistance is low (i.e. k_d is large), then $K_G \approx k_r$ and so the process is controlled by surface integration (or reaction).

However, this is a simplification. Although the diffusional step is considered to be linearly dependent on concentration, the validity of assuming that the reaction step is first-order is questionable. For many inorganic salt crystals growing in aqueous solutions, the overall growth rate order is in the range of 1 to 2. This leads to a solution where the relationships between K_G, k_r and k_d remain complex.

The crystal growth process is undoubtedly more complex than the simple two-step process explained above. Mullin (1993) suggested that the processes for an electrolyte crystallising from an aqueous solution might be as follows:

1. Bulk diffusion of hydrated ions through the diffusion boundary layer
2. Bulk diffusion of hydrated ions through the adsorption layer
3. Surface diffusion of hydrated or dehydrated ions
4. Partial or total dehydration of ions
5. Integration of ions into the lattice
6. Counter diffusion of released water through the adsorption layer
7. Counter-diffusion of the released water through the boundary layer

Although diffusion-reaction theory fails to describe the surface integration step in crystallisation, it can be ignored in systems where diffusion is the limiting step e.g. most ionic salts, of which KNO_3 is an example.

2.2. Potassium nitrate crystallisation

2.2.1. General properties of potassium nitrate

Potassium nitrate, KNO_3, is an inorganic salt that was first produced by the Chinese in the 10th century for the manufacture of black gunpowder. They leached soil in which the nitrogen from urine had combined with mineral potassium. By the 1800s potassium nitrate was a strategic military chemical and was still produced in India by the traditional Chinese method. The only source of naturally occurring potassium nitrate is in the caliche deposits in Chile and even these are not very rich.

Today potassium nitrate is produced commercially by the reaction of potassium chloride and nitric acid shown by Equation 2-13. The process is operated at elevated temperatures and yields chlorine gas as a co-product.

$$3\ KCl + 4HNO_3 \rightarrow 3\ KNO_3 + Cl_2 + NOCl + 2H_2O \qquad (2\text{-}13)$$

The main uses of potassium nitrate include fertilisers, pyrotechnics, steel making, foodstuff preservation and a heat transfer agent. Production of potassium compounds (almost solely derived from potassium chloride) amounted to 22 million metric tons in 1993, which was down from 32 million tons in 1989. (Kirk-Othmer, 1996)

Selected physical and thermodynamic properties of potassium nitrate are listed in Table 2-1.

***Table 2-1**: Physical and thermodynamic properties of KNO_3*

(CRC Handbook of Chemistry and Physics, 1997)

Molecular mass	101.1 g/mol
Melting point	334 ^0C
Boiling point	400 ^0C
Density (298 K)	2.109 g/cm3
Specific heat capacity, Cp_0	96.4 J/mol/K
Standard heat of formation, ΔH^0_f	-494.6 kJ/mol
Standard heat of fusion, ΔH_{fus}	10.1 kJ/mol
Standard heat of solution, ΔH^0_{sol}	34.89 kJ/mol
Standard entropy, S^0	133.1 J/mol/K
Standard Gibbs free energy, ΔG^0_f	-394.9 kJ/mol
Refractive index @ 593 nm (Ullman, 1984)	
	$n(\alpha) = 1.3350$
	$n(\beta) = 1.5056$
	$n(\gamma) = 1.5064$

2.2.2. Potassium nitrate crystal morphology

Potassium nitrate exhibits a more complicated crystallographic form than other common ionic crystals (such as NaCl or CsCl) with up to 8 different faces in a growth form. Each face grows at a different rate and has a different morphology (Rolfs et al., 1997). At room temperature, the salt crystallises in the orthorhombic-dipyramidal form (Weber, 1999) and the space group is Pmcn (Nimmo and Lucas, 1976).

Groth (1908) states that potassium nitrate exhibits the following eight crystal faces in the growth form: {100}, {010}, {001}, {110}, {011}, {021}, {012} and {111}. There are slight discrepancies between researchers in the unit cell dimensions but Weber (1999) gives them as a=5.414, b=9.164 and c=6.431.

Various theoretical equilibrium forms of KNO_3 are presented in literature (Heijnen, 1986; Rolfs et al., 1997; van der Voort, 1991; Weber, 1999). Little agreement is found between them since some use more complicated surface tension predictive studies (Honigman (1958) and Lacmann (1968, 1974)) while others use more predictive studies based on the molecular structure of similar compounds (Heijnen, 1986).

Figure 2-8 shows the theoretical growth form described by Heijnen, which he deduced from that of aragonite ($CaCO_3$) which is isostructural with KNO_3. Figure 2-8 also highlights a common trend in literature, which is a discrepancy between the calculated and observed habits of a potassium nitrate crystal (Rolfs et al., 1997; van der Voort, 1991). Van der Voort (1991) argues that this can be predicted if the interaction of the solvent with the crystal is taken into account.

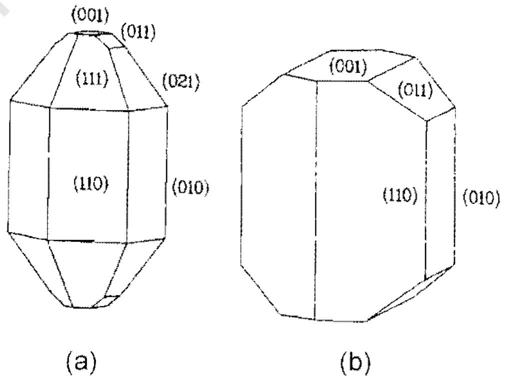

***Figure 2-8**: a) The crystal habit of KNO_3 grown from an aqueous solution and (b) the theoretical growth form of aragonite (b) (Heijnen, 1986).*

2.2.3. The Solubility of potassium nitrate

Figure 2-9 shows a compilation of the solubility data of potassium nitrate in water presented by Gmelin (1938), Linke (1965), Mullin (1993) and Rolf et al. (1997). Solubility is highly dependent on temperature. It increases nearly two thousand percent over the range of 0 °C to 100 °C.

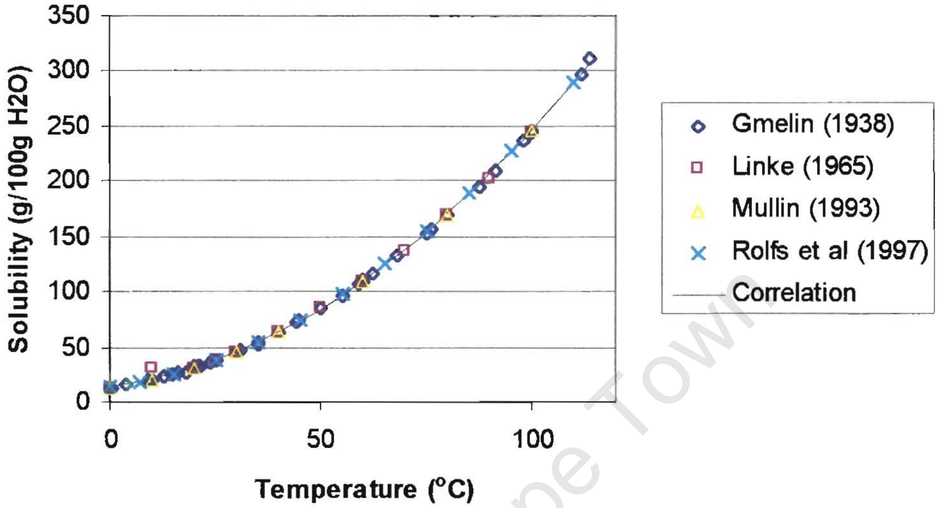

***Figure 2-9**: The solubility of potassium nitrate according to literature*

The raw literature data presented in Figure 2-9 can be found in Appendix 1. The four literature sources present similar but slightly varied data. Linke's data is the most different from the others with a notable outlier at 10°C, probably a typographical error. Generally the data is more alike at temperatures below 75°C.

A quadratic equation was fitted to the complete set of data yielding Equation 2-14

$$S = 13.8152 + 0.51928T + 0.01799T^2 \qquad (2\text{-}14)$$

where S: Solubility of KNO_3 (g KNO_3/ 100 g H_2O)

T: Temperature (°C)

The average relative error of the correlation is ± 0.88 % (see Appendix 5 for a definition of average relative error).

2.2.4. The growth rate of potassium nitrate

Rolfs, Lacmann and Kipp (1997) have carried out work on the face specific growth rates of potassium nitrate in pure aqueous solution. The relative supersaturation was varied between 0.3% and 1.8%, with the solution being saturated at 15 °C. The growth rate was lowest for the {010} face and highest for the {001} face. The {001} face was also the smallest and most difficult to observe. An overview of their results is depicted in Figure 2-10. Their conclusion was that each face exhibited its own characteristic growth rate. They also determined the exponent n and the growth rate constant (k_g) from Equation 2-15. From the values that they observed for the exponent n in the growth law, they concluded that the crystallisation of potassium nitrate is mostly incorporation limited. They stated that their measured surface growth rates were high in comparison to other systems, with a maximum deviation factor of about 2.

$$v = k_g \sigma^n \tag{2-15}$$

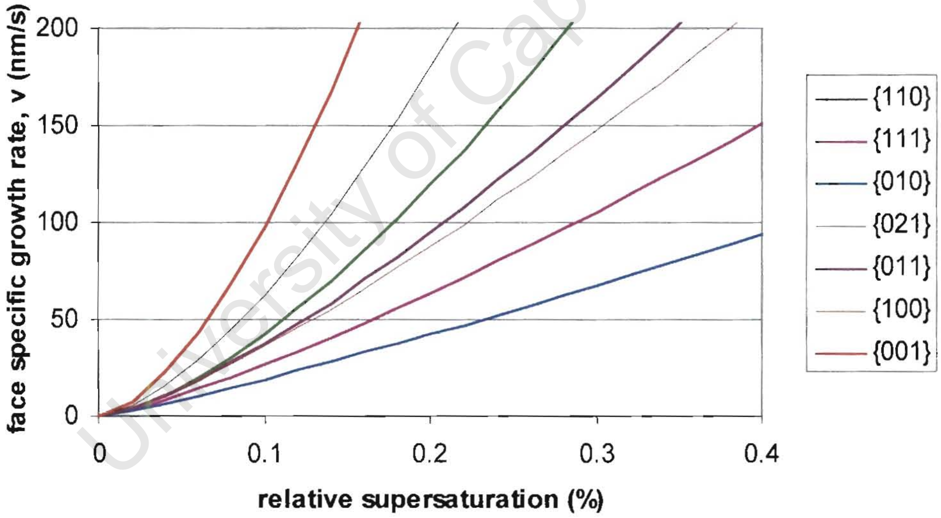

***Figure 2-10**: Results of the face specific determination of the mean crystal growth rate. Flow rate: 16 cm/s, saturation temperature: 15°C (Rolfs et al., 1997)*

Herden and Lacmann (1997) measured the specific growth rate of the {111} face on single crystals. The kinetic growth coefficient (k_g) is calculated to be 24 μm/s from the linear fit (n = 1) of their growth rate versus supersaturation data, for the {111} face of an untreated KNO_3 crystal. This is negligibly different (1% larger) to the kinetic growth coefficient reported by Rolfs et al. (1997).

Other literature values reported for the growth of potassium nitrate in water tend to vary. Mullin (1993) reported the potassium nitrate growth rates shown in Table 2-2. This shows the large influence of temperature on the growth rates. The growth rates that he reports fall well below what would be expected at that level of supersaturation by both Rolfs et al. (1997) and Herden and Lacmann (1997). Rolfs et al. (1997) state that differences in literature values are due to the variations in temperature under which the crystals were grown, quality of the crystals, the method of growth rate determination, variations in hydrodynamic conditions and the preparation of the seed crystals used.

***Table 2-2**: The mean linear growth rate for potassium nitrate crystals in the approximate size range 0.5 to 1mm growing in the presence of other crystals (Mullin, 1993).*

T (°C)	σ (%)	v (nms^{-1})
20	5	45
40	5	150

2.2.5. Growth rate dispersion

Growth rate dispersion (GRD) is the name given to the phenomenon where crystals of the same size, growing under the same, constant environmental conditions (such as supersaturation, temperature and hydrodynamics) grow at different rates. The dispersion of growth rates is a topic of great interest at present. The reason for this phenomenon still remains disputed (Butler et al., 1999).

Several publications have investigated GRD. Bunn first hypothesised the phenomenon in 1949 and White and Wright (1971) were the first to report experimental evidence. There are now two models that have been developed to describe it: the constant crystal growth (CCG) model and the random fluctuation (RF) model. The CCG model describes each crystal separately with a unique, but constant growth rate dependent on the number, sign and size of the screw dislocations (Burton et al., 1951). The RF model states that the growth rate of individual crystals fluctuate randomly around an average linear growth rate with a Guassian probability distribution (Randolph and White, 1977).

Many authors have observed growth rate dispersion in KNO_3 crystals (Treivus and Novikova (1978), Herden (1994, 1995), Herden and Lacmann (1997), Rolfs et al. (1997)). Single crystal growth experiments (Herden and Rolfs et al.) report mixed results on the model describing GRD. Rolf et al. (1997) found that the {111} face seemed to have CCG while the {010} face indicated RF behaviour with a standard deviation of ± 30%. This margin of error is consistent with results obtained by Helt and Larson (1977). Rolfs et al. (1997) conclude that the RF model seems to be most valid for KNO_3 crystal growth despite the fact that CCG is also observed.

Herden and Lacmann (1997) measured the difference in the {111} face growth rate of potassium nitrate crystals that had been artificially treated (by scratching or roughening etc) and those that had not been treated. Interestingly they report a wide range of growth rates for any one of the number of levels of supersaturation observed. They state that the growth behaviour of the {111} face for a relative supersaturation < 0.001 can be described by the constant crystal growth model while, for a relative supersaturation > 0.001, the random fluctuation model is more suitable. The disagreement over the correct model, even by one author, illustrates the complexity and poor understanding of this phenomenon.

2.2.6. The effect of impurities on the growth rate of potassium nitrate

Any substance other than the material being crystallised can be considered as an impurity. Impurities within a system can have a significant effect on the growth of a crystal. Some can suppress growth completely; others can enhance growth. The presence of specific impurities can even change the crystal habit by being highly selective and acting on only certain crystal faces. Particular impurities can have an effect on growth when present at low concentrations while others require large amounts to be present before having any effect.

There are a number of ways in which impurities can affect the growth rate. They can change the structure of the solution or the equilibrium solubility. They may alter the conditions at the crystal surface – solution interface and thereby affect the integration of growth units into the crystal lattice. It also happens that they may build into the crystal lattice, particularly where there is some degree of lattice similarity, and decrease crystal purity (Mullin, 1993)

Marc (1912) carried out the first work dealing with the influence of impurities on potassium nitrate crystallisation. He examined the effect that Patent-blue had on the nucleation behaviour. Later, further work was carried out by Whetstone (1949, 1955a, 1955b) who found several additives that changed the crystal habit and some that increased the twinning tendency of crystals with increasing concentrations. He also derived the first theoretical model for the potassium nitrate adsorption process (Whetstone, 1957).

More recent work has been carried out by Teot (1971, 1973) (as cited by Kipp et al., 1997) and Barta et al. (1986) on the effect of impurities on potassium nitrate crystal morphology; by Shimizu and Kubota (1986) on their effect on nucleation and by Franke et al. (1981) on the effect on the overall growth rate. Franke states that there was no marked effect on either the growth rate or the imperfection of the crystals when reagents of different purity were used.

2.2.7. The choice of potassium nitrate

The motivation for this work came from the need to broaden the dynamic model for an industrial crystalliser that had been developed at the Technical University of Delft, Netherlands. In order to further the model, the choice of model compound (previously ammonium sulphate) needed to be changed.

Potassium nitrate was chosen as an intermediate step with the aim of moving finally to an organic compound. The reason for the choice of potassium nitrate was that it was significantly different from ammonium sulphate in many ways but was still a common inorganic salt. They differed most significantly in their solubility in water (see section 2.2.3) and in their brittleness (Mullin, 1993).

The solubility of KNO_3 is greatly dependent on temperature. This is particularly clear when it is compared with the solubilities of other common ionic salts such as KCl, $(NH_4)_2SO_4$ or NaCl (see Figure 2-11). The great increase in the solubility of KNO_3 with temperature makes this system particularly suitable for cooling crystallisation.

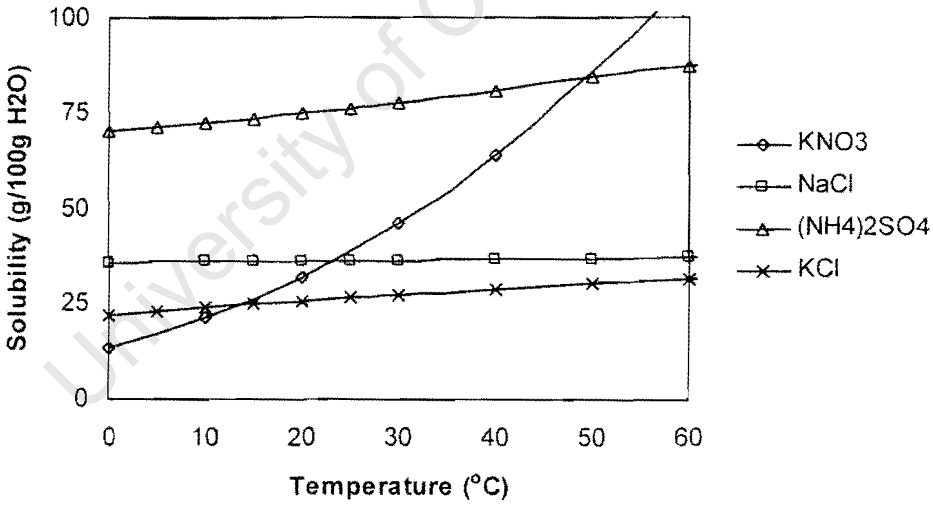

Figure 2-11: *Comparative solubilities of a few common ionic salts*

The brittleness of a crystal plays a large role in the degree of secondary nucleation that occurs due to attrition. The fact that potassium nitrate is much more brittle than ammonium sulphate means that there would be a much greater amount of self generated surface area for growth resulting from the attrition of the crystals in the suspension. This would affect the equilibrium sizes in the crystalliser and the role that nucleation would play in the development of the product crystal size distribution.

It was also important that the chosen model compound was cheap since large quantities would be used over the duration of the project. This was particularly relevant with a compound of high solubility since a greater mass of the substance would be required to reach saturation. Since potassium nitrate is a fairly widely used salt it was both cheap and easily accessible.

Other factors that influenced the choice were that potassium nitrate was of interest to one of the project sponsors, that the viscosity of the saturated solution was not too high, that it did not degrade over time and that it was prone to neither agglomeration nor scaling.

2.3. Growth rate measurement

A wide variety of experimental techniques for measuring crystal growth rates exist. Single crystal growth techniques are used for more fundamental studies of growth mechanisms as they can focus on single crystal faces. When the determination of overall mass transfer rates or the observation of size-dependent growth or growth rate dispersion is important, crystal population measurements are more useful. Population measurements are of great benefit to those designing crystallisers.

2.3.1. Crystal growth rate expressions

Unfortunately there is no simple or generally accepted method for the description of the growth rate of a crystal due to its complex dependence on temperature, supersaturation, size, habit, system turbulence, individual structure etc. For carefully defined conditions crystal growth rates can be expressed either in terms of mass deposition rate R_G ($kgm^{-2}s^{-1}$), a mean linear velocity $\bar{v}$ (ms^{-1}) or an overall linear growth rate G (ms^{-1}). These quantities are related as follows (Mullin, 1993),

$$R_G = K_G \Delta c^g = \frac{1}{A}\cdot\frac{dm}{dt} = \frac{3\alpha}{\beta}\cdot\rho_c G = \frac{3\alpha}{\beta}\rho_c\frac{dL}{dt} = \frac{6\alpha}{\beta}\cdot\rho_c\frac{dr}{dt} = \frac{6\alpha}{\beta}\cdot\rho_c\bar{v} \qquad (2\text{-}16)$$

where L is some characteristic size of the crystal, r is the radius of a sphere of equivalent volume, and ρ_c is the crystal density. α and β are the volume and surface shape factors respectively defined by $m = \alpha\rho_c L^3$ and $A = \beta L^2$ where m and A are the particle mass and area. $6\alpha/\beta = 1$ for spheres and cubes and 0.816 for octahedra.

2.3.2. Methods for determining growth rate

In crystalliser design the main concern is how crystals grow in the presence of other crystals. It is therefore both more useful and convenient to measure the overall crystal growth rate than it is to measure individual face growth rates.

The aim of this work was to provide information for the modelling of industrial crystallisers. Therefore all experiments considered the populations of crystals and the overall growth rate was of primary concern.

The following is a discussion of two possible methods for the determination of the overall growth rate, G, from population experiments.

2.3.2.1. Moment modelling

The roots of moment modelling are found in the Population Balance Equation, or PBE.

First introduced by Randolph (1962), the PBE describes the evolution of the crystal size distribution (CSD) and how the various kinetic processes that occur in the crystalliser affect this evolution. Thus, when a prediction of the CSD of the solid phase in a crystalliser is required, it is necessary to examine and solve the PBE.

The general form of the PBE is given below:

$$\frac{\partial(n(L,t)V(t))}{\partial t} = -V\frac{\partial(G_L(L,t)n(L,t))}{\partial L} + B(L,t)V - D(L,t)V + \sum_{j=1}^{m}\phi_{v,in,j}(t)n_{in,j}(L,t) - \sum_{k=1}^{p}\phi_{v,out,k}(t)h_{out,k}(L,t)n(L,t) \qquad (2\text{-}17)$$

where

n	particle number density	#.m^{-3}m^{-1}
L	particle length	m
t	time	s
V	crystalliser volume	m^3
G$_L$	linear size dependent growth rate	ms^{-1}
B	birth rate	m^{-3}m^{-1}s^{-1}
D	death rate	m^{-3}m^{-1}s^{-1}
ϕ_v	volumetric flow rates (in and out)	m^{3}s^{-1}
h	classification function	
m, p	# of streams entering and leaving the system	

Two boundary conditions are required to solve the PBE as it is a partial differential equation dependent on both time and length. The two boundary conditions are:

$$n(0,t) = \frac{B_0(t)}{G_L(0,t)} \qquad \text{and} \qquad n(L,0)$$

where n(L,0) is the initial distribution and n(0, t) describes the nucleation rate which is the birth of new crystals at size zero (van Rosmalen et al., 1997). The birth term in the first boundary condition, B_0 is related to B in the following way:

$$B_0(t) = \int_0^Y B(L,t)dL \tag{2-18}$$

The 2-l draft tube, baffled (DTB) crystalliser that was used for the investigation of the growth kinetics of potassium nitrate was operated in batch mode. For batch crystallisation the PBE can be simplified by assuming that:

i) nucleation is only reflected by a boundary condition at L=0 (the first boundary condition shown above),
ii) there is size-independent growth,
iii) there is no aggregation, and
iv) there is no breakage.

Each of these assumptions makes the approach less realistic. The first assumption is reasonable in that all of the experiments that were modelled in this way were seeded experiments and seeding occurred before any primary nucleation took place. The assumption that secondary nucleation was insignificant is justified by the low supersaturation levels and absence of a significant tail in the particle size distributions. Examining crystal samples under a scanning electron microscope (SEM) showed no aggregation and thereby validated the third assumption. The fourth assumption, however, is known to be a simplification because some breakage must occur when there is agitation with an impeller. However, in this small-scale case scenario, it is limited. The most significant assumption is that growth is size independent.

These assumptions result in the simplified PBE shown below:

$$\frac{\partial n(L,t)V(t)}{\partial t} = -VG_L(t)\frac{\partial n(L,t)}{\partial L} \tag{2-19}$$

Batch operation is at unsteady state and so the solution of the simplified PBE shown above involves solution of a partial differential equation. Analytical solutions for this type of problem rarely exist. It is possible, however, to transform the PBE into moment form. This allows a numerical solution of the partial differential equation that describes the dynamic behaviour of the crystalliser.

The Moment equations

The moments of a distribution are generally defined as:

$$m_j = \int_0^{\infty} n(L) L^j dL \tag{2-20}$$

where n is the particle number density (#$m^{-3}m^{-1}$) and L is the particle length (m). These moments can be related to lumped properties of the entire crystal population as shown in Table 2-3 (van Rosmalen et al., 1997).

***Table 2-3**: The moments of a size distribution*

m_0	Total number of particles per unit crystalliser volume	m^{-3}
m_1	Total length of particles per unit crystalliser volume	$m \cdot m^{-3}$
m_2	Related to the total area of particles per unit crystalliser volume	m^2m^{-3}
m_3	Related to the total volume of particles per unit crystalliser volume	m^3m^{-3}

The moment transformation of Equation 2-19 gives

$$\frac{d(Vm_j)}{dt} = jGm_{j-1}V + B_0 l_0^j V \tag{2-21}$$

where l_0 is the size of the nuclei, which in this case is zero. Now it is possible to solve the PBE (previously a partial differential equation) using only four ordinary differential equations – the zeroth (j=0) to third (j=3) moments (van Rosmalen et al., 1997). These are given below:

$$\frac{d(Vm_0)}{dt} = B_0 V \tag{2-22}$$

$$\frac{d(Vm_1)}{dt} = Gm_0 V \tag{2-23}$$

$$\frac{d(Vm_2)}{dt} = 2Gm_1 V \tag{2-24}$$

$$\frac{d(Vm_3)}{dt} = 3Gm_2 V \tag{2-25}$$

Equations 2-23, 2-24 and 2-25 show that the crystal growth rate, G, can be determined if any two consecutive moments are known. This is the basis for moment modelling.

The third moment is related to the mass of crystals in the slurry, which is easily calculated from the crystal content of the slurry.

Brown and Felton (1985) have shown that it is possible to use the obscuration signal and the corresponding crystal size distribution ($\Delta V(x_i,t)$) from a laser diffraction instrument (such as a Malvern Mastersizer) to calculate the mass of solids in the slurry – Equation 2-26 and 2-27.

$$M_T(t) = \rho_c V_c \frac{-\ln\left(\frac{I(t)}{I_0}\right)}{3\sum_{i=1}^{k} \Delta V(x_i,t)\frac{l}{d_i}} \tag{2-26}$$

and

$$obsc(t) = 1 - \frac{I(t)}{I_0} \tag{2-27}$$

where

M_T	total mass of solids in the crystalliser	kg
ρ_c	density of the crystals	kgm^{-3}
V_c	volume of crystalliser	m^3
ΔV	volume percent	
l	path length	m
d_i	mean crystal size of size class i	m
I(t)	intensity of refracted beam	Wm^{-2}
I_0	intensity of incident beam	Wm^{-2}
obsc(t)	obscuration signal	[-]

Putting Equations 2-26 and 2-27 together, taking out l from the summation and dividing by the density of the crystals (ρ_c) and the volume of the crystalliser (V_c) gives a expression for the absolute value of the particle concentration, C_v, in m^3 crystals per m^3 slurry:

$$C_v(t) = \frac{-\ln\left(\frac{I(t)}{I_0}\right)}{3l\sum_{i=1}^{k} \frac{\Delta V(x_i,t)}{d_i}} \tag{2-28}$$

C_v has the same units as m_3 but is in fact the absolute value, $m_{3,abs}$. Generally moments are normalised with respect to m_3. Hence the general moment expression can be written as Equation 2-29,

$$m_{j,norm} = \frac{\int_0^\infty n(x)x^j dx}{\int_0^\infty n(x)x^3 dx} \times 100 \tag{2-29}$$

The normalised third moment, $m_{3,norm}$, will therefore will always be equal to 100.

Malvern data is reported in terms of volume percent where V_i is the volume percent of crystals in size class i:

$$V_i(t) = \frac{N(i,t)x_m^3(i)}{\sum N(i,t)x_m^3(i)} \times 100 \tag{2-30}$$

where

N(i) # of particles in class i # m^{-3}

So the normalised third and second moments can be expressed as follows:

$$m_{3,norm}(t) = \frac{\int_0^\infty n(x)x^3 dx}{\int_0^\infty n(x)x^3 dx} \times 100 = \frac{\sum N(i,t)x_m^3(i)}{\sum N(i,t)x_m^3(i)} \times 100 = \sum V_i(t) \tag{2-31}$$

and

$$m_{2,norm}(t) = \frac{\int_0^\infty n(x)x^2 dx}{\int_0^\infty n(x)x^3 dx} \times 100 = \frac{\sum N(i,t)x_m^2(i)}{\sum N(i,t)x_m^3(i)} \times 100$$

$$= \sum \frac{N(i,t)x_m^3(i)}{\sum N(i,t)x_m^3(i)} \times \frac{1}{x_m(i)} = \sum \frac{V_i(t)}{x_m(i)} \tag{2-32}$$

For modelling of the absolute growth rate at a given time, the absolute moments hold more interest. As has been shown, the absolute m_3 can be calculated from the Brown and Felton correlation (Brown and Felton, 1985). Equation 2-33 shows a quick method to calculate the absolute second moment, $m_{2,abs}$.

$$m_{2,abs} = m_{3,abs} \times \sum \frac{V_i(t)}{100} \times \frac{1}{x_m(i)} = \frac{m_{3,abs}}{100} \times \sum \frac{V_i(t)}{x_m(i)} \tag{2-33}$$

Knowing the absolute second and third moments, the crystal growth rate is easily computed using the fourth ordinary differential equation (Equation 2-25) to solve the batch PBE. Equation 2-25 in this constant volume case simplifies to

$$\frac{dm_3}{dt} = 3Gm_2 \tag{2-34}$$

The growth rate, G, can then be expressed as

$$G(t) = \frac{\Delta m_{3,abs}}{\Delta t} \times \frac{1}{3m_{2,abs}(t)} \tag{2-35}$$

2.3.2.2. Lognormal curve fitting

The lognormal curve fitting method is a simple graphical technique used to predict the growth of the median sized crystals (Butler, 1998). It relies on the raw data measured by the Malvern Mastersizer. The procedure is given below:

i) The Malvern records showing an obscuration of less than 10% or more than 30% were ignored due to unreliable light scattering;

ii) The volume fractions for crystal sizes below 30μm were ignored (because they appeared to contain errors) and the remaining volume fractions were renormalised;

iii) The Malvern automatically measured every 30 seconds, so there is often an excess of data. One measurement was selected at every 10μm increase in the median size reported by the Malvern.

iv) The volume density crystal size distributions for each of these selected measurements were imported into the curve fitting program, Table Curve 1.0, and fitted with a lognormal curve (Equation 2-36)

$$y = ae^{-0.5\left[\left(\ln\frac{x}{b}\right)/c\right]^2} \tag{2-36}$$

where a is the height of the curve, b is the median crystal size and c is the spread (equal to 2·ln(std.dev)) which is proportional to the standard deviation of the curve. Figure 2-12 shows an example of this fitting method with results from Experiment 1. The fit gave the following parameters:

a = 0.570

b = 146.7

c = 0.456

v) The growth rate can be determined from the median sizes by Equation 2-37

$$G = \frac{L_2 - L_1}{t_2 - t_1} \qquad (2\text{-}37)$$

where L_i is the median at t_i

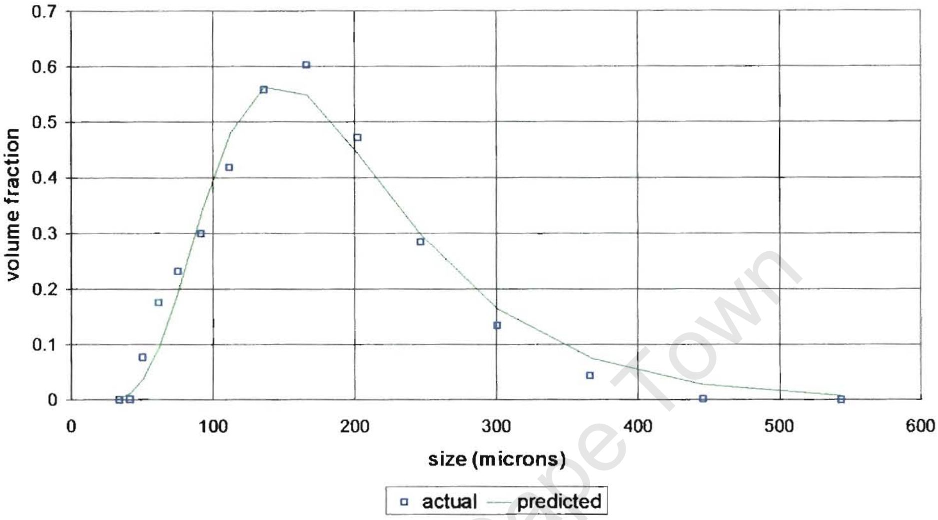

Figure 2-12: An example of a lognormal curve fitted to a set of Malvern data measured during Experiment 1

The lognormal curve fitting method however, is not perfect. By fitting lognormal curves and recording only the time of the measurement and the median size of the fit there is an intrinsic assumption made. The median sized crystals at the beginning of the experiment are assumed to be the same median sized crystals at the middle and end of the experiment, thus assuming size independent growth. This assumption needs to be validated by using a size dependent growth-determining model.

Another assumption that this method makes is that the distribution is always lognormal. Within this there is an intrinsic assumption that no nucleation occurs after seeding which could create a second peak in the distribution. This is a reasonable assumption as supersaturation levels were kept low and no significant tail was observed in any of the particle size distributions.

Chapter Three

Supersaturation measurement

The supersaturation of the crystallising solution is the most significant of all the variables affecting the crystal growth rate. In-line measurement of this variable is therefore of great value. The relative supersaturation (σ) of a system is defined by Equation 3-1 which shows that it involves both the equilibrium concentration (c*) and the real concentration (c).

$$\sigma = \frac{c - c^*}{c^*} \tag{3-1}$$

The equilibrium concentration, otherwise known as solubility, is dependent on the temperature of the solution. It can be determined by measuring the solution temperature once the relationship between solubility and temperature is known.

The measurement of the solution concentration can be made by either direct or indirect methods. Direct measurement involves either gravimetric or chemical analysis of the solution while indirect measurement relies on the measurement of a physical property of the solution that is highly dependent on the solution concentration. Frequently chosen examples of such properties include viscosity, refractive index, electrical conductivity and density.

This chapter deals with the methods used in this work to determine the relative supersaturation. It focuses on the calibration of the density meter used to measure the solution concentration and the development of a new solubility curve for potassium nitrate.

3.1. The concentration measuring device

A device used to determine the concentration of a solution was developed at the Laboratory for Process Equipment (Neumann, 1998). It is in essence a temperature controlled density meter. The density of a sample of crystal free mother liquor is measured at a fixed temperature. This temperature is always slightly higher than that of the crystalliser (usually at 60 °C) to avoid the possibility of blockages forming within the device. A water bath maintains the required temperature. The measurement is achieved by comparing the sample of mother liquor with a reference sample stored within the density meter.

A relation must therefore be found for the solution concentration as a function of temperature and density to make the density measurements meaningful. The method and results of this calibration procedure is discussed below.

3.1.1. The calibration method

It is vital that the calibration is made over the applicable range of concentrations. This range is dictated by the solubility of the solution at and around the temperatures that the 1100-litre DTB crystalliser and 2-litre crystalliser are operated. Different concentration ranges were used for the two potassium nitrate types (Industick and Haifa).

The concentration range used for the Industick calibration was between 35.1 wt % and 50.5 wt %. This was calculated from the solubilities at 35 °C and 55 °C plus 5% broadening at each extreme. Ten solutions of varying concentrations over this range were made up as shown in Table 3-1.

As with the solubility measurements, the calibration curve developed for Haifa potassium nitrate had a smaller range than the Industick calibration curve. This was possible because the precise operating temperature range of the density meter and the actual concentration range within the crystalliser were now known. Table 3-1 shows the four Haifa solutions ranging from 39 wt % to 49 wt %.

***Table 3-1**: The concentration standards used for the Industick and Haifa calibrations*

Sample number	1	2	3	4	5	6	7	8	9	10
Industick conc (wt%)	35.1	37.5	39.4	41.2	42.9	44.4	45.9	47.4	48.7	50.5
Haifa conc (wt%)	39.4			42.9			45.8			48.8

The method of making up the solutions was as follows:
A one kilogram sample of potassium nitrate salt was put in the oven at 60°C for half an hour to dry and then allowed to cool to room temperature in a dessicator. A known mass of the dry salt together with a known mass of distilled water was then placed into a pre-weighed conical flask. The exact concentration of the solution was then known.

Temperature fluctuations of the density cell occur and, because density is so closely related to temperature, the effect on the measured value is significant. To quantify this effect the densities of the ten concentrations were measured at three different temperatures: 55 °C, 60 °C, and 65 °C for Industick KNO_3 and 57.5 °C, 60 °C and 62.5 °C for the Haifa KNO_3.

The density meter was set at the desired temperature and allowed to stabilise for two hours before measurements were begun. The flasks were placed in a temperature-controlled bath set at the same temperature and shaken until all of the crystals dissolved. Three density readings of each solution were recorded. The process was repeated for each temperature.

3.1.2. The calibration results

The results from the calibration process gave density measurements for several known concentrations of potassium nitrate solution at three different temperatures. This allowed for the development of an equation expressing concentration as a function of both temperature and density, i.e. C = F (ρ, T).

The measured data for the potassium nitrate produced by both Industick GmbH and Haifa Chemicals can be found in Appendix 2 (Tables 2, 3 and 4). From this data, correlations (shown as Equation 3-2 and Equation 3-3) were developed to describe the C-T-ρ relationships for Industick potassium nitrate and the Haifa potassium nitrate respectively. Pastifit, the fitting package, is a non-linear regression package based on the Levenberg-Marquardt algorithm (Verheijen, 1999).

$$C = -98.9 + 99.9\rho^{5.95\times10^{-3}} - 1000T^{-2.55} - 0.828\rho^{-1.17}T^{3.21\times10^{-2}} \tag{3-2}$$

$54.8 < T < 64.8$

$0.98 < \rho < 1.36$

average relative error in C = 0.11% over the entire temperature range and average relative error in C = 0.094% at 60 °C (temperature most frequently used)

$$C = -80181.647 - 698.05\rho^{0.4968} + 174200.2T^{-0.0262634} - 94472.5\rho^{-7.124\times10^{-3}}T^{-5.4555\times10^{-2}} \tag{3-3}$$

$57.3 < T < 62.3$

$0.98 < \rho < 1.35$

average relative error in C = 0.12% over the entire range (see Appendix 5)

where: C: concentration (weight %)
ρ: density (kg/l)
T: temperature (°C)

It was expected that the error for Equation 3-3 would be smaller than that for Equation 3-2 because of the narrower experimental range. It can be seen that this is not the case. This can be attributed to the variation in the purity of the potassium nitrate samples (see Appendix 3). These C-ρ-T relationships can also be shown as surfaces. Figure 3-1 shows the surface for the Industick plane.

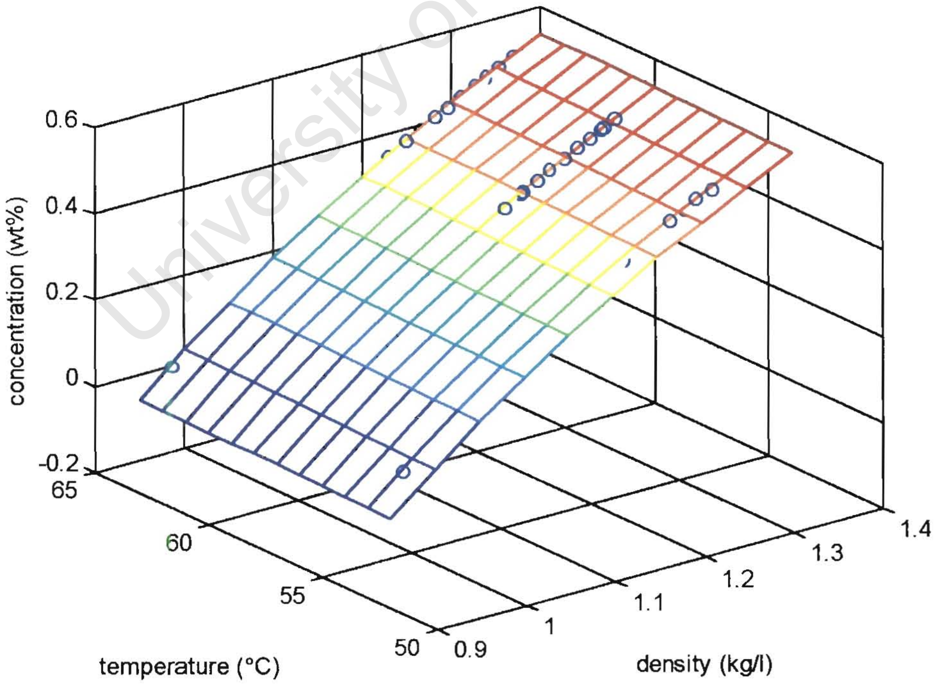

***Figure 3-1**: The concentration-temperature-density relationship for Industick potassium nitrate depicted as a surface in space*

3.2. The solubility of potassium nitrate

Past experience has shown that the source of the solute affects its purity, which in turn often significantly affects the solubility. This section deals with the determination of solubility curves for both of the potassium nitrate products used in this work; Industick GmbH and Haifa Chemicals.

3.2.1. The Method

The method used to generate the solubility curves was similar for both types of potassium nitrate. The procedure for the development of the Industick GmbH KNO_3 solubility curve is detailed below. The differences for the Haifa Chemicals KNO_3 measurements are noted afterwards.

Two sets of solubility measurements were carried out using Industick potassium nitrate. The method for the first set of measurements was as follows:

A potassium nitrate-water solution with excess potassium nitrate was made up in a two-litre, temperature controlled vessel. An excess of potassium nitrate was to ensure that ample solids remained at 80 °C. The slurry was then stirred continuously, heated to 60 °C and allowed to stabilise. The solution's temperature set point was programmed for a step decrease of 5 °C every hour. The solution was given enough time, at each temperature interval, to reach equilibrium. Density was measured continuously. In this way the density of a saturated solution was measured at 5 °C intervals between 60 °C and 30 °C. The process was then repeated with an increasing temperature profile between 30 °C and 60 °C.

The second set of measurements with Industick potassium nitrate was carried out in an identical manner with the exception of the initial solution's preparation. The second solution was prepared in the laboratory to be saturated (according to literature) at 70 °C; the solution was then superheated to 80 °C and filtered through 3.0 μm filter paper. When filtered, a brown foamy impurity was removed. The density of this filtered solution was measured, at different temperatures, using the method described above. This was performed so that the effect of macroscopic impurities (> 3μm) on the solubility could be established.

The solubility measurements for Haifa Chemicals potassium nitrate were limited to a filtered cooling run with a temperature range between 52 °C and 48 °C. This adjustment increased the accuracy of the solubility curve by constraining the area of interest to only what is used in the cooling crystallisation experiments.

3.2.2. The Results

The correlation developed for the density meter made it possible to find the solubility curve for the KNO_3-H_2O system. Each equilibrium density measurement (with the associated cell temperature) could be related to the corresponding equilibrium concentration.

Figure 3-2 shows the general shape of the solubility curve. It compares the measured cooling and heating solubility data for Industick potassium nitrate with that presented in literature. Notice that the difference in solubilities seems particularly slight on this scale. However small the differences may seem, when dealing with the low supersaturations involved in cooling crystallisation experiments (in the order of 0.2%) these slight variations can have significant consequences. Figure 3-3 shows these variations more clearly as it plots the difference between the solubility measured experimentally and that calculated using the correlation of solubilities reported in the literature, Equation 2-14.

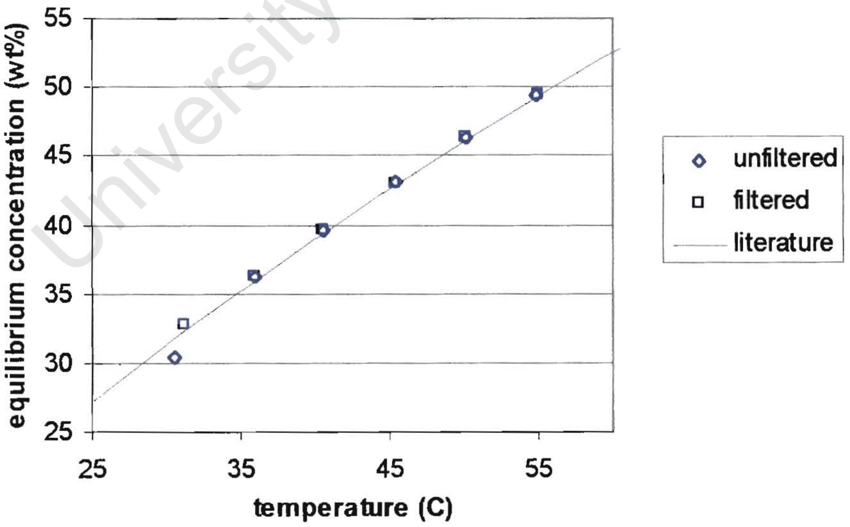

Figure 3-2: The cooling solubility of Industick potassium nitrate

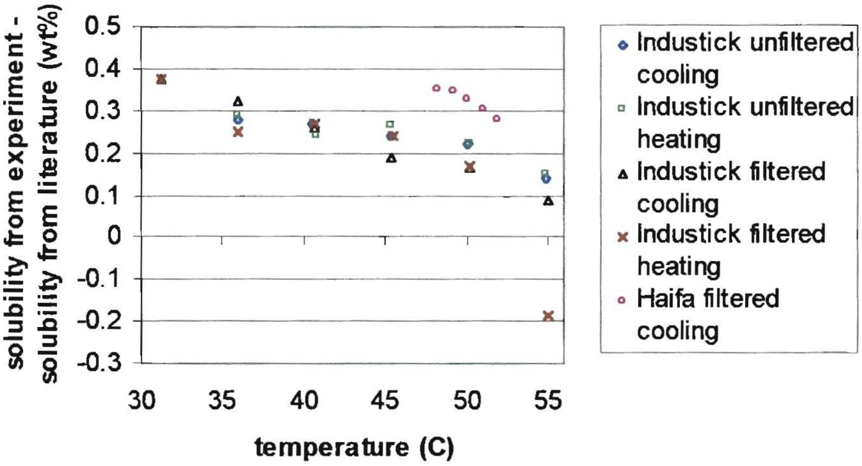

***Figure 3-3**: The difference between the solubility of potassium nitrate found in literature and that found by experiment*

The solubility of the filtered Industick solution, measured on a heating profile at 35 °C is significantly different to all the other points. It appears to be an outlier rather than a true solubility. Perhaps insufficient potassium nitrate remained for the solubility concentration to be quickly attained. All further analysis will ignore this point.

Figure 3-3 shows no significant difference in the solubility of potassium nitrate whether it is determined by heating or cooling the system. This adds validity to the measured solubility curve showing that enough time was given between measurements for the system to reach equilibrium.

The macroscopic impurities in the potassium nitrate sample do not significantly affect the solubility of the salt. Therefore the solubility used for calculation of the supersaturation of the crystallising system will be reliable whether the solution has been filtered or not. This has particular relevance in the 1100 litre experiments where good filtration is difficult.

A significant difference in the solubility of potassium nitrate produced by Industick GmbH and Haifa Chemicals is shown in Figure 3-3. The potassium nitrate produced by Industick contained an anti-caking agent and is reported as being 99.5% pure while the Haifa salt had no anti-caking agent and was reported as being 99.8% pure. This difference in purity (and hence the presence of more soluble impurities) in the Industick salt could be the cause of the difference in the solubilities shown in

Figure 3-3. For more detailed information on the purity of the two salts see Appendix 3, Tables 1 and 2.

Figure 3-3 also shows that the temperature range over which the solubility measurements for Haifa Chemicals KNO_3 were taken was much narrower. This was done once the exact temperature range for the experiments was known. The narrower range makes the solubility prediction more focussed and reliable.

All experimentally determined solubilities lie significantly above those presented in literature (except the outlier at 55 °C) and the difference is greater at lower temperatures. This observation, along with the solubility difference between the two potassium nitrate sources, verifies the importance of conducting these experiments. Without an accurate solubility curve it is very difficult to conduct meaningful growth rate experiments. The use of the literature data would have led to incorrect reporting of the growth rate. The experimentally determined solubility-temperature relationships must be used for the potassium nitrate growth rate experiments.

The quadratic equations shown in Table 3-2 (Table Curve Windows v 1.0) were fitted to the collected experimental data.

***Table 3-2**: Solubility curves for potassium nitrate*

KNO_3 source	**Equation**	**a.r.e**	**r^2 fit**	**Eqn**
Industick filt cooling	$S=-2.82*10^{-3}T^2+0.95T+5.765$	0.30%	0.999	3-4
Industick unfilt cooling	$S=-9.378*10^{-3}T^2+1.5653T-8.365$	0.52%	0.998	3-5
Haifa filt cooling	$S=-5.66*10^{-3}T^2+1.223T-0.598$	0.01%	0.999	3-6

The units of the equations:

S	solubility	wt %
T	temperature	°C
a.r.e.	average relative error	% (see Appendix 5)

For the two litre experiments both the Industick filtered and Haifa filtered equations were used depending on the source used in the experiment being run. All experiments on the 1100 litre scale were with Haifa salt and so Equation 3-6 was used.

Chapter Four

The 2-litre Growth Cell Experiments

4.1. Experimental Equipment

The jacketed, batch, two-litre draft tube baffled (DTB) cooling crystalliser system used to carry out these experiments is shown in Figure 4-1. A Lauda UKS 1000 water bath with linked computer facilitated the cooling of the crystalliser contents at a user defined rate. Crystal growth was monitored using on-line particle sizing, density and temperature measurements.

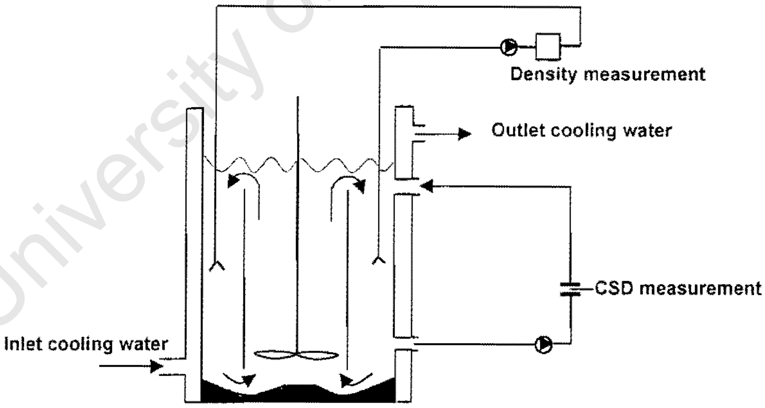

__Figure 4-1__: The jacketed, batch, two-litre cooling crystalliser used for this work

The on-line particle sizing was achieved with a Malvern Mastersizer, using laser defraction, by continuous circulation of the slurry through its measurement cell. A Watson-Marlow peristaltic pump maintained this circulation. Size distributions, at set time intervals, were later calculated from the stored optical scattering data. The on-line concentration measurements were performed using a temperature controlled

Anton Paar mPDS 2000 density meter. A computer controlled the circulation and injection of the filtered solution (5 μm filters) and stored the measured data for later analysis. The temperature of the solution was measured with a F250 MK II precision thermometer.

4.2. Experimental procedure

During the course of this investigation numerous experiments were carried out to investigate the growth behaviour of KNO_3 crystals in an aqueous solution. Four successful seeded experiments are reported here.

4.2.1. General procedure

i) An aqueous potassium nitrate solution was prepared to be 0.5% supersaturated at 50°C and then heated by 10 °C;

ii) The solution was filtered through a 3 μm filter;

iii) It was then cooled to the desired temperature (approximately 50°C) and allowed to stabilise in the growth cell;

iv) 1.133 - 1.359 g of potassium nitrate seeds (75-106 μm) were added. The seeds were obtained by taking a 500g sample from the raw crystal mass supplied by Industick or Haifa and sieving for 30 minutes. The time of the seed addition was designated as time zero.

v) A temperature ramp of - 0.025 °C/min was applied for 40 min;

vi) Where possible, it was allowed to stabilise for about 20 min and a second temperature ramp was applied.

4.2.2. Experimental details

Experiments 1 and 2 are duplicates while Experiments 3 and 4 each highlight the effect of a particular variable. Major variables were the source of KNO_3 and the type of water used. Table 4-1 shows these variations.

***Table 4-1**: A summary of the four potassium nitrate growth experiments*

Experiment #	Seeded	Type of water	purity of KNO_3
1	yes	demineralised	99.8%
2	yes	demineralised	99.8%
3	yes	demineralised	99.5% - due to anti-caking agent
4	yes	tap water	99.8%

See Appendix 3 for a description of the composition of the two KNO_3 types and Appendix 4 for a list of the impurities found in both tap and demineralised water.

Other small variations between experiments were found in the initial concentration of the solution, the amount of seeds used and the temperature profile used. These are reported in Appendix 2. For all experiments the impeller speed was set at 600 rpm - an empirically determined rate: the minimum to just keep the growing crystals in suspension. The crystal attrition rate increases with increasing impeller speed. It is particularly important therefore when measuring growth rate that the minimum speed is used.

4.3. Results

Numerous experiments were carried out during this investigation into the growth behaviour of potassium nitrate crystals in an aqueous solution. Due primarily to abundant nucleation in the unseeded runs and trouble with the on-line logging of data, only the four successful seeded experiments will be reported here.

Each experiment produces vast quantities of raw data and a number of steps are required to transform each raw data set (temperatures, densities and crystal size distributions) into the final growth vs supersaturation plots. A full, step by step illustration of how this transformation is achieved is given below in section 4.3.1 using the data set collected for Experiment 1. Only the final growth rate versus supersaturation plots for each of Experiments 2 to 4 will be shown thereafter.

4.3.1. Worked Example: Experiment 1

As has been described in section 4.1 the two-litre crystalliser system has two in-line measuring instruments. The first is a Malvern Mastersizer that reports the crystal size distribution (CSD) and obscuration and the second is the density meter, which is used to measure the concentration of the solution. Both instruments take measurements at discrete time intervals.

4.3.1.1. The Malvern Mastersizer

The forward light scattering Malvern Mastersizer records three sets of data that were of particular interest: the crystal size distribution (CSD), the obscuration of the laser light and the median crystal size (calculated from the CSD). A measurement was taken every thirty seconds. Due to the long time periods of some experiments, this instrument generates vast quantities of information. A manual selection of the total number of data sets were made after the experiment ended. The selection process aimed at even spacing of the CSDs. Figure 4-2 shows the reduced set of normalised CSD data extracted from the Malvern for Experiment 1.

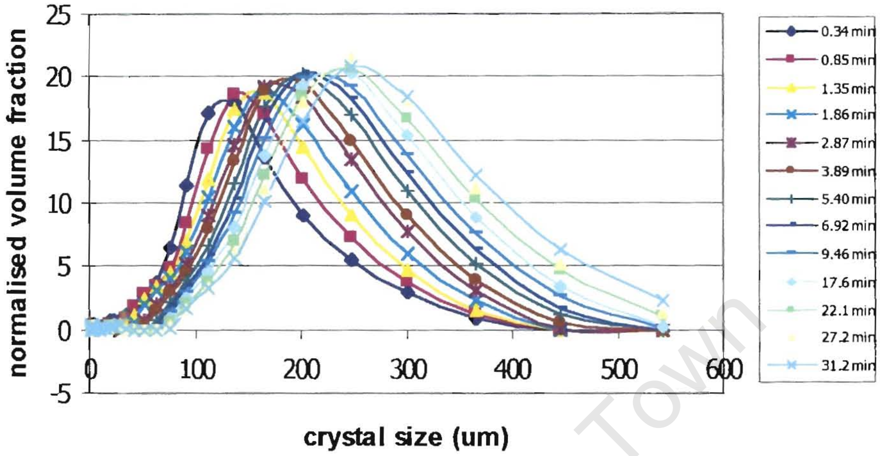

Figure 4-2: *The raw crystal size distribution from the Malvern Mastersizer for Experiment 1. The legend represents the time after seeding in minutes.*

Figure 4-3 shows the percentage obscuration of the light signal together with the median crystal size as calculated by the Malvern. The obscuration is a measure of the amount of light that is scattered by the crystals as the laser beam passes through the crystal slurry. This is thus naturally a function of the crystal content of the slurry. Brown and Felton (1985) have shown that it is possible to calculate the mass of crystals in the slurry if the CSD and the obscuration are known.

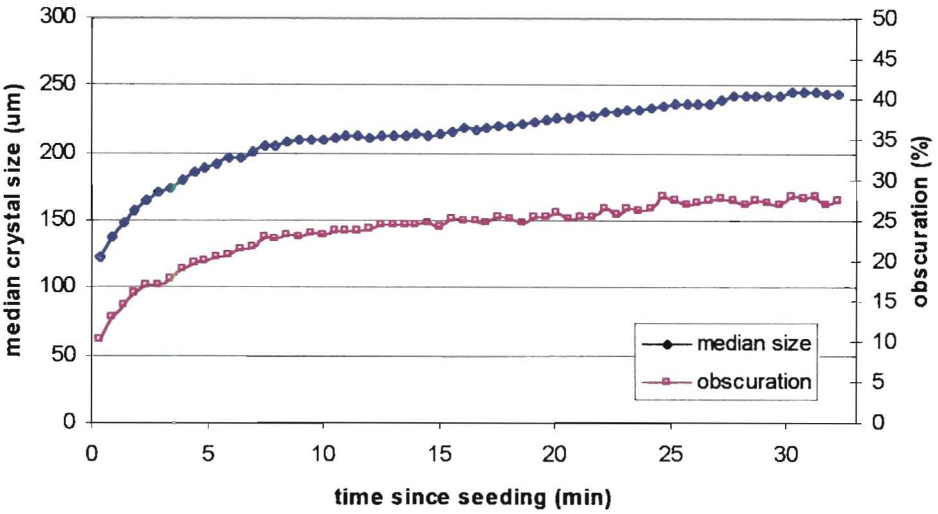

***Figure 4-3**: The median crystal size and the obscuration of the laser signal during Experiment 1*

Measurements between 5 and 30% for the obscuration are generally accepted (Boxman, 1992). Above and below these values there are too many or too few crystals for an accurate CSD measurement. Combining the CSD and the obscuration, using the methods set out in the modelling theory (section 2.3.2.1), allows for the determination of the moments for each CSD and thus the prediction of the growth rate.

Figure 4-4 shows the results of the moment modelling of the crystal growth. Notice the large amounts of noise in the raw growth function. This is due to the numerical integration procedure, which is inherently sensitive to the noise on the experimental data (Jager, 1990). It was found that the majority of the noise in the growth function was due to the noise in the third moment. Smoothing of the third moments (using a moving average of 5) results in a much smoother growth function as shown by the 'smoothed' curve.

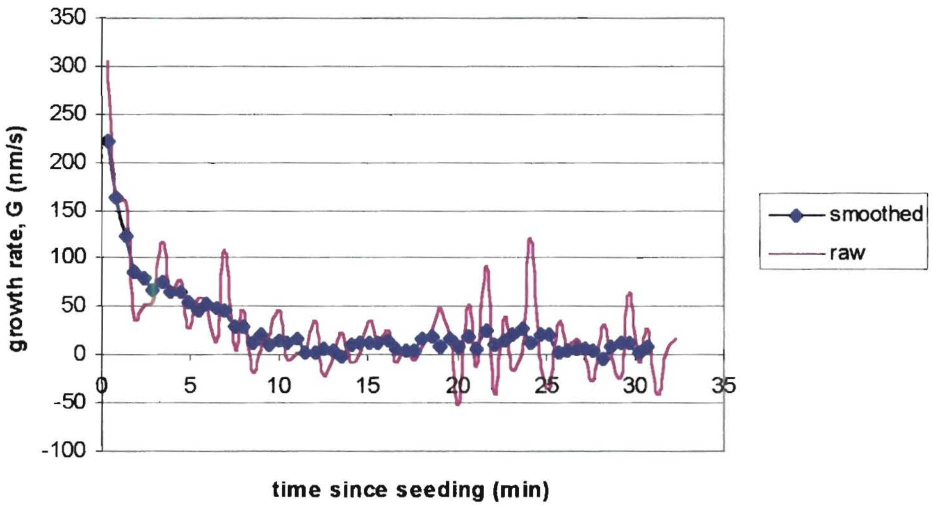

***Figure 4-4**: The crystal growth rate determined by moment modelling for Experiment 1.*

4.3.1.2. The Density Meter

The second measurement instrument, the MPS 2000 density meter, measures two pieces of raw data: the density of the crystalliser solution and the temperature of the density meter measurement cell. These two sets of data are logged at 3-minute intervals. They are presented together in Figure 4-5. The combination of this raw data with the calibration curve described by Equation 3-2 or 3-3 (depending on the source of the potassium nitrate being used) gives the concentration of the crystalliser solution. The corresponding concentration profile For Experiment 1 is given in Figure 4-6.

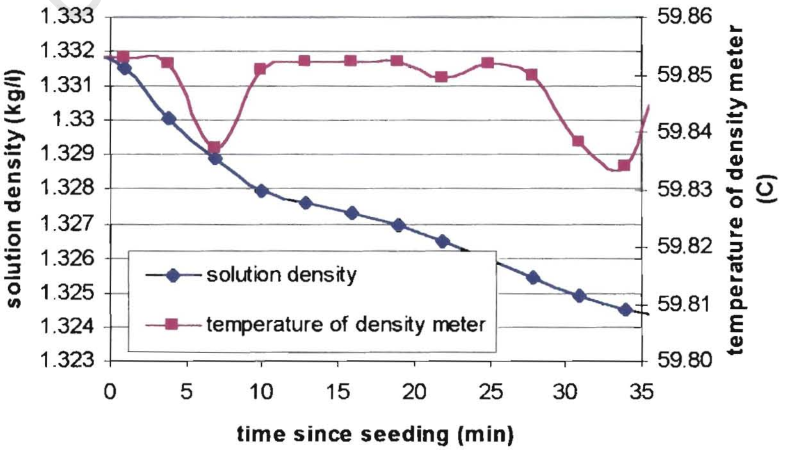

***Figure 4-5**: The raw data from the density meter for Experiment 1*

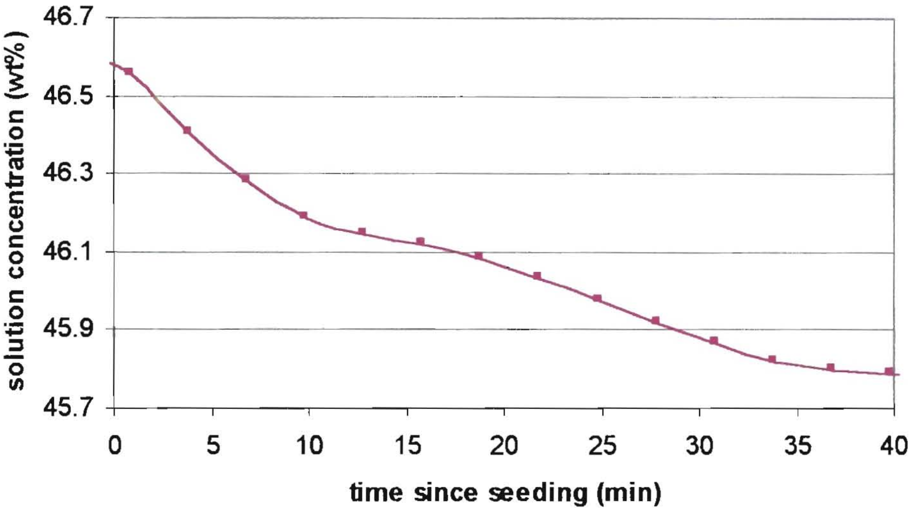

***Figure 4-6**: The concentration of the crystalliser solution during Experiment 1*

The third piece of information logged independently by the density meter computer is the temperature of the crystalliser as measured by the high precision temperature probe. The equilibrium potassium nitrate concentration is calculated using this temperature and the solubility curve described by the appropriate equation from Table 3-2. The logged crystalliser temperature data, the equilibrium concentration and the solution concentration for Experiment 1 are shown in Figure 4-7.

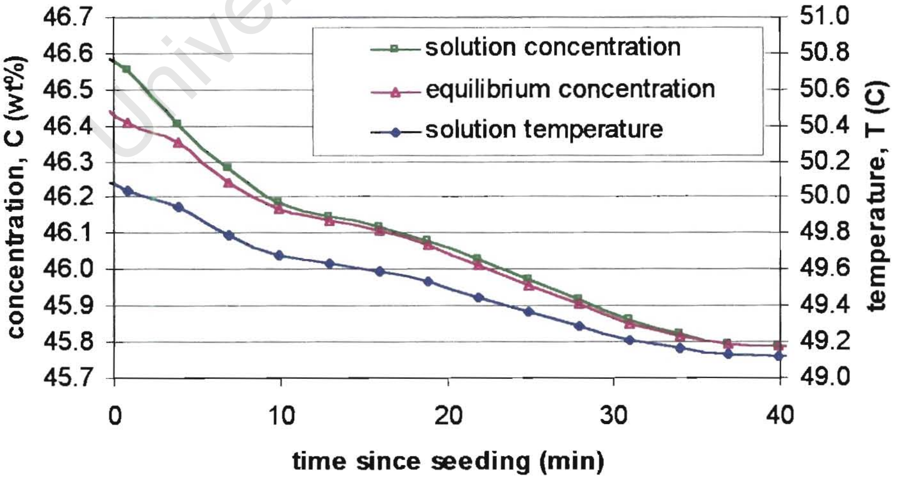

***Figure 4-7**: The actual and equilibrium crystalliser concentrations shown together with the temperature profile for Experiment 1*

The difference between the actual crystalliser concentration and the equilibrium concentration is the absolute supersaturation of the KNO_3 solution in the crystalliser. The supersaturation is a maximum at the beginning of the experiment and decreases to zero as the temperature stabilises at the end of the experiment. Figure 4-8 shows the relative supersaturation with time. Notice how it decreases to zero from 33 minutes after seeding onwards as the temperature stabilises.

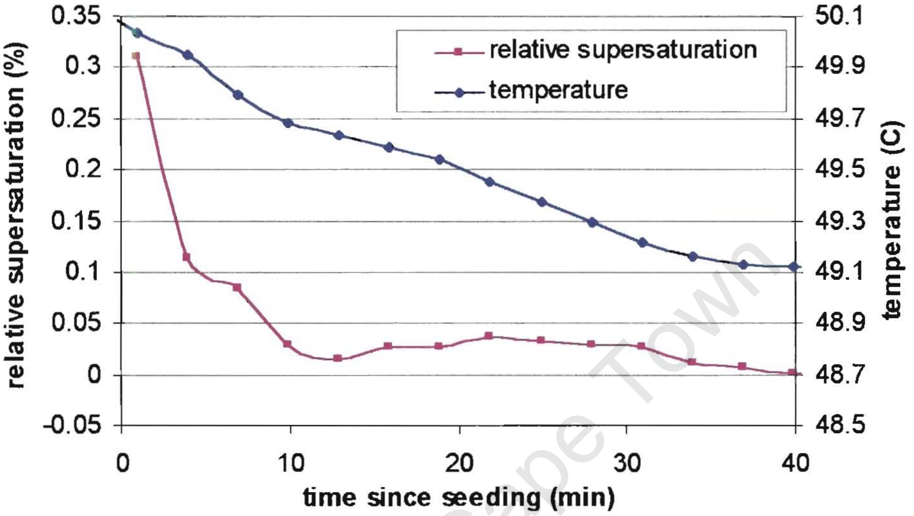

***Figure 4-8**: The relative supersaturation of the crystalliser solution for Experiment 1*

As described earlier, a generic solubility curve was found for potassium nitrate in demineralised water. It was found that the solubility varied slightly from experiment to experiment. Making sure that the supersaturation reduced to zero as the temperature stabilised was a useful method to check that the solubility curve was accurate.

Combining Figure 4-4 and Figure 4-8 gives the desired growth rate versus supersaturation plot from which the value of the growth constant (k_g) and growth parameter (n) can be determined. Only this growth rate versus supersaturation plot will be shown and discussed for each of the experiments in the following sections of this chapter.

4.3.2. Experiment 1

Figure 4-9 shows the growth rate data obtained by moment modelling (see section 2.3.2.1) for Experiment 1, a seeded experiment run with demineralised water and KNO_3 (Haifa Chemicals).

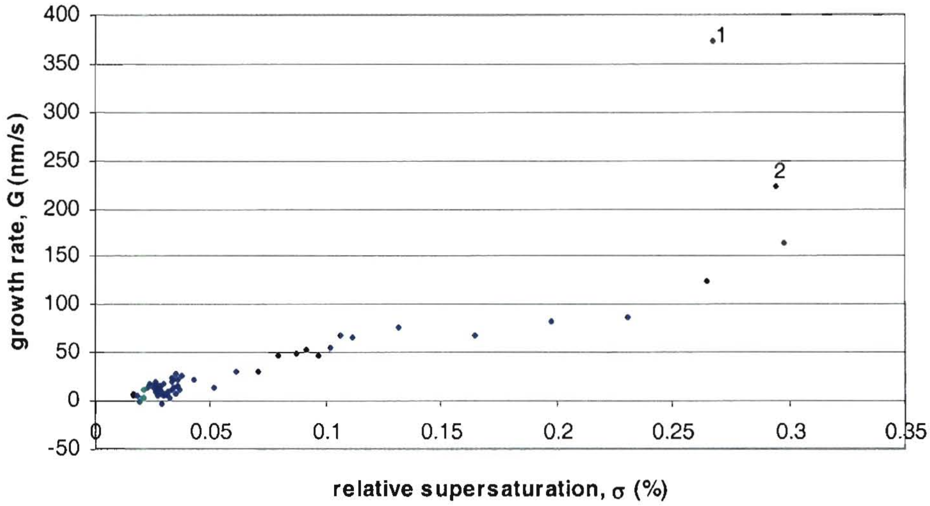

Figure 4-9: *The KNO_3 crystal growth rate for Experiment 1 expressed as a function of supersaturation*

Notice that the initial two points (marked 1 and 2) show growth rates over double and triple the average growth rate. This phenomenon is common in seeding experiments. Seed crystals are often broken or imperfect structures (see Figure 4-10). The high initial growth rate is due to the seed crystals first repairing their own crystal lattices before further "normal" growth occurs (Mersmann, 1995 and Herden et al, 1997).

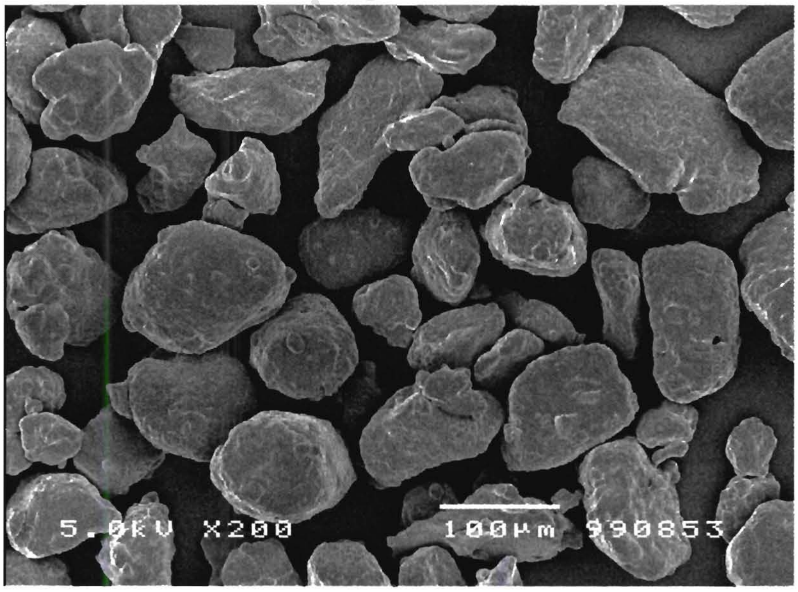

Figure 4-10: *A scanning electron microscope photograph of the KNO_3 seed crystals used in experiments 1,2 and 4 (Haifa Chemicals). The magnification is 200 times.*

This dissertation is interested solely in the growth of "structurally complete" crystals. In this context "structurally complete" means crystals that are predominantly undamaged i.e. in their natural shape. Since these first two points do not form part of this type of growth they are considered outliers.

There are relatively few points at the higher supersaturations while at the low supersaturations there is a cluster of points. This is due to the way in which the experiment naturally proceeds.

The experiment is set up to start with a high supersaturation. As soon as the seeds are added they begin their rapid growth and so consume this supersaturation quickly. The linear cooling ramp produces a constant supply of supersaturation but because the crystals are growing steadily there is an increasingly greater surface area on which further growth can take place. Supply of supersaturation therefore is short of the demand and as a result the supersaturation decreases over time to close to zero. The majority of the experiment thus takes place while the supersaturation is at the lower end of the scale.

Figure 4-11 shows how the experimental data can be fitted to the general growth rate equation (Equation 4-1).

$$G = k_g \sigma^n \tag{4-1}$$

A line of best fit (r^2=0.926) gave the following growth parameters:

k_g	$= 5.0 \cdot 10^{-7} \pm 4 \cdot 10^{-8}$	$[ms^{-1}]$
n	$= 1.04 \pm 4 \cdot 10^{-2}$	[-]

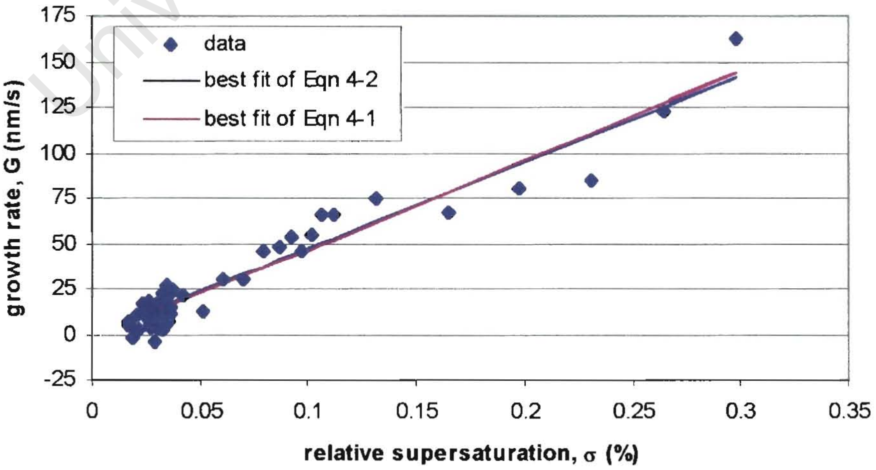

***Figure 4-11**: Shows the fit of Equation 4-1 to the experimental data by linear regression (Table Curve). It also shows the fit of the simplified diffusion limited form of the equation, Equation 4-2*

Crystal growth from a solution is generally classed as either mass diffusion limited or surface integration limited. By fitting the general growth equation to the data and checking the value of the growth parameter, n, the distinction between these limiting steps can easily be determined. If the growth rate is directly proportional to the supersaturation (i.e. n=1) then the growth is mass diffusion limited. If the growth rate is proportional to the square of the supersaturation (n=2) then the growth is surface integration limited (van Rosmalen, 1997). Rolfs et al. (1997) goes further, stating that, if $n \leq 2$, spiral growth can be expected while when $n > 2$ growth occurs via two-dimensional nuclei.

Figure 4-11 shows that growth is directly proportional to the supersaturation within the calculated error ($n = 1.04 \pm 4 \cdot 10^{-2}$). Growth of potassium nitrate crystals from an aqueous solution at 50 °C is thus mass diffusion limited.

When the data is refitted using a first order growth rate versus supersaturation relationship, Equation 4-2, the result is the almost indistinguishable second trend shown in Figure 4-11 with a new k_g value of $4.8 \cdot 10^{-7} \pm 0.1^{-7}$ ms^{-1} (r^2=0.925).

$$G = k_g \sigma \tag{4-2}$$

This second fit will be used as a "base case" fit to compare with the other experimental results. The other experiments will also be fitted with the simplified diffusion limited equation, Equation 4-2, which fits the data well.

4.4.3. Experiment 2

Experiment 2 was run as a duplicate of Experiment 1 to check the reproducibility of the experimentally determined growth rate. Figure 4-12 shows the data for Experiment 2 fitted with the diffusion limited trend.

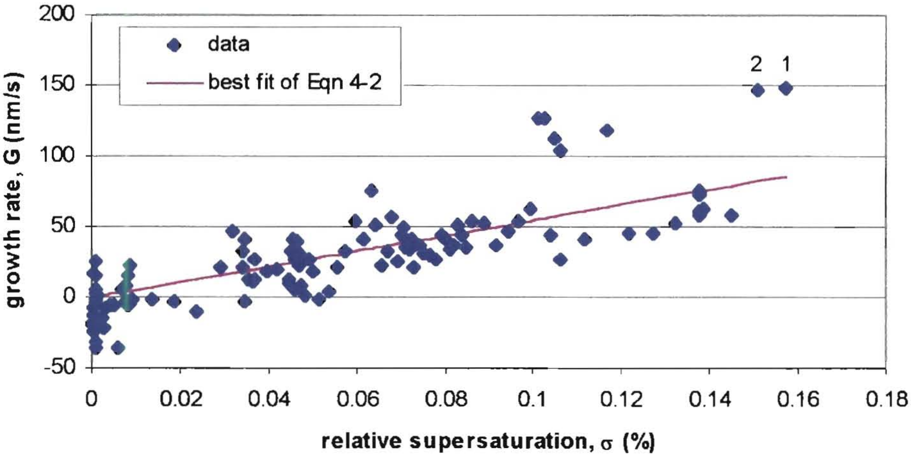

***Figure 4-12**: The KNO_3 crystal growth rate for Experiment 2 expressed as a function of supersaturation*

Once again the initial two points (labelled 1 and 2) have a much higher growth rate. Again these first two points were identified as outliers due to the repair of the seed crystal lattices. The fitted trend confirms the results of Experiment. Again the mass diffusion limited growth assumption appears to be justified. The best fit of Equation 4-2 to the data from Experiment 2 gives a k_g value of $5.5 \cdot 10^{-7} \pm 0.3 \cdot 10^{-7}$ ms^{-1} (r^2=0.624). Some of the scatter of the points (particularly around zero supersaturation) can be attributed to the noisy moment functions (Jager, 1990).

Figure 4-13 shows a comparison of the trend found for Experiment 1 with that found for Experiment 2. Notice that the slope (k_g value) of Experiment 2 is slightly greater than that of Experiment 1. This can be attributed to the unexpectedly high growth rate attributed to five of the points lying in the range of 0.1 – 0.2 % supersaturation. Excluding these points the k_g value becomes $4.9 \cdot 10^{-7} \pm 0.2 \cdot 10^{-7}$ ms^{-1}. Within the calculated error bound these growth rates are the same.

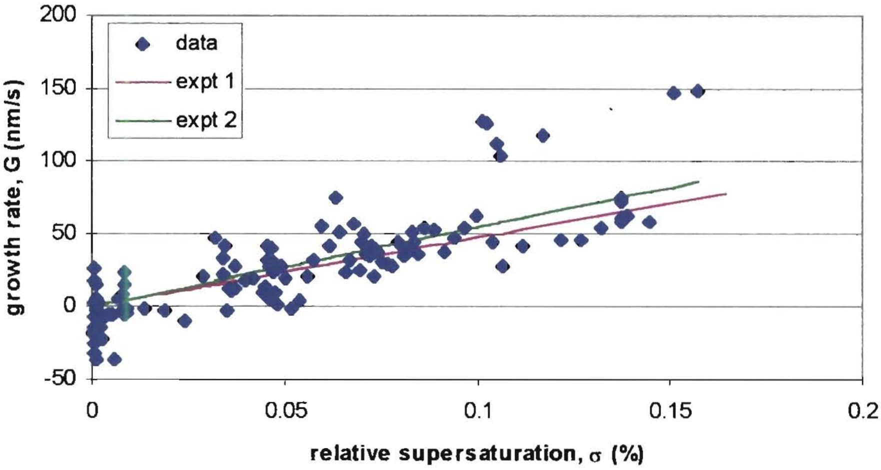

***Figure 4-13**: A comparison of the results of Experiment 1 with those of Experiment 2 presented with the data from Experiment 2.*

4.4.4. Experiment 3

Experiment 3 was run to quantify the changes that the source of the KNO_3 salt would have on the crystal growth rate from solution. The KNO_3 produced by Industick GmbH, although having similar purity specifications, has different impurities to the same salt produced by Haifa Chemicals. The most notable difference between the two is that the Industick salt contains an anti-caking agent (0.3-0.6% [w/w] sulphobutanaphtol), while the Haifa chemicals salt does not. A list of impurities for both of the salts can be found in Appendix 3.

Experiment 3 was run with Industick KNO_3 to compare with Experiments 1 and 2 which were run with Haifa KNO_3. Figure 4-14 shows the growth rate results.

Again high growth rates correspond to the first few measured values. If this is attributed to seed repair then the longer period may be due to the low supersaturation at the time of seeding. This could cause the repair process to take longer, almost up until the time for the supersaturation to reach its maximum level (σ = 0.15%). The long period could also be due to the different nature of the seeds used. The seeds prepared from the Industick KNO_3 could require more time to repair themselves than those prepared from the Haifa Chemicals KNO_3. This seems likely if a comparison is made between Figure 4-15, showing the Industick seeds, and Figure 4-10, which shows the Haifa seeds. The Industick seeds are rougher and more irregular in shape. They are also not as well classified as the Haifa seeds (small crystals can also be seen).

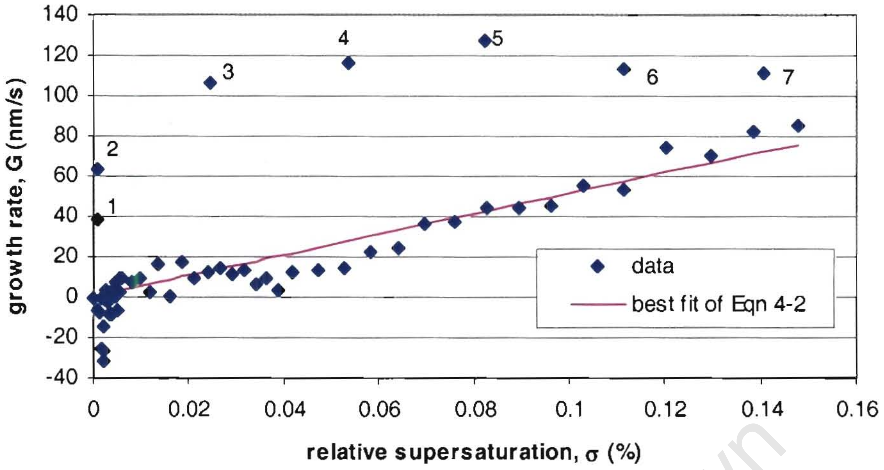

***Figure 4-14**: The KNO_3 crystal growth rate for Experiment 3 expressed as a function of supersaturation (n=1)*

The seven outliers (labelled points 1-7) were ignored when fitting the linear trend shown in Figure 4-14. The results from Experiment 3 gave a k_g value of $5.1 \cdot 10^{-7} \pm 0.2 \cdot 10^{-7}$ ms^{-1} (r^2=0.925). This is similar to that found in Experiment 1. Figure 4-16 compares the trend of Experiment 1 with the data and trend for Experiment 3.

***Figure 4-15**: A SEM photograph of the KNO_3 seeds used in Experiment 3 (produced by Industick GmbH). The magnification is 200 times.*

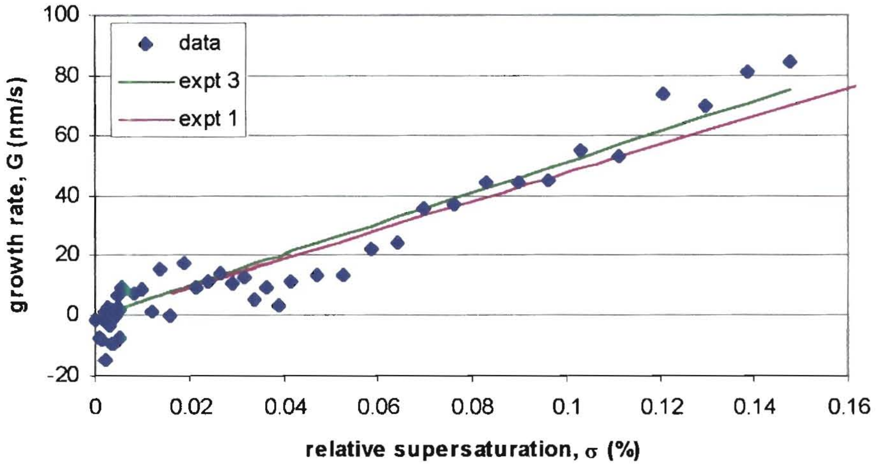

Figure 4-16: *A comparison of the data and trend for Experiment 3 with the trend for Experiment 1*

This is a particularly interesting discovery. Despite the increased impurities and the presence of anti-caking agent in the Industick KNO_3, it shows no significant difference in growth rate when compared with the purer Haifa Chemicals KNO_3. Franke et al (1981) came to the same conclusion in their studies stating that "the use of reagents of different purity had no marked effect on the growth rate and imperfection of crystals".

Taking an average of the overall growth constants found in Experiments 1, 2 and 3 gives a k_g value of $4.9 \cdot 10^{-7} \pm 1 \cdot 10^{-8}$ ms^{-1} for the growth of potassium nitrate crystals from demineralised water at 50 ^{0}C.

4.4.5. Experiment 4

Experiment 4 was run to examine the effect that impurities in the water used would have on the growth rate. Experiments 1 to 3 were run with demineralised water from the laboratory. Experiment 4 made use of municipal tap water. The effect was substantial.

Figure 4-17 shows the growth rate data collected from Experiment 4. Five unexplainable outliers (one is slightly obscured) can be seen at very low supersaturation, these fast growing points appeared at the end of the experiment. Notice also that this is the only experiment that does not show significantly faster growth at the beginning. This could be due to the fact that the growth rate is already high. The growth rate at σ=0.3% is as high in Experiment 4 as it is for seed reparation in Experiment 1.

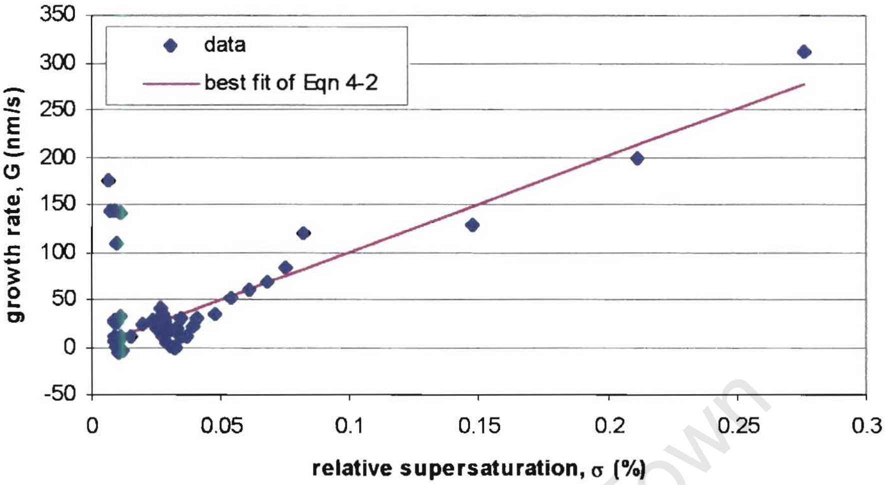

***Figure 4-17**: The KNO_3 crystal growth rate for Experiment 4 expressed as a function of supersaturation*

Ignoring the five outliers, a linear trend has been fitted to the remaining points giving a k_g value of $1.01 \cdot 10^{-6} \pm 0.04 \cdot 10^{-6}$ ms^{-1} (r^2=0.916). This is nearly double the k_g value found for the other experiments using demineralised water. Figure 4-18 shows the phenomonen clearly.

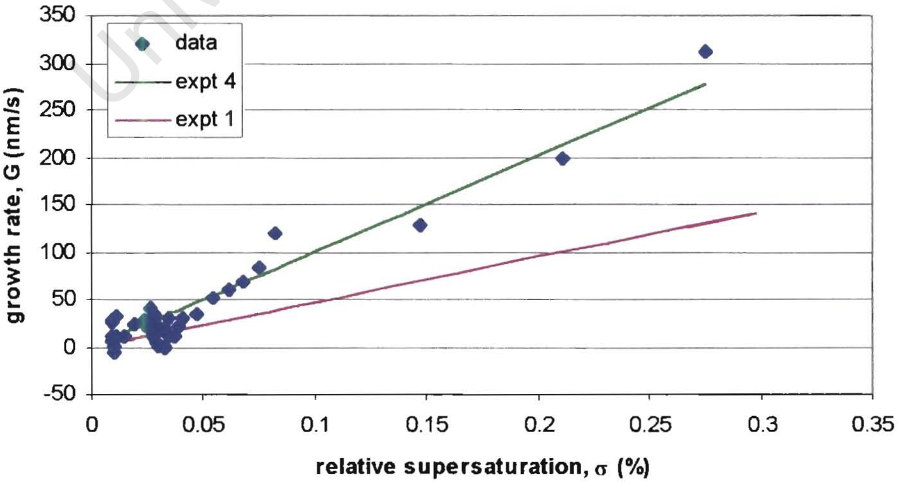

***Figure 4-18**: A comparison of the data and trend for Experiment 4 with the trend for Experiment 1*

Figure 4-18 seems to indicate that one or more of the impurities in the tap water aids the growth rate of potassium nitrate. This could be because the particular impurities either aid the diffusion of molecules through the boundary layer or alter the characteristics of the adsorbtion layer at the crystal-surface interface and influence the integration of growth units (Mullin, 1993). Since the growth is known to be diffusion limited it seems more likely that the increased growth rate is due to the impurities promoting the diffusion process.

The particular impurity in the municipal water that is affecting the growth so substantially is unknown.

Figure 4-19 shows a SEM photograph of a sample of potassium nitrate crystals taken immediately after the cooling ramp of Experiment 4. Figure 4-20 shows a close-up of a single crystal grown during the same experiment but sampled during the cooling ramp.

Comparing Figure 4-20 with Figure 4-10 shows the extent to which the seed crystals have been damaged. It gives an idea of how much repair must occur before regular growth can take place.

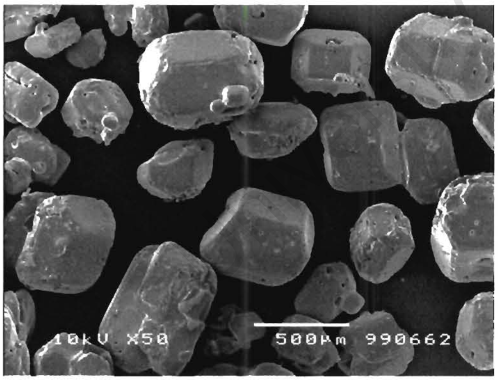

***Figure 4-19:** A SEM photograph of a sample of KNO_3 crystals taken after the cooling ramp of Experiment 4. The magnification is 50 times.*

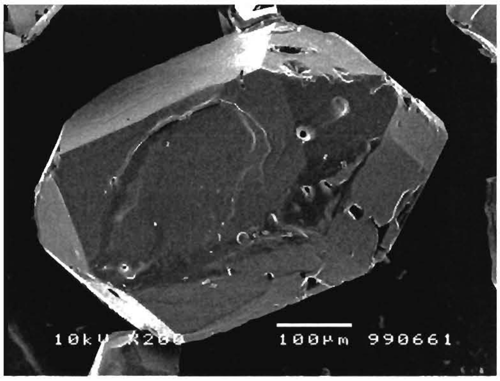

***Figure 4-20:** A SEM photograph of a KNO_3 crystal withdrawn during the cooling ramp of Experiment 4. The magnification is 200 times.*

4.4.6. The influence of the method of determining growth rate

Figure 4-21 shows the strong influence that the method of determining crystal growth exerts on the results. The data from Experiment 1 was transformed into the growth rate vs supersaturation form using the method of plotting log normal curve fits to selected crystal size distributions (CSD) from the Malvern Mastersizer. Using the median sizes from the lognormal plots and the time between CSD measurements the overall mean growth rate was calculated.

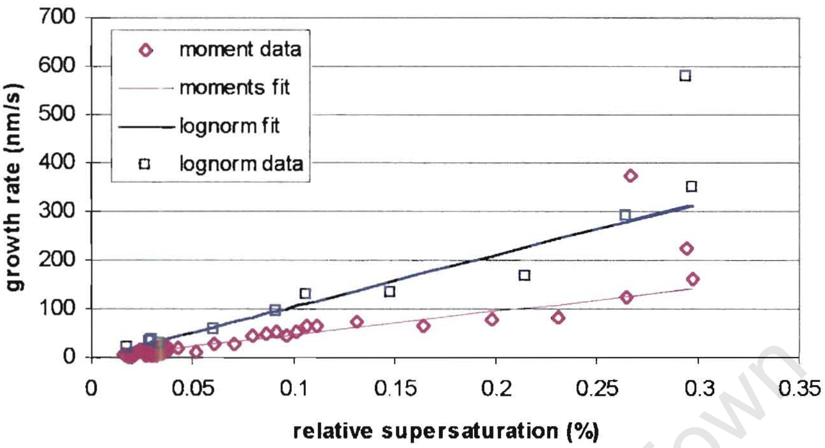

Figure 4-21: The influence of the method used to determine growth rates shown with the data from Experiment 1

Log normal fitting gives a growth rate that is double that found by the moment method. It is known that log normal fitting does tend to be biased towards a higher median size when the CSD is not perfectly log normal in shape. It is also prone to report only the fast growers, particularly when growth rate dispersion is present. For these reasons it is expected that the log normal fitting method would give a k_g value that was higher than that found by the moment method.

The moment method is based heavily on the increase of the crystal mass. It assumes that the Malvern obscuration signal is a reliable measure of this mass increase. The moment method also assumes that all crystals grow at the same rate and in so doing neglects to model growth rate dispersion.

The difference in the predicted k_g values is thus due to inaccuracies in both growth-predicting methods.

4.4.7. Comparison with literature

The literature values reported for the growth of potassium nitrate in water tend to vary. Rolfs states that differences in literature values are primarily due to the variations in hydrodynamic conditions and in the preparation of the seed crystals used. Perhaps more important than those however, are the differences in crystallisation temperature and method of crystallisation (either single or bulk crystal experiments).

Literature reports the growth rate of crystals in a vast number of forms. Older studies seem to focus on overall growth rates while more recent work has concentrated on face specific growth rates. For both types of growth the values can be reported at constant or changing supersaturation levels and at a range of temperatures. In order to meaningfully compare data these differences need to be reconciled.

Figure 4-22 shows the literature values reported by Rolfs et al (1997) and Herden and Lacmann (1997) with the growth data from Experiment 1. Both authors report specific face growth rates in their papers. Face specific growth is a measurement of the radial growth rate while the overall growth rate is a based on the increasing diameter of the crystals. Assuming ideal spherical crystals the overall growth rate should be equal to twice the face specific growth rate. In order to compare the literature values with the overall growth rate measured in Experiment 1 the reported growth constants (k_g) were doubled. Only the fastest and slowest growing faces observed by Rolfs are shown. Herden and Lacmann only measure the growth of the {111} face (known by Rolfs et al to be a slower growing face) and so this is reported.

The agreement between the literature and measured values is good. The results from Experiment 1 lie in-between the fastest and slowest growing faces reported by Rolfs et al and are very similar to those reported by Herden and Lacmann. Even the two fastest growing points lie within the boundaries of Rolfs et al's work. This could suggest that during the initial repair of the seed crystals the fastest growing {001} face dominated the overall growth rate. The temperatures at which these measurements were carried out were different: Experiment 1 was at 50 °C, Rolfs et al's work was at 15 °C and Herden and Lacmann's work was at 25 °C.

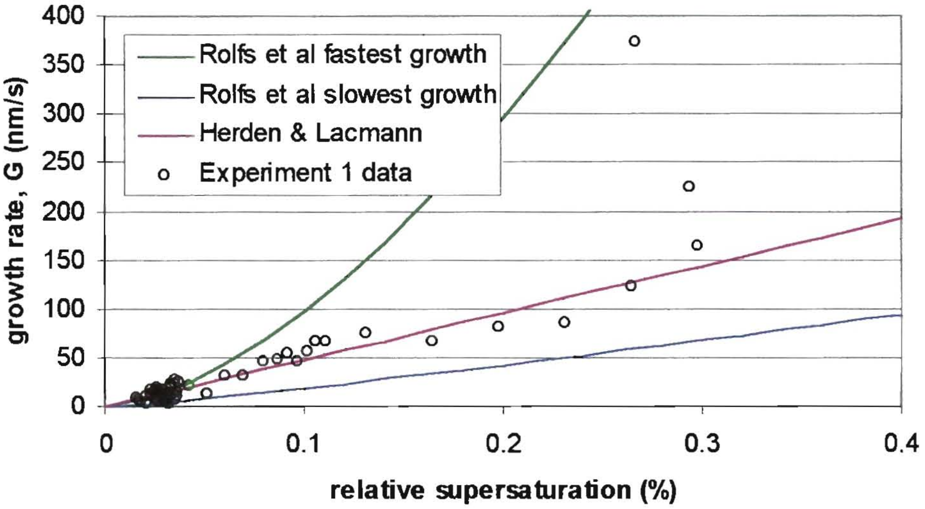

***Figure 4-22**: A comparison of the growth rates found in literature with those measured during Experiment 1. Literature: Rolfs et al (1997) and Herden and Lacmann (1997).*

Rolfs et al (1997) states that the face specific growth rates for potassium nitrate that he reports, for experiments carried out at 15 °C, are high. This seems justified when compared with Experiments 1 to 4 (carried out at 50 °C) as growth rate is expected to increase with temperature.

Rolfs et al (1997) also concludes that growth of potassium nitrate is integration limited. This is different to the diffusion limited growth mechanism found in Experiments 1 to 4. This discrepancy could be explained by the different hydrodynamic conditions. The speed and direction of flow in the single crystal experiments (Rolfs et al, 1997; Herden and Lacmann, 1997) could have reduced the diffusion layer to a degree not found in bulk crystallisation. The different growth mechanisms could cause the difference in growth rates discussed in the previous paragraph.

4.4.8. Error analysis

Calculation of the error associated with the growth rate measurements was not performed. The growth rate is directly determined from the crystal size distributions and obscuration signal measured by the laser light scattering Malvern Mastersizer X. The error associated with these measurements is undefined as they are absolute values. To quantify the error the same crystals should be measured a number of times over to determine the reproducibility of the measurement. To determine the accuracy of the actual device it would be necessary to measure the same sample through two different sizing instruments. Because growth rate measurements are based on the difference between size distributions it is not so important that the instrument measures the absolute size accurately.

The calculation of the error associated with the relative supersaturation measurements which combines the errors associated with the solubility curve, temperature measurement device, density meter and concentration calibration curves is shown in Appendix 5. It is found to be $1.92 \cdot 10^{-3}$.

Chapter 5

The 1100 litre DTB crystalliser experiments

The second experimental set-up used in this study was Uniak's 1100 litre draft tube baffled (DTB) crystalliser. As mentioned before, the aim of the 2 litre growth cell experiments was to provide the necessary familiarity with the growth behaviour of potassium nitrate so that it could be properly implemented and modelled on the large-scale.

5.1. The history of the crystalliser

The main body of the 1100 litre crystalliser was designed and built at the beginning of the Uniak project. After the Uniak-2 project the crystalliser underwent a renovation during the summer of 1996. During this revision several changes were made to the original 970 litre DTB crystalliser. The most important changes were:

1. The internal heat exchanger was removed
2. An uncoated marine impeller was installed
3. All main pumps were replaced or revised and placed vertically
4. All piping and tubing was redesigned and reinstalled
5. A new Honeywell process computer system was installed

The construction material used was mostly the high quality stainless steel 316. The direct consequence of removing the internal heat exchanger was a change in the crystalliser volume from 970 to 1100 litres (Hartog, 1998).

5.2. Description of the crystalliser

The complete crystalliser set-up can be split into two broad categories: i) the crystalliser itself and ii) the ancillary vessels.

5.2.1. The crystalliser

The crystalliser body (see Figures 5-1 and 5-2) is constructed from stainless steel. It has a volume of about 1100 litres and an internal diameter of 0.7 m. The crystalliser is equipped with a draft tube. Just inside the bottom of this draft tube is a marine type impeller with a diameter of 484 mm. The impeller pumps the suspension in the crystalliser up through the draft tube. The suspension flows back down between the draft tube and the outer hull.

The crystalliser has a non-agitated annular zone that facilitates settling. A fines pump (located on the ground floor) is used to remove a stream of particles from the top of this zone. The fines stream then passes through an external plate and frame heat exchanger where it is heated from 50 °C to between 60 °C and 70 °C. This serves as a classifying mechanism. The degree of classification depends on the flow rate of the fines removal system, the heat input from the heat exchanger, the solids concentration in the crystalliser, the physical properties of the crystals and the residence time of the crystals in the fines loop. The residence time is manipulated by using or bypassing the dissolution vessel installed in the return line to the crystalliser.

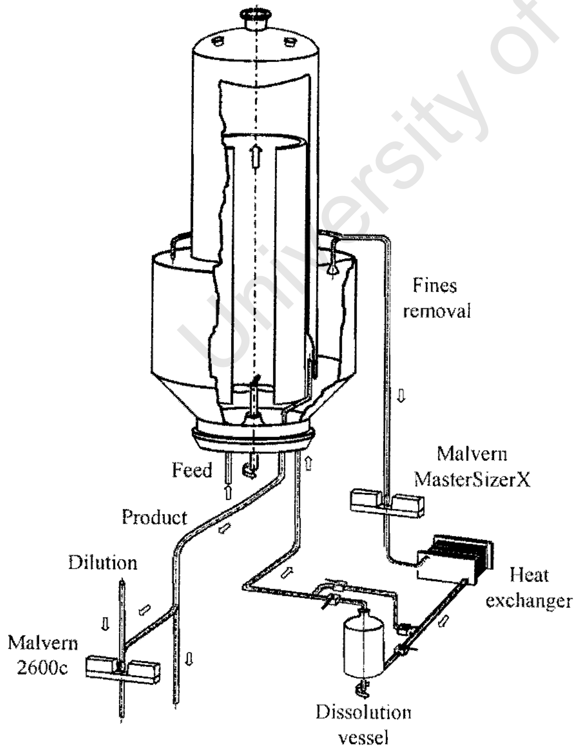

Figure 5-1: *A simplified diagram of the 1100 litre DTB crystalliser (Neumann, 1998)*

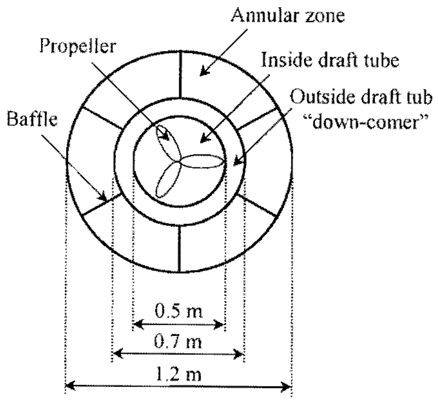

Figure 5-2: *A cross sectional top view of the crystalliser showing the internal dimensions (Neumann, 1998)*

The heat from the heat exchanger is not only used to dissolve the fines but also to provide the energy necessary for the evaporation of the solvent. This evaporation at 50 °C and about 100 mbar provides the supersaturation, which is the driving force for crystallisation. The low pressure in the crystalliser is maintained by a water-cooled vacuum pump. The vapour is condensed in two condensers located at the top of the crystalliser. The condensate is pumped back to the primary feed vessel (see section 5.2.2).

Product is removed from the bottom of the crystalliser between the draft tube and the skirt baffle. This stream passes through a number of particle sizing instruments. The Opus uses ultrasound to measure particle size in highly concentrated slurries. The other instruments, the Malvern and Helos (laser light scattering devices) and a CCD camera require slurries with low solids concentrations. To achieve this a portion of the product stream is intermittently mixed with a saturated solution at 50 °C, named the dilution stream, when sizing is required. Depending on whether the crystalliser is operating in batch or continuous mode the remaining portion of the undiluted product stream is either returned to the crystalliser after measurement of the crystal size distribution or pumped to the primary feed vessel. The mixed product/dilution stream is always pumped to the primary feed vessel. Feed enters the crystalliser at a rate equal to the combined removal flowrates of the product and condensate streams to maintain a fixed volume.

Apart from the sizing instrumentation there are various measurement devices placed in line to record pressure, temperature, flowrates and solution density. Inline density meters are present in the fines loop, product loop and the dilution system. A more accurate offline density measurement can also be taken using the density meter component of the concentration-measuring device.

5.2.2. The auxiliary vessels

The feed is prepared in two vessels. The primary vessel operates at 50 °C. It has two distinct zones. The outer zone contains an agitated slurry into which the dilution stream, condensate and additional raw materials are added. Solution passes from this zone into the central conical, settling zone. Crystal free liquor is drawn via an overflow line from the central zone of the primary feed vessel to the secondary feed vessel. The secondary vessel operates at about 53 °C. This elevated temperature ensures a crystal free solution. The secondary feed vessel provides a saturated, crystal free solution for the feed and dilution streams.

Another vessel provides storage of the crystalliser contents between experiments. A hot water vessel, kept at 90 °C, provides heating liquid for the heat exchanger. There is also a luke-warm water vessel (50 °C), which supplies rinse water in case blockages develop in the pipes.

5.3. The results and discussion

Three successful experiments were run on the 1100 litre crystalliser. Only one set of experimental data is presented here as the publishing rights of the other two sets of data belong to a colleague. The raw results of one of these experiments are presented below in Figures 5-3 and 5-5.

The crystalliser was run in continuous mode at 50 °C and 100 mbar. The fines were removed from the annular zone at 2 l/min and this stream was heated at a rate of 85 Wm^{-3}. This energy input was sufficient to dissolve the small crystals in the stream and maintain the desired level of evaporation in the crystalliser. The feed to the crystalliser was a saturated, crystal free potassium nitrate solution and the product flow was 0.25 l/s. The impeller speed was set to 270 rpm and increased to 320 rpm five hours after crystals were first detected by the Helos. All conditions were set to mimic an ammonium sulphate experiment run previously. This allowed comparability between experiments.

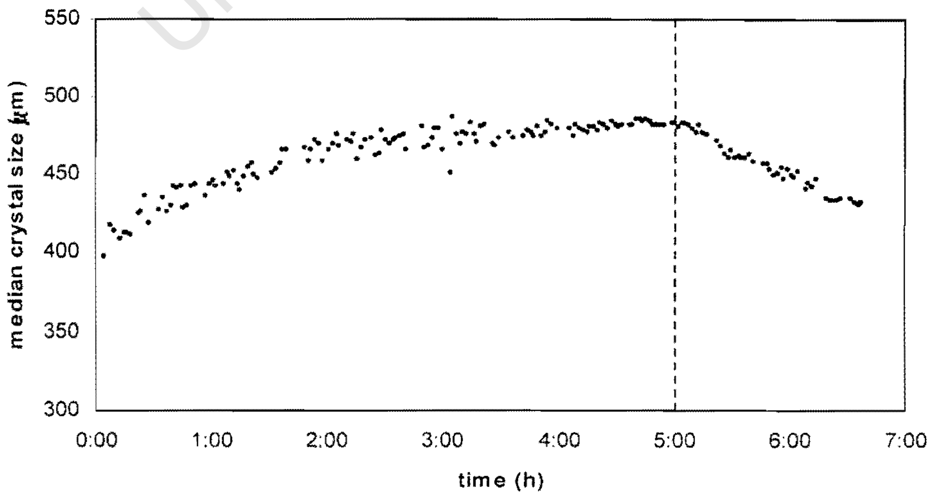

***Figure 5-3**: The median crystal size in the 1100 litre DTB crystalliser as measured by the Helos laser light scattering device*

Time zero is defined as being the time that the first crystals were observed by the Helos. It has no real experimental significance since it is definitely not the time that crystals first appear in the crystalliser as crystals are not born at 400 μm. The label is made for convenience. The premature ending of the experiment was due to excessive foaming in the boiling zone after about six and a half hours.

The median crystal sizes measured by the Helos are presented in Figure 5-3. Notice the slow increase in the mean crystal size over the first three hours and then the gradual flattening that occurs between three and five hours. Figure 5-4 shows the median crystal sizes for a typical ammonium sulphate experiment on the 1100 litre crystalliser. Comparing Figures 5-3 and 5-4 shows how differently the two salts behave. Potassium nitrate reaches an equilibrium size in four hours while the crystal size distribution in the ammonium sulphate experiment is still unstable after twenty hours.

The oscillating median crystal size (with a regular period of oscillation – here about seven hours) was consistently found in all the ammonium sulphate experiments on both the 1100 litre and 22 litre scale. This is because there is not enough surface area being continuously generated from attrition to sustain the consumption of the supersaturation being created by evaporation. The peak of the oscillation corresponds to a time when the supersaturation is highest because the surface area available for growth is at a minimum. It is at this time that spontaneous nucleation occurs generating a burst of nuclei and lowering the supersaturation. The drop in the median size takes a little while because the nuclei need to grow slightly before they make up a significant mass percentage of the total crystal distribution measured.

A probable reason for the potassium nitrate experiments not showing this trend is the characteristically brittle nature of the salt. This means that enough surface area for growth is provided by attrition to prevent the build up of supersaturation and thus limit spontaneous nucleation.

Potassium nitrate also seems to establish a much smaller equilibrium crystal size of ± 480 μm compared with ± 800 μm crystals in the ammonium sulphate experiment. This could also be attributed to the brittleness of the potassium nitrate crystals and hence the greater degree of attrition.

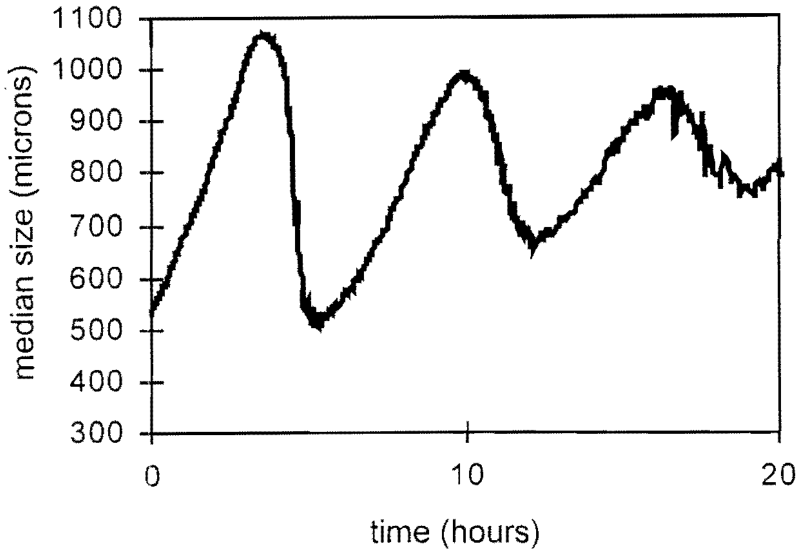

Figure 5-4: *The results of a typical ammonium sulphate experiment in the 1100 litre DTB crystalliser showing the development of the median size with time (Bermingham, 1988)*

Figure 5-3 also shows the effect that the increase in impeller speed after five hours had on the median crystal size. The decreasing crystal size is expected, as potassium nitrate is known to be extremely brittle and thus susceptible to attrition. Breakage will obviously increase as the number and magnitude of particle-impeller, particle-wall and particle-particle collisions increase. It is speculated that a new equilibrium crystal size would have been attained if the experiment had continued.

The median crystal size may also decrease with the increased impeller speed due to the greater crystal suspension. Since the product removal is at the bottom of the crystalliser it would be sensitive to changes in the crystal suspension if there was a non-uniform solids distribution. Even mixing within industrial crystallisers is known to be difficult (Sha and Palosaari, 2000). If this were the case then the numbers of larger crystals in the measured product would decrease when the impeller speed increased. A step change is not observed in Figure 5-3 so the effect of the crystal suspension is an unlikely reason for the decreasing median size.

Figure 5-5 shows the supersaturation and temperature measurements within the crystalliser. The supersaturation was noisy during this experiment and so it was smoothed using a moving average of 5. This smoothed line is superimposed on the figure.

At time zero the supersaturation reaches a maximum. As discussed earlier, primary nucleation probably occurs a little before time zero. This is consistent with the supersaturation trend, as the level of supersaturation would continue to increase until there was sufficient surface area for growth to start using it up. Figure 5-3 suggests that this critical surface area is reached when the crystals reach a median size of 400 μm.

The supersaturation remains consistently low, almost zero, while the crystals grow then from about two and a half hours onwards, when the median size is stabilising (see Figure 5-3), the supersaturation starts to climb to about 0.3%. The supersaturation then drops back to almost zero at 5 hours with the change in impeller speed. This could be due to the increase in the surface area available for growth and the roughening of that surface area. Both of these factors could lead to a more rapid use of the available supersaturation. It could also be due to better mixing throughout the crystalliser causing a more even distribution of the crystal surface area. This leads to greater use of the available supersaturation in the upper part of the crystalliser where supersaturation is generated by evaporation and the probe is situated.

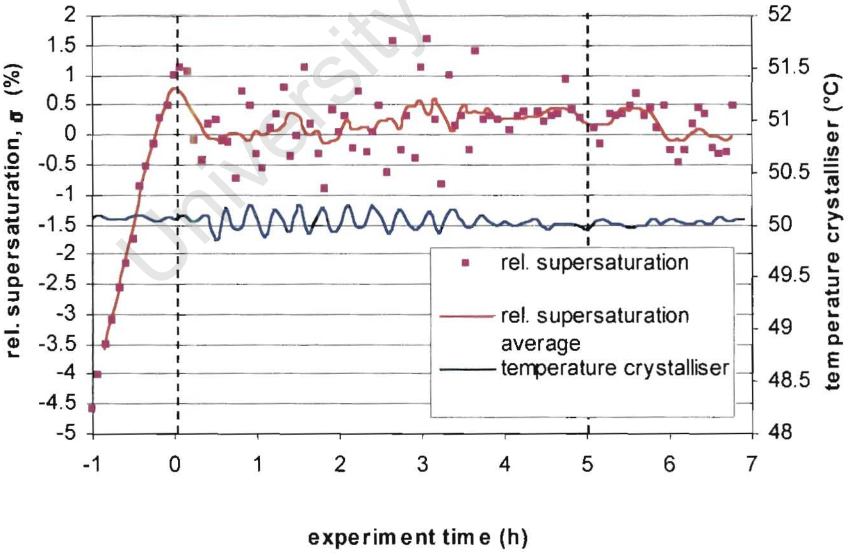

***Figure 5-5**: The relative supersaturation and temperature within the 1100 litre DTB crystalliser*

From the results gained from the 1100 litre potassium nitrate experiments it can be seen that further experiments on this scale will provide useful information. This new data is particularly beneficial because it is shows a behaviour that is very different from the ammonium sulphate crystallisation behaviour. This difference will help in the generalisation of the current Uniak models.

Chapter Six

Conclusions

Accurate density-concentration-temperature and equilibrium concentration (solubility) correlations for potassium nitrate were established using two sources of potassium nitrate. The equilibrium solubility curve varied significantly for the different sources.

Potassium nitrate batch growth rate experiments at 50 °C in a 2 litre draft tube baffled crystalliser had on-line measurement of the crystal size distribution, the solution density and the solution temperature. The crystal growth rate could be calculated from the crystal size distributions and the supersaturation calculated using the density-concentration-temperature and solubility correlations for potassium nitrate.

The potassium nitrate experimental results showed that:

1) Crystal growth from an aqueous solution at 50 °C is diffusion limited.
2) Growth rate results are reproducible.
3) The source of potassium nitrate does not significantly ·affect the growth rate constant when the appropriate solubility curve is used. This implies that impurities in the Industick salt, especially anti-caking agent, have a negligible effect on the growth rate.
4) The source of the water seriously alters the growth rate constant. Crystals grown in tap water grow twice as fast as those grown in demineralised water. The impurities in the tap water may adsorb onto the surface of the growing crystals.
5) The overall crystal growth rate constant (k_g) for the potassium nitrate – water system at 50 °C is:

   $4.9 \cdot 10^{-7} \pm 0.1 \cdot 10^{-7}$ ms^{-1} for demineralised water, and

   $1.01 \cdot 10^{-6} \pm 0.04 \cdot 10^{-6}$ ms^{-1} for tap water.

6) All growth rates measured lie between the fastest and slowest face specific growth rates reported in literature.
7) The two growth rate determination methods report very different results. Both the moment and log-normal fitting methods neglect the possibility of size dependent growth.

Large-scale crystallisation of potassium nitrate using the 1100 litre DTB crystalliser at 50 °C proved successful. It showed that:

1) A new, second model material could be successfully introduced to the crystalliser for the first time in 13 years.
2) In-line measurement of the potassium nitrate supersaturation is possible.
3) Impeller speed has a significant effect on the particle size, as a result of the brittleness of potassium nitrate crystals.
4) Potassium nitrate crystallisation behaviour is different to that of ammonium sulphate in that there is no oscillation in the median size.

Chapter Seven

Recommendations

Some suggestions for further work are given below.

Collect the mass of crystals at the end of all future two litre growth cell experiments. If this mass is known it is then possible to check the accuracy of the value for the third moment calculated using the Brown & Felton method.

Run a number of experiments at a constant growth rate by keeping the supersaturation constant. This would require modification of the programme that controls the temperature of the water bath.

Improve the method of taking crystal samples during and after the experiments. The steep potassium nitrate solubility curve meant that many samples were ruined due to cooling on the filter paper. Attempt warming the filter before use.

Investigate the effect that the type of nucleation has on the growth rate and growth behaviour of the potassium nitrate crystals since it is theorised that the type of nuclei (in terms of differing internal energies and structural defects) play a large role in the growth of the crystal.

Investigate growth of undamaged seeds. No initial fast growth due to crystal repair would be anticipated in an undamaged, seeded growth experiment. If none was seen this would suggest that seed reparation does occur in seeded experiments where damaged seeds are used.

Incorporate growth rate dispersion theory into the growth rate calculations. Both moment modelling and log-normal curve fitting ignore GRD and cannot be used to calculate the growth of the crystals accurately where it occurs. Growth rate dispersion in potassium nitrate crystals should be looked into in more detail. This would aid growth rate modelling and thus achieve a more precise measurement of the overall growth rate.

Continue the investigation of potassium nitrate crystallisation on the 1100 litre scale. For a full comparison with the ammonium sulphate experiments the effect of each of the major variables (impeller speed, heat input, residence time and fines flow rate) on the product quality needs to be examined. Samples of the potassium nitrate crystals should be taken from the crystalliser at various times throughout the experiment. Crystal analysis by scanning electron microscopy and comparison with similar pictures of ammonium sulphate under identical conditions would illustrate the relative brittleness of the two crystal structures.

Investigate another material with very different properties e.g. an organic material in the 1100 litre crystalliser.

Simulate the results using the gPROMS model based on ammonium sulphate experiments. This would provide useful information on where the model needs to be generalised in order for it to be applicable a range of materials.

Chapter Eight

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The Appendices

1. Raw calibration data:
    - i) KNO_3 solubility data
    - ii) Industick GmbH C-ρ-T calibration curve data
    - iii) Haifa Chemicals C-ρ-T calibration curve data
    - iv) Rolf's (1997) face specific growth rate measurements
2. Experimental details
3. Impurities found in the KNO_3 produced by Haifa Chemicals and Industick GmbH
4. Impurities found in the tap water used in Experiment 4
5. Error calculation
6. Raw particle size distribution and density data for Experiments 1-4

Appendix 1
Raw data

***Table 1**: The solubility of potassium nitrate according to literature*

Temp (°C)	Solubility ($g\ KNO_3/100g\ H_2O$)			Temp (°C)	Solubility ($g\ KNO_3/100g\ H_2O$)		
	Linke (1965)	Mullins (1993)	Gmelin (1938)		Linke (1965)	Mullins (1993)	Gmelin (1938)
0	13.25	13.3	13.25	35			53.87
0			13.26	35.21			54.72
0			13.3	40	63.93	63.9	63.88
0			13.31	40			63.93
0.4			13.43	40			64.47
4			16	40.1			64.12
9.1			20.13	44.5			73.25
9.92			20.8	44.75			74.5
10	31.58	20.9		50	85.19		85.36
12.63			23.36	50			85.7
14.9			25.78	55.13			97.42
16.3			27.23	59.16			107.63
18			28.03	60	109.21	110	109.86
20	31.58	31.6	31.49	60.05			111.18
20			31.58	62.5			116.5
20			32.05	68			132.77
21.1			32.93	70	136.97		
21.5			33.52	75			153
23.82			36.64	76			156.61
25	37.93		37.57	80	168.82	169	169.04
25			37.72	87.5			195.8
25			38.16	90	203.03		
25			38.38	91.65			210.2
25			38.46	98			237.6
30	45.56	45.8	45.56	100	244.83	247	244.8
30			45.77	100			246.03
30.2			46.2	111.7			297.2
30.8			47.52	114			311.64
35			53.28				

Correlation:

$m = 13.767+0.5588\nu+0.0178\nu^2$ (Rolfs et al., 1997)

where m is the weight of soluted KNO_3 per 100g of water, and ν is the temperature in °C.

***Table 2**: Density measurements of Industick potassium nitrate solutions*

Concentration (g KNO_3/100g H_2O)	Solubility Temp (°C)	Density (kg/l)		
		54.81 ^{0}C	59.85 ^{0}C	64.82 ^{0}C
0.000	-	0.98723	0.98461	0.98213
53.815	34.9	-	1.22787	-
54.054	35.0	-	1.22889	-
54.054	35.0	1.23333	1.22848	1.22582
60.128	38.3	-	1.24944	-
59.949	38.2	1.25416	1.24884	1.24636
65.125	40.9	-	1.26607	-
65.020	40.8	-	1.26579	-
65.012	40.8	1.27140	1.26550	1.26333
70.008	43.3	-	1.28182	-
70.021	43.3	1.28640	-	1.27846
74.847	45.6	-	1.29661	-
75.012	45.7	-	1.29746	-
74.965	45.6	1.30273	1.29659	1.29435
79.979	47.9	-	1.31166	-
79.734	47.8	1.31623	1.31077	1.30792
84.962	50.1	-	1.32657	-
84.996	50.1	1.33300	1.32580	1.32426
90.021	52.2	-	1.33747	-
90.034	52.2	-	1.33931	-
90.110	52.3	-	1.33994	1.33709
95.574	54.5	-	1.35451	-
94.988	54.3	-	1.35293	1.35055
102.457	57.2	-	-	-
101.654	56.9	-	-	-
102.079	57.1	-	-	1.36792

***Table 3**: Raw data for the Haifa Chemical – Demineralised water concentration calibration curve*

Temperature: 57.5C			Temperature: 60C			Temperature: 62.5C		
Conc	Density	Box Temp	Conc	Density	Box Temp	Conc	Density	Box Temp
(wt frac)	(kg/l)	(C)	(wt frac)	(kg/l)	(C)	(wt frac)	(kg/l)	(C)
0.393995	1.269577	57.34963	0.393995	1.266347	59.85252	0.393995	1.265103	62.32684
0.393995	1.269217	57.35891	0.393995	1.266559	59.85302	0.393995	1.265148	62.32707
0.393995	1.269255	57.35875	0.393995	1.266597	59.85498	0.393995	1.265179	62.32693
0.393995	1.269289	57.35676	0.393995	1.266631	59.85585	0.393995	1.265195	62.32688
0.393995	1.269313	57.35756	0.393995	1.266656	59.85308	0.393995	1.265213	62.32691
0.393995	1.269332	57.35869	0.393995	1.266665	59.85494	0.393995	1.265227	62.32697
0.429306	1.302001	57.35917	0.429306	1.296327	59.85257	0.429306	1.295463	62.32685
0.429306	1.302019	57.34129	0.429306	1.296356	59.85423	0.429306	1.295381	62.32694
0.429306	1.302084	57.35901	0.429306	1.296418	59.85379	0.429306	1.295432	62.32702
0.429306	1.302122	57.35914	0.429306	1.296476	59.86941	0.429306	1.295484	62.32702
0.429306	1.302176	57.35794	0.429306	1.296529	59.86824	0.429306	1.29554	62.32702
0.429306	1.302219	57.3589	0.429306	1.296571	59.85343	0.429306	1.295593	62.32693
0.458075	1.327115	57.35861	0.458075	1.324965	59.85878	0.458075	1.323234	62.3268
0.458075	1.327137	57.3466	0.458075	1.324891	59.8526	0.458075	1.323259	62.32675
0.458075	1.327176	57.35888	0.458075	1.324924	59.86325	0.458075	1.32328	62.32718
0.458075	1.327215	57.35909	0.458075	1.324934	59.86781	0.458075	1.323293	62.32707
0.458075	1.327235	57.35868	0.458075	1.324948	59.87002	0.458075	1.323307	62.32707
0.458075	1.327261	57.35819	0.458075	1.324961	59.86471	0.458075	1.323317	62.32703
0.458075	1.327281	57.35546	0.458075	1.32497	59.85616	0.458075	1.323333	62.32705
0.48793	1.356405	57.35895	0.48793	1.353782	59.86563	0.48793	1.352614	62.32703
0.48793	1.356462	57.35663	0.48793	1.353779	59.86893	0.48793	1.352365	62.32693
0.48793	1.356521	57.3444	0.48793	1.353823	59.86485	0.48793	1.352413	62.32697
0.48793	1.356586	57.35835	0.48793	1.353863	59.87048	0.48793	1.352461	62.3271
0.48793	1.356639	57.35863	0.48793	1.353899	59.87032	0.48793	1.352501	62.32685
0.48793	1.356703	57.35361	0.48793	1.353943	59.86902	0.48793	1.352539	62.327

Table 4: *Raw data for the Haifa Chemicals – tap water concentration calibration curve*

Temperature: 57.5C			Temperature: 60C			Temperature: 62.5C		
Conc	Density	Box Temp	Conc	Density	Box Temp	Conc	Density	Box Temp
(wt%)	(kg/l)	(C)	(wt%)	(kg/l)	(C)	(wt%)	(kg/l)	(C)
0.445667	1.316615	57.35901	0.445667	1.313466	59.85218	0.445667	1.311973	62.32586
0.445667	1.316653	57.34287	0.445667	1.313489	59.85208	0.445667	1.31188	62.32688
0.445667	1.31669	57.34913	0.445667	1.313574	59.85217	0.445667	1.311907	62.32686
0.445667	1.31671	57.35922	0.445667	1.31362	59.85217	0.445667	1.311919	62.32683
0.445667	1.316741	57.34107	0.445667	1.313653	59.85219	0.445667	1.311935	62.32682
0.445667	1.316762	57.35864	0.445667	1.313621	59.85217	0.445667	1.311963	62.32668
0.455324	1.324383	57.35835	0.455324	1.322593	59.85232	0.455324	1.320654	62.32691
0.455324	1.324412	57.35857	0.455324	1.322197	59.85253	0.455324	1.320571	62.32694
0.455324	1.324452	57.35902	0.455324	1.322246	59.85236	0.455324	1.320597	62.32699
0.455324	1.32447	57.34206	0.455324	1.322273	59.85232	0.455324	1.320619	62.32695
0.455324	1.324489	57.34185	0.455324	1.322287	59.85235	0.455324	1.320634	62.32703
0.455324	1.324502	57.35405	0.455324	1.322291	59.85234	0.455324	1.320649	62.32696
0.470173	1.338693	57.3548	0.470173	1.336939	59.85232	0.470173	1.33562	62.32694
0.470173	1.338713	57.35473	0.470173	1.336927	59.8523	0.470173	1.335543	62.32694
0.470173	1.338772	57.34172	0.470173	1.336968	59.85228	0.470173	1.335594	62.32696
0.470173	1.338814	57.35908	0.470173	1.337005	59.85233	0.470173	1.335591	62.32697
0.470173	1.338838	57.35918	0.470173	1.337033	59.85241	0.470173	1.335614	62.32687
0.470173	1.33886	57.35778	0.470173	1.337053	59.85225	0.470173	1.335619	62.32697
			0.48768	1.37192	59.85247	0.48768	1.369958	62.32695
			0.48768	1.371515	59.85251	0.48768	1.369423	62.32706
			0.48768	1.371563	59.85247	0.48768	1.369431	62.32688
			0.48768	1.371593	59.85287	0.48768	1.369445	62.32699
			0.48768	1.371613	59.85248	0.48768	1.369463	62.32697
			0.48768	1.371619	59.8547	0.48768	1.369477	62.32699

***Table 5**: Results of the face specific determination of the mean crystal growth Flow rate: 16 cm/s, saturation temperature: 15 °C rate (Rolfs et al., 1997).*

Face	Measurements	k (nm/s)	n
{110}	19	65800±13500	1.49±0.04
{111}	14	23800±4700	1.25±0.04
{010}	13	13500±3200	1.15±0.05
{021}	10	103800±28900	1.52±0.06
{011}	3	41800±6200	1.35±0.03
{100}	2	34500±4500	1.28±0.03
{001}	3	195200±36100	1.60±0.03

Appendix 2
Experimental details

Appendix 3 gives the important experimental details of each of the four experiments run.

Experiment 1

Source of KNO_3:	Haifa Chemicals
Type of water used:	Demineralised
Initial concentration:	46.4 wt %
Mass of seeds added:	1.3585g
Temperature profile:	50.1 – 49.1 ^{0}C in 2400s

Experiment 2

Source of KNO_3:	Haifa Chemicals
Type of water used:	Demineralised
Initial concentration:	46.4 wt %
Mass of seeds added:	1.3590g
Temperature profile:	50.3 – 49.3 ^{0}C in 2400s

Experiment 3

Source of KNO_3:	Industick GmbH
Type of water used:	Demineralised
Initial concentration:	46.3 wt %
Mass of seeds added:	1.1330g
Temperature profile:	49.2 – 49.0 ^{0}C in 900s

Experiment 4

Source of KNO_3:	Haifa Chemicals
Type of water used:	Municipal tap
Initial concentration:	46.4 wt %
Mass of seeds added:	1.360g
Temperature profile:	50.1 – 49.2 ^{0}C in 2300s

Appendix 3

The impurities found in the KNO_3 produced by Haifa Chemicals and Industick GmbH

Table 1: *The impurities found in KNO_3 produced by Haifa Chemicals and used in Experiment 1, 2 and 4*

Analysis		Typical	Specification
KNO_3	%	99.8	99.7
H_2O	%	0.05	0.2 max
pH		6.5	6.0-8.5
Na	ppm	150	300 max
Ca	ppm	1	8 max
Mg	ppm	4	8 max
Fe	ppm	2	10 max
Cl	ppm	150	300 max
Nitrites	ppm	1	5 max
Insolubles	ppm	150	350 max

Table 2: *The impurities found in the KNO_3 produced by Industick GmbH and used in Experiment 3*

Analysis		Typical
KNO_3	%	99.5 min
N	%	13.7 max
H_2O	%	0.2 max
sulphobetanaphtol	%	0.3-0.6
NaCl	ppm	600
Insolubles	ppm	200
Fe	ppm	10

Appendix 4
The impurities found in the tap water

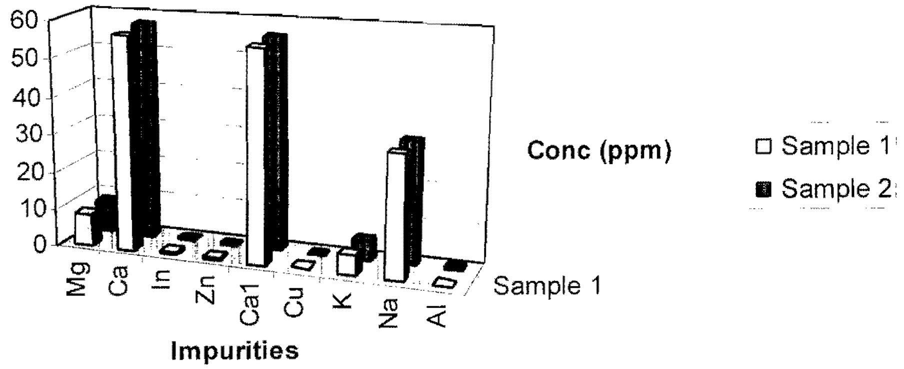

***Figure 1**: A bar graph of the major metal impurities found in the tap water at the Laboratory for Process Equipment, Delft. Sample 1 was taken directly after opening the tap in the morning and Sample 2 was taken after running the water for 10 minutes*

Element	Sample 1 (ppm)	Sample 2 (ppm)
Ag	0.20	0.09
Ba	0.15	0.04
Bi	0.27	0.17
Co	0.15	0.05
Cr	0.10	0.01
Ga	0.14	0
Mg	8.37	8.39
Mn	0.10	0.00
Ca	56.62	57.45
Fe	0.17	0.09
B	0.45	0.15
In	0.54	0.38
Cd	0.18	0.02
Zn	0.48	0.08
Ca1	55.55	56.18
Cu	0.47	0.09
Ni	0.18	0.01
Cd1	0.19	0.01
Pb	0.19	0.04
K	5.41	5.30
Li	0.18	0.01
Na	31.98	32.08
Sr	0.32	0.16
Tl	0.23	0.09
Al	0.23	0.55

***Table 1**: A full list of the metal impurities found in the tap water at the Laboratory for Process Equipment, Delft. Sample 1 was taken directly after opening the tap in the morning and Sample 2 was taken after running the water for 10 minutes. 0.4 ppm should be regarded as the detection limit.*

Appendix 5
Error calculations

Equilibrium solubility curve

The error in the values determined by equilibrium solubility curve, is found as follows:

Equation:

$c^*=-5.6589707*10^{-3}T^2+1.2229757T-0.59845073$

Known,

The average absolute error in the c* calibration = 0.002 wt%

Absolute error in the temperature measurement = 0.012 ^{0}C

Therefore

$$e_{c^*}=\sqrt{\left(\frac{\partial c^*}{\partial T}\right)^2 e_T^2}=\sqrt{(1.2229757-0.0056589707T)^2*0.012^2}$$

$$=\sqrt{1.27\times10^{-4}}=1.13\times10^{-2}$$

Concentration measurements

The error in the concentration measurements made with the density meter and the calibration curve is found as follows:

Equation:

$$C=-80181.6467-698.052413\rho^{0.49679594}+174200.1719T^{-0.02626337}$$

$$-94472.4562\rho^{-7.12451\times10^{-3}}T^{-5.455469\times10^{-2}}$$

Known,

The average absloute error in the c calibration = 0.054 wt% (@c = 45wt%)

Absolute error in te temperature measurement = 0.012 ^{0}C

Absolute error in the density measurement = $1\cdot10^{-4}$ g/cm^3

Therefore (evaluated at 50 ^{0}C and 1.3105 g/cm^3)

$$e_c=\sqrt{\left(\frac{\partial c}{\partial\rho}\right)^2 e_\rho^2+\left(\frac{\partial c}{\partial T}\right)^2 e_T^2}$$

$$=\sqrt{\left(-346.79\rho^{-0.50320406}+673.069\rho^{-1.0071245}T^{-5.455469\times10^{-2}}\right)\times0.00001^2+\ldots \left(-4575.08T^{-1.02626337}+5154.08\rho^{-7.1245\times10^{-3}}T^{-1.05455469}\right)\times0.012^2}$$

$$=\sqrt{1.115\times10^{-3}+6.52\times10^{-3}}=8.74\times10^{-2}$$

These errors are combined in the calculation of the relative supersaturation as follows:

Equation

$$\sigma=\frac{c-c^*}{c^*}$$

Known

The error in c^* = $1.13\cdot10^{-2}$

The error in c = $8.74 \cdot 10^{-2}$

Therefore

$$e_\sigma = \sqrt{\left(\frac{\partial \sigma}{\partial c}\right)^2 e_c^2 + \left(\frac{\partial \sigma}{\partial c^*}\right)^2 e_{c^*}^2} = \sqrt{\left(\frac{1}{c^{*2}}\right) * 7.64 \times 10^{-3} + \left(\frac{c^2}{c^{*4}}\right) * 1.27 \times 10^{-4}}$$

$$= 1.92 \times 10^{-3}$$

Average growth rate

The error in the average growth rate for potassium nitrate in demineralised water was calculated as follows:

$$k_{gavg} = \frac{k_{g1} + k_{g2} + k_{g3}}{3}$$

$$e_{k_{avg}} = \sqrt{\left(\frac{\partial k_{g_{avg}}}{\partial k_{g_1}}\right)^2 e_{k_{g1}}^2 + \left(\frac{\partial k_{g_{avg}}}{\partial k_{g_2}}\right)^2 e_{k_{g2}}^2 + \left(\frac{\partial k_{g_{avg}}}{\partial k_{g_3}}\right)^2 e_{k_{g3}}^2}$$

Definition of average relative error (a.r.e.)

The average relative error has been used as a gauge of the accuracy of correlations fitted to raw data. It is calculated as follows:

$$average\_relative\_error = \frac{\dfrac{\sum_{i=1}^{n} \left(V_{i,predicted} - V_{i,actual}\right)}{n}}{\dfrac{\sum_{i=1}^{n} V_{i,actual}}{n}}$$

Where	V_{actual}	experimentally determined data value
	$V_{predicted}$	data value predicted by the correlation

Appendix 6

Raw particle size distribution and density data for Experiments 1-4

Appendix 6.1
Experiment 1

Source M170699 SAMData Seg

Recordno	Runno	Time/Date	d10	d50	d90	Span	Resid	Obscur	SSA	1.32	1.6	1.95	2.38	2.9	3.53	4.3	5.24	6.39	7.78	9.48	11.55	14.08	17.15	20.9	25.46	31.01	37.79	46.03	56.09	68.33
1	1	6/17/99 2:22	63	385.5	568.3	1.3	9.07	-0.4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0.56	2.9	3.66	5.32
2	2	6/17/99 2:23	44.5	379.8	566.8	1.4	28.63	-0.4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.46	3.89	6.65	4.13	7.57
3	3	6/17/99 2:23	96.3	516.8	583.7	0.9	21.28	-0.3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.23
4	4	6/17/99 2:24	27.5	56.9	85.6	1	27.86	-0.2		0	0	0	0	0	0	0	0	0	0	0	0.02	0.38	1.8	3.19	3.16	4.31	11.7	17.64	7.24	10.3
5	5	6/17/99 2:24	38.3	65.4	89	0.8	24.11	-0.1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1.82	6.93	19.69	10.63	14.46
6	6	6/17/99 2:25	80.6	534	587	0.9	13.91	0.1		0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.09	0.14	0.2	0.45	1.54	2.48	0.94	1.24
7	7	6/17/99 2:25	68.7	471.9	576.3	1.1	12.48	0.3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1.33	3.91	1.79	2.62
8	8	6/17/99 2:26	85.8	528.6	586	0.9	7.74	0.5		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.12	0.9	2.7	1.02	1.35
9	9	6/17/99 2:26	390.7	545.1	589.3	0.4	5.39	0.7		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.38	2.47	0.58	0.57
10	10	6/17/99 2:27	83.8	143.8	284.3	1.4	18.77	1.1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.54
11	11	6/17/99 2:27	72.2	87.9	111.1	0.4	31.51	0.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	2.55	0.96	2.71
12	12	6/17/99 2:28	40.6	82.6	152	1.3	12.4	0.9		0	0	0	0	0	0	0	0	0	0	0	0.01	0.05	0.25	0.58	0.53	0.78	3.93	12.45	6.55	8.42
13	13	6/17/99 2:29	83.7	526.6	585.7	1	6.3	0.9		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0.54	2.75	1.49	1.87
14	14	6/17/99 2:29	64.1	129.6	287.2	1.7	1.22	5.9		0.4	0.24	0.05	0	0	0.08	0.15	0.17	0.19	0.23	0.27	0.37	0.35	0.09	0	0	0	0.24	1.34	2.77	4.99
15	15	6/17/99 2:30	52.9	123.7	220.1	1.4	0.99	10.3		0.16	0.49	0.02	0	0.01	0.38	0.23	0.14	0.12	0.13	0.17	0.23	0.33	0.49	0.68	0.76	0.8	1.24	1.9	2.58	3.79
16	16	6/17/99 2:30	59.1	137.3	235.7	1.3	1.06	12.9		0.03	0.12	0.18	0.21	0.21	0.18	0.14	0.12	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.37	0.43	0.91	1.89	2.74	3.44
17	17	6/17/99 2:31	66.7	148.2	246.8	1.2	1.16	14.6		0.03	0.11	0.17	0.2	0.19	0.17	0.13	0.11	0.11	0.14	0.17	0.21	0.25	0.31	0.34	0.27	0.13	0.34	1.25	2.44	3.39
18	18	6/17/99 2:31	74	158	262.6	1.2	1.19	16		0	0.08	0.15	0.19	0.2	0.17	0.13	0.11	0.11	0.12	0.15	0.19	0.25	0.34	0.41	0.19	0	0	0.56	2	3.11
19	19	6/17/99 2:32	79.7	164.8	272.4	1.2	1.25	16.9		0.01	0.18	0.43	0.01	0	0	0.26	0.16	0.12	0.12	0.13	0.17	0.23	0.32	0.41	0.21	0	0	0.03	1.45	2.8
20	20	6/17/99 2:32	87.6	170.9	277.7	1.1	1.39	17.1		0.01	0.17	0.41	0.01	0	0	0.26	0.16	0.12	0.12	0.13	0.17	0.23	0.3	0.38	0.23	0	0	0.01	0.75	2.09
21	21	6/17/99 2:33	88	174.5	285.3	1.1	1.42	17.7		0.01	0.16	0.4	0.01	0	0	0.26	0.15	0.11	0.1	0.12	0.16	0.2	0.28	0.39	0.3	0.01	0	0.01	0.55	2.14
22	22	6/17/99 2:33	94.8	179.8	289.2	1.1	1.43	19		0	0.15	0.39	0.01	0	0	0.26	0.16	0.11	0.1	0.12	0.16	0.2	0.27	0.37	0.31	0.01	0	0	0.19	1.58
23	23	6/17/99 2:34	98.7	185.3	295.8	1.1	1.52	19.7		0.01	0.17	0.35	0.01	0	0	0.25	0.16	0.11	0.1	0.11	0.15	0.19	0.25	0.37	0.37	0.01	0	0	0.01	1.27
24	24	6/17/99 2:34	101.2	188.8	301.3	1.1	1.6	20.1		0	0.1	0.36	0.01	0	0	0.28	0.17	0.11	0.09	0.1	0.14	0.18	0.25	0.35	0.36	0.01	0	0	0.01	1
25	25	6/17/99 2:35	103.4	192.1	305.8	1.1	1.62	20.5		0	0.15	0.33	0.01	0	0	0.26	0.16	0.1	0.09	0.1	0.14	0.18	0.24	0.35	0.38	0.01	0	0	0.01	0.82
26	26	6/17/99 2:35	105.9	195.8	310.8	1	1.67	20.8		0	0.08	0.35	0.01	0	0	0.29	0.17	0.11	0.08	0.09	0.13	0.17	0.23	0.33	0.38	0.06	0	0	0.01	0.67
27	27	6/17/99 2:36	107.1	197.2	313.4	1	1.7	21.5		0	0.07	0.35	0.01	0	0	0.29	0.17	0.11	0.08	0.09	0.13	0.17	0.22	0.33	0.39	0.08	0	0	0	0.59
28	28	6/17/99 2:36	109.7	200.8	319.5	1	1.7	21.7		0	0.03	0.21	0.37	0.01	0	0.01	0.22	0.14	0.1	0.1	0.13	0.16	0.21	0.31	0.39	0.13	0	0	0	0.42
29	29	6/17/99 2:37	112.5	204.8	323.4	1	1.77	22.9		0	0.01	0.2	0.37	0.01	0	0.01	0.22	0.14	0.09	0.09	0.12	0.15	0.2	0.3	0.39	0.18	0	0	0	0.23
30	30	6/17/99 2:37	113.2	206.2	328.1	1	1.88	22.7		0	0.01	0.19	0.36	0.01	0	0.01	0.21	0.14	0.09	0.09	0.13	0.16	0.21	0.3	0.37	0.17	0	0	0.01	0.18
31	31	6/17/99 2:38	114.9	208.9	332.2	1	1.85	23.2		0	0.01	0.18	0.36	0.01	0	0.01	0.22	0.14	0.09	0.08	0.12	0.15	0.2	0.29	0.38	0.2	0	0	0.01	0.09
32	32	6/17/99 2:38	114.9	209.5	333.7	1	1.88	22.9		0	0.01	0.18	0.36	0.01	0	0.01	0.22	0.14	0.09	0.09	0.12	0.15	0.2	0.29	0.37	0.21	0	0	0.01	0.1
33	33	6/17/99 2:39	115	209.9	333.6	1	1.88	23.5		0	0.06	0.2	0.31	0.01	0	0.01	0.21	0.14	0.09	0.09	0.12	0.15	0.2	0.29	0.38	0.22	0	0	0.01	0.09
34	34	6/17/99 2:39	115.8	210.4	333.6	1	1.93	23.3		0	0	0.18	0.36	0.01	0	0.01	0.23	0.15	0.09	0.08	0.12	0.15	0.2	0.29	0.38	0.22	0	0	0.02	0.03
35	35	6/17/99 2:40	116.8	212.1	336.7	1	1.89	23.8		0	0	0.17	0.36	0.01	0	0.01	0.22	0.14	0.09	0.08	0.11	0.15	0.2	0.29	0.37	0.23	0	0	0.01	0.01
36	36	6/17/99 2:40	117.7	213.1	337	1	1.88	23.7		0	0	0.17	0.36	0.01	0	0.01	0.22	0.15	0.09	0.08	0.11	0.15	0.19	0.28	0.38	0.24	0	0	0	0.02
37	37	6/17/99 2:41	117.3	212.3	336.3	1	1.95	23.8		0	0	0.17	0.36	0.01	0	0.01	0.23	0.15	0.09	0.08	0.11	0.15	0.19	0.28	0.37	0.23	0	0	0	0.02
38	38	6/17/99 2:41	116.4	211.3	335.5	1	1.91	23.9		0	0	0.17	0.36	0.01	0	0.01	0.22	0.15	0.09	0.08	0.12	0.15	0.2	0.29	0.37	0.22	0	0	0.02	0.01
39	39	6/17/99 2:42	117.7	212.6	335.7	1	1.93	24.5		0	0	0.17	0.36	0.01	0	0.01	0.23	0.15	0.09	0.08	0.11	0.15	0.2	0.28	0.37	0.24	0	0	0	0.02
40	40	6/17/99 2:42	117.6	213.2	338.6	1	1.94	24.5		0	0.05	0.19	0.31	0.01	0	0.01	0.22	0.14	0.09	0.08	0.11	0.15	0.19	0.28	0.38	0.24	0	0	0	0.02
41	41	6/17/99 2:43	117.6	213.1	337.3	1	1.93	24.5		0	0.05	0.19	0.31	0.01	0	0.01	0.22	0.15	0.09	0.08	0.11	0.15	0.19	0.28	0.37	0.25	0	0	0	0.02
42	42	6/17/99 2:44	118.5	214.2	338.7	1	1.92	24.4		0	0	0.17	0.36	0.01	0	0.01	0.23	0.15	0.09	0.08	0.11	0.15	0.19	0.28	0.37	0.24	0	0	0	0.02
43	43	6/17/99 2:44	117.5	213.4	338.5	1	1.96	24.8		0	0.05	0.19	0.31	0.01	0	0.01	0.21	0.15	0.1	0.09	0.12	0.15	0.19	0.28	0.37	0.24	0	0	0	0.02
44	44	6/17/99 2:45	118.4	214.2	339	1	1.87	24.2		0	0	0.16	0.36	0.01	0	0.01	0.23	0.15	0.1	0.08	0.11	0.15	0.19	0.28	0.36	0.23	0	0	0	0.02
45	45	6/17/99 2:45	119.4	216.2	341.2	1	1.98	25.3		0	0.05	0.19	0.31	0.01	0	0.01	0.22	0.15	0.09	0.08	0.11	0.14	0.19	0.27	0.37	0.26	0	0	0	0.01
46	46	6/17/99 2:46	121.4	218.5	345.1	1	2.05	25		0	0.04	0.18	0.31	0.01	0	0.01	0.22	0.15	0.09	0.07	0.1	0.14	0.18	0.26	0.36	0.28	0.01	0	0	0.01
47	47	6/17/99 2:46	121.6	218.1	344.9	1	1.96	25		0	0	0.16	0.35	0.01	0	0.01	0.23	0.15	0.08	0.07	0.1	0.14	0.18	0.27	0.36	0.26	0	0	0	0.01
48	48	6/17/99 2:47	122.4	219.4	343.8	1	2.02	24.8		0	0	0.15	0.35	0.01	0	0.01	0.24	0.16	0.09	0.07	0.1	0.14	0.18	0.26	0.36	0.29	0.01	0	0	0.01
49	49	6/17/99 2:47	122.3	220	346.5	1	2.03	25.4		0	0.04	0.18	0.31	0.01	0	0.01	0.22	0.15	0.09	0.07	0.1	0.14	0.18	0.26	0.36	0.28	0.01	0	0	0.01
50	50	6/17/99 2:48	122.8	220.2	343.7	1	1.96	25.3		0	0.04	0.18	0.31	0.01	0	0.01	0.23	0.15	0.09	0.07	0.1	0.13	0.17	0.25	0.36	0.31	0.01	0	0	0.01
51	51	6/17/99 2:48	123.2	221.7	350.5	1	2.05	24.7		0	0	0.15	0.35	0.01	0	0.01	0.23	0.15	0.08	0.06	0.1	0.13	0.18	0.26	0.35	0.28	0.01	0	0	0.01
52	52	6/17/99 2:49	124.4	222.8	349.9	1	2.1	25.6		0	0.04	0.18	0.3	0.01	0	0.01	0.22	0.15	0.08	0.07	0.1	0.13	0.18	0.26	0.36	0.3	0.01	0	0	0.01
53	53	6/17/99 2:49	126.2	225.4	355.2	1	2.07	25.6		0	0	0.14	0.34	0.01	0	0.01	0.24	0.16	0.08	0.05	0.09	0.13	0.17	0.25	0.35	0.31	0.01	0	0	0.01
54	54	6/17/99 2:50	126.9	225.8	351.1	1	2.01	25.9		0	0	0.14	0.35	0.01	0	0.01	0.24	0.16	0.08	0.05	0.08	0.12	0.16	0.24	0.35	0.33	0.01	0	0	0.01
55	55	6/17/99 2:50	126.8	226.9	358.8	1	2.12	25.2		0	0.03	0.17	0.3	0.01	0	0.01	0.23	0.15	0.08	0.06	0.09	0.13	0.17	0.24	0.34	0.3	0.01	0	0	0.01
56	56	6/17/99 2:51	127.8	227.5	357.7	1	2.13	25.5		0	0	0.13	0.34	0.01	0	0.01	0.24	0.16	0.08	0.05	0.08	0.12	0.17	0.24	0.35	0.31	0.01	0	0	0.01
57	57	6/17/99 2:51	129	228.7	360	1	2.22	25.6		0	0.03	0.17	0.29	0.01	0	0.01	0.23	0.16	0.07	0.05	0.08	0.12	0.16	0.24	0.35	0.33	0.01	0	0	0
58	58	6/17/99 2:52	129.3	231.1	366	1	2.25	26.4		0	0	0.11	0.34	0.01	0	0.01	0.24	0.16	0.09	0.05	0.08	0.12	0.16	0.24	0.34	0.32	0.01	0	0	0.01
59	59	6/17/99 2:52	130.6	231.6	363.1	1	2.14	25.7		0	0	0.12	0.34	0.01	0	0.01	0.24	0.16	0.08	0.05	0.08	0.11	0.15	0.23	0.34	0.34	0.01	0	0	0
60	60	6/17/99 2:53	131.2	232.2	362.5	1	2.19	26.4		0	0	0.12	0.35	0.01	0	0.01	0.24	0.16	0.08	0.04	0.07	0.11	0.15	0.22	0.34	0.34	0.01	0	0	0
61	61	6/17/99 2:53	131.7	233.2	367.9	1	2.26	26.3		0	0.02	0.16	0.29	0.01	0	0.01	0.23	0.16	0.08	0.05	0.08	0.12	0.16	0.23	0.34	0.33	0.01	0	0	0
62	62	6/17/99 2:54	132.3	233.4	363.5	1	2.23	26.5		0	0.02	0.16	0.3	0.01	0	0.01	0.24	0.16	0.08	0.04	0.07	0.11	0.15	0.22	0.34	0.36	0.01	0	0	0
63	63	6/17/99 2:54	134	236	367.3	1	2.31	28		0	0	0.11	0.35	0.01	0	0.01	0.25	0.17	0.08	0.03	0.06	0.1	0.14	0.22	0.34	0.37	0.01	0	0	0
64	64	6/17/99 2:55	134.5	236.8	369.4	1	2.26	27.6		0	0	0.1	0.35	0.01	0	0.01	0.25	0.17	0.08	0.04	0.06	0.1	0.14	0.22	0.34	0.38	0.01	0	0	0
65	65	6/17/99 2:55	130.5	237.7	385.6	1.1	2.39	27.1		0	0.01	0.15	0.29	0.01	0	0.01	0.23	0.16	0.08	0.04	0.07	0.11	0.15	0.22	0.33	0.34	0.01	0	0	0
66	66	6/17/99 2:56	134.5	237	370.3	1	2.41	27.3		0	0	0.09	0.34	0.01	0	0.01	0.25	0.17	0.08	0.04	0.06	0.11	0.15	0.23	0.33	0.35	0.01	0	0	0
67	67	6/17/99 2:57	135.6	237.2	368.3	1	2.26	27.5		0	0	0.1	0.34	0.01	0	0.01	0.25	0.17	0.08	0.03	0.06	0.1	0.14	0.21	0.33	0.37	0.01	0	0	0
68	68	6/17/99 2:58	136.3	239.8	374	1	2.34	27.7		0	0	0.1	0.34	0.01	0	0.01	0.25	0.17	0.08	0.03	0.06	0.1	0.14	0.21	0.33	0.39	0.01	0	0	0
69	69	6/17/99 2:58	138.9	242.3	380.3	1	2.47	27.6		0	0	0.15	0.29	0.01	0	0.01	0.23	0.17	0.08	0.03	0.06	0.1	0.15	0.21	0.32	0.36	0.05	0	0	0
70	70	6/17/99 2:58	134.6	242.4	392.6	1.1	2.52	27		0	0	0.14	0.29	0.01	0	0.01	0.23	0.17	0.08	0.03	0.06	0.1	0.14	0.21	0.32	0.35	0.04	0	0	0
71	71	6/17/99 2:59	140.3	243.3	379.7	1	2.41	27.4		0	0	0.14	0.29	0.01	0	0.01	0.24	0.17	0.08	0.03	0.05	0.1	0.13	0.2	0.31	0.37	0.06	0	0	0
72	72	6/17/99 2:59	140	242.7	374.7	1	2.38	27.2		0	0	0.07	0.35	0.01	0	0.01	0.25	0.18	0.08	0.02	0.05	0.09	0.13	0.2	0.32	0.38	0.07	0	0	0
73	73	6/17/99 3:00	140.4	243.2	379.6	1	2.36	27.1		0	0	0.15	0.29	0.01	0	0.01	0.23	0.17	0.08	0.03	0.05	0.1	0.13	0.2	0.31	0.37	0.05	0	0	0
74	74	6/17/99 3:00	142.7	246.1	382.7	1	2.51	27.9		0	0	0.14	0.29	0.01	0	0.01	0.24	0.17	0.08	0.02	0.04	0.09	0.13	0.2	0.31	0.38	0.1	0	0	0
75	75	6/17/99 3:01	141.9	246.2	387.6	1	2.51	27.7		0	0	0.14	0.28	0.01	0	0.01	0.24	0.17	0.08	0.03	0.05	0.1	0.14	0.21	0.31	0.36	0.08	0	0	0
76	76	6/17/99 3:01	138.5	246.6	393	1	2.51	27.9		0	0	0.06	0.35	0.01	0	0.01	0.25	0.18	0.09	0.02	0.04	0.09	0.13	0.19	0.3	0.38	0.11	0	0	0
77	77	6/17/99 3:02	136.9	245.2	396.6	1.1	2.53	27.1		0	0	0.07	0.33	0.01	0	0.01	0.24	0.17	0.08	0.03	0.05	0.1	0.14	0.21	0.31	0.35	0.05	0	0	0
78	78	6/17/99 3:02	142.3	245.2	380.2	1	2.39	27.4		0	0	0.08	0.34	0.01	0	0.01	0.25	0.18	0.08	0.02	0.05	0.1	0.14	0.2	0.31	0.37	0.07	0	0	0

83.26	101.44	123.59	150.57	183.44	223.51	272.31	331.77	404.21	492.47	600
7.08	4.23	1.54	0.82	0.91	2.64	5.12	7.3	10.88	15.78	31.22
20.1	6.05	0.14	0	0	0	0.01	0.03	1.97	16.74	32.25
4.49	6.64	0.62	-0.02	0	0.01	0.4	1.36	5.4	19.38	61.49
27.01	12.5	0.75	0	0	0	0	0	0	0	0
28.39	15.46	2.31	0.01	0	0	0	0	0	0	0
3.47	2.2	0.18	0	0	0	0	0.08	1.21	11.91	73.84
7.23	7	2.62	0.82	0.02	0.01	0.33	1.8	7.18	19.47	43.68
3.43	2.16	0.18	0	0	0	0.01	0.67	3.7	14.41	69.37
0.92	0.2	0	0	0	0	0.1	1.12	4.48	8.58	80.57
8.73	22.91	10.93	8.44	5.76	10.53	18.3	11.84	1.92	0.01	0
28.86	47.89	12.77	4.2	0.04	0	0	0	0	0	0
17.18	16.78	10.76	11.27	6.42	3.3	0.72	0.03	0	0	0
3.22	1.98	0.23	0	0	0	0.39	2	5.5	12.67	67.31
8.37	12.17	14.19	13.31	11.25	9.31	7.69	5.98	4.05	1.75	0.02
6.49	11.5	17.28	17.99	13.69	9	5.55	2.93	0.94	0	0
4.92	8.36	14.29	18.68	17.05	11.88	7.23	3.73	1.26	0.01	0
4.53	7	11.96	17.56	18.74	14.44	9.03	4.68	1.59	0.01	0
4.17	6.21	10.45	16.1	19.03	16.26	10.99	6.03	2.28	0.01	0
3.92	5.77	9.59	15.13	18.95	17.29	12.28	7.09	2.88	0.04	0
3.37	5.28	9	14.65	19.27	18.4	13.45	7.77	3.11	0.16	0
3.45	5.16	8.47	13.79	18.69	18.53	14	8.45	3.72	0.4	0
2.9	4.61	7.87	13.34	18.94	19.5	14.98	8.98	3.93	0.55	0
2.63	4.26	7.27	12.48	18.44	19.98	16.01	9.87	4.43	0.76	0
2.42	4.1	7.01	12	17.97	20.1	16.55	10.48	4.88	0.96	0
2.23	3.89	6.69	11.52	17.63	20.26	17.06	10.96	5.25	1.18	0
2.07	3.7	6.35	10.96	17.07	20.34	17.67	11.61	5.68	1.38	0
1.98	3.6	6.24	10.81	16.91	20.32	17.82	11.83	5.89	1.52	0.01
1.81	3.39	5.88	10.27	16.47	20.44	18.35	12.37	6.3	1.77	0.02
1.63	3.18	5.55	9.75	15.94	20.5	19.05	13.04	6.68	1.94	0.02
1.55	3.15	5.58	9.72	15.65	20.03	18.88	13.34	7.15	2.29	0.01
1.45	3.01	5.37	9.39	15.28	19.96	19.18	13.72	7.5	2.54	0.03
1.45	3.02	5.36	9.34	15.15	19.8	19.15	13.85	7.65	2.63	0.03
1.44	3	5.33	9.27	15.07	19.85	19.26	13.9	7.65	2.63	0.03
1.4	2.95	5.26	9.21	15.08	19.92	19.4	13.98	7.65	2.61	0.03
1.34	2.88	5.15	9.02	14.81	19.77	19.51	14.25	7.93	2.85	0.04
1.27	2.81	5.06	8.9	14.67	19.81	19.71	14.44	8.01	2.83	0.03
1.3	2.84	5.08	8.96	14.83	19.91	19.61	14.27	7.91	2.8	0.03
1.37	2.9	5.19	9.11	14.93	19.84	19.44	14.11	7.83	2.75	0.03
1.26	2.8	5.04	8.89	14.81	20.02	19.75	14.32	7.87	2.74	0.03
1.27	2.81	5.06	8.9	14.67	19.73	19.57	14.38	8.11	2.98	0.04
1.27	2.8	5.04	8.89	14.7	19.81	19.66	14.42	8.04	2.85	0.04
1.22	2.74	4.94	8.73	14.56	19.84	19.82	14.54	8.15	2.97	0.04
1.29	2.81	5.05	8.86	14.63	19.71	19.59	14.44	8.14	2.95	0.04
1.23	2.75	4.98	8.8	14.57	19.68	19.7	14.63	8.24	2.95	0.04
1.15	2.66	4.83	8.53	14.25	19.61	19.97	14.92	8.46	3.12	0.05
1.02	2.5	4.62	8.26	13.99	19.58	20.13	15.15	8.73	3.39	0.21
1.01	2.48	4.62	8.3	14.09	19.65	20.09	15.08	8.67	3.39	0.21
0.95	2.43	4.52	8.1	13.88	19.69	20.47	15.42	8.75	3.26	0.11
0.96	2.43	4.52	8.09	13.77	19.49	20.3	15.42	8.9	3.47	0.22
0.97	2.41	4.41	7.91	13.71	19.81	20.76	15.52	8.68	3.22	0.19
0.93	2.38	4.43	7.94	13.54	19.29	20.28	15.59	9.15	3.72	0.4
0.83	2.27	4.31	7.8	13.43	19.32	20.58	15.87	9.22	3.65	0.35
0.74	2.16	4.13	7.53	13.09	19.13	20.65	16.08	9.55	4.01	0.6
0.74	2.14	4.01	7.31	12.98	19.4	21.18	16.41	9.42	3.65	0.43
0.71	2.12	4.09	7.43	12.88	18.86	20.55	16.25	9.8	4.23	0.77
0.65	2.05	3.98	7.3	12.81	19.02	20.81	16.39	9.81	4.17	0.69
0.59	1.96	3.85	7.14	12.69	18.99	20.89	16.52	9.94	4.3	0.82
0.59	1.96	3.84	7.01	12.31	18.48	20.7	16.71	10.34	4.67	1.09
0.56	1.91	3.68	6.77	12.19	18.79	21.21	16.95	10.25	4.45	0.97
0.53	1.88	3.64	6.68	12.08	18.78	21.42	17.13	10.27	4.4	0.94
0.47	1.81	3.62	6.75	12.09	18.48	20.98	17.04	10.52	4.79	1.19
0.47	1.81	3.53	6.53	11.91	18.74	21.59	17.32	10.35	4.46	1
0.38	1.73	3.4	6.28	11.53	18.45	21.71	17.71	10.7	4.7	1.16
0.36	1.7	3.35	6.2	11.44	18.38	21.65	17.72	10.83	4.85	1.27
0.48	1.97	3.78	6.68	11.46	17.25	19.93	16.94	11.3	5.9	2.11
0.32	1.66	3.41	6.37	11.56	18.16	21.32	17.75	11.06	4.95	1.2
0.31	1.64	3.29	6.13	11.39	18.45	21.9	17.89	10.8	4.77	1.2
0.29	1.61	3.23	5.98	11.04	17.95	21.67	18.15	11.26	5.14	1.46
0.2	1.5	3.15	5.9	10.81	17.52	21.38	18.32	11.73	5.58	1.72
0.29	1.79	3.52	6.24	10.86	16.83	20.16	17.54	11.85	6.3	2.42
0.16	1.47	3.03	5.63	10.54	17.59	21.81	18.58	11.74	5.52	1.71
0.15	1.5	3.07	5.67	10.56	17.69	22.09	18.8	11.67	5.21	1.39
0.16	1.47	3.02	5.66	10.61	17.59	21.77	18.58	11.73	5.5	1.72
0.07	1.37	2.88	5.38	10.16	17.27	21.99	19.02	12.06	5.71	1.86
0.09	1.35	2.94	5.57	10.34	17.09	21.39	18.7	12.17	6.04	2.11
0.07	1.66	3.25	5.71	10.17	16.6	20.87	18.42	12.28	6.35	2.4
0.17	1.68	3.38	6.02	10.54	16.59	20.26	17.87	12.16	6.54	2.63
0.07	1.39	2.92	5.47	10.28	17.4	22.03	19.01	11.99	5.56	1.69

Time	Density	Box Temp	Cry Temp	Status	
14:02:52	0.953958	59.85474	56.629	Loading	cell
14:02:58	0.953958	59.85474	56.527		
14:03:10	1.13508	59.85091	56.367		
14:03:22	1.33628	59.84742	56.208		
14:03:28	1.335739	59.84393	56.134	Stabilising:0.0405%	
14:03:40	1.334123	59.84306	56.001	Stabilising:0.0507%	
14:03:52	1.333233	59.84878	55.864	Measuring	
14:03:58	1.332937	59.85243	55.788		
14:04:10	1.332547	59.85178	55.659		
14:04:22	1.332303	59.852	55.537	Done	
14:04:28	1.332207	59.85198	55.453		
14:04:40	1.33212	59.85186	55.365		
14:04:52	1.33207	59.84887	55.258		
14:04:58	1.332053	59.85243	55.182		
14:05:10	1.332022	59.85234	55.103		
14:05:22	1.332015	59.8524	54.986		
14:05:28	1.332022	59.85188	54.94		
14:05:40	1.331993	59.85181	54.86	Start	measurement
14:05:52	1.332023	59.85186	54.804	Loading	cell
14:05:58	1.332576	59.85197	54.764		
14:06:10	1.332484	59.85136	54.688		
14:06:22	1.334043	59.85232	54.618		
14:06:28	1.333527	59.85193	54.585	Stabilising:0.0387%	
14:06:40	1.332836	59.85218	54.528	Stabilising:0.0229%	
14:06:52	1.332486	59.85246	54.468	Measuring	
14:06:58	1.332372	59.85186	54.438		
14:07:10	1.332206	59.85168	54.388		
14:07:22	1.332133	59.85223	54.343	Done	
14:07:28	1.332094	59.85222	54.323		
14:07:40	1.332061	59.852	54.291		
14:07:52	1.332034	59.85236	54.26		
14:07:58	1.332029	59.85218	54.242		
14:08:10	1.332022	59.85208	54.208		
14:08:22	1.332022	59.85214	54.182		
14:08:28	1.332017	59.85161	54.165		
14:08:40	1.33202	59.85213	54.122	Start	measurement
14:08:52	1.332007	59.85223	54.062	Loading	cell
14:08:58	1.333189	59.85209	54.021		
14:09:10	1.3355	59.85114	53.925		
14:09:22	1.33417	59.85197	53.818		
14:09:28	1.333574	59.85128	53.763	Stabilising:0.0446%	
14:09:40	1.332896	59.85143	53.643	Stabilising:0.0220%	
14:09:52	1.332525	59.84971	53.532	Measuring	
14:09:58	1.332417	59.85225	53.473		
14:10:10	1.332249	59.85177	53.353		
14:10:22	1.332154	59.85123	53.225	Done	
14:10:28	1.332121	59.85213	53.162		
14:10:40	1.332084	59.85198	53.038		
14:10:52	1.332068	59.85134	52.916		
14:10:58	1.332059	59.85184	52.849		
14:11:10	1.332048	59.85209	52.721		
14:11:22	1.332038	59.85227	52.594		
14:11:28	1.332053	59.85161	52.545		
14:11:40	1.332039	59.85191	52.421	Start	measurement
14:11:52	1.332126	59.85166	52.281	Loading	cell
14:11:58	1.334894	59.85189	52.244		
14:12:10	1.336108	59.84992	52.113		
14:12:22	1.334463	59.84744	51.991		
14:12:28	1.333866	59.84652	51.932	Stabilising:0.0447%	
14:12:40	1.333074	59.85209	51.814	Stabilising:0.0251%	
14:12:52	1.332639	59.84837	51.684	Measuring	
14:12:58	1.332489	59.85198	51.655		
14:13:10	1.332295	59.85194	51.563		
14:13:22	1.332194	59.85126	51.474	Done	
14:13:28	1.332151	59.85164	51.427		
14:13:40	1.332105	59.85037	51.349		
14:13:52	1.332078	59.85204	51.276		
14:13:58	1.332062	59.85177	51.237		
14:14:10	1.332051	59.85238	51.162		
14:14:22	1.332051	59.8523	51.097		
14:14:28	1.332047	59.85087	51.06		
14:14:40	1.332038	59.85197	51.005	Start	measurement
14:14:52	1.332049	59.85197	50.95	Loading	cell
14:14:58	1.334688	59.85222	50.909		
14:15:10	1.336379	59.85184	50.824		
14:15:22	1.334665	59.84941	50.754		
14:15:28	1.33393	59.85197	50.724	Stabilising:0.0550%	
14:15:40	1.333109	59.84731	50.659	Stabilising:0.0322%	
14:15:52	1.332662	59.84718	50.589	Stabilising:0.0148%	
14:15:58	1.332511	59.8515	50.559	Stabilising:0.0113%	
14:16:10	1.332314	59.85236	50.516	Stabilising:0.0063%	
14:16:22	1.332192	59.85232	50.467	Stabilising:0.0050%	
14:16:28	1.332168	59.85191	50.444	Measuring	
14:16:40	1.332105	59.85227	50.409		
14:16:52	1.332079	59.85198	50.373		
14:16:58	1.332063	59.85219	50.351	Done	
14:17:10	1.332061	59.85249	50.32		
14:17:22	1.332055	59.8524	50.293		
14:17:28	1.332049	59.85236	50.277		
14:17:40	1.332051	59.85232	50.261	Start	measurement
14:17:52	1.332029	59.85245	50.25	Loading	cell
14:17:58	1.334494	59.8524	50.234		

Time	Density	Box Temp	Cry Temp	Status	
14:56:52	1.32449	59.83431	49.138	Loading	cell
14:56:58	1.327459	59.83396	49.131		
14:57:10	1.329211	59.8343	49.12		
14:57:22	1.327205	59.83442	49.115		
14:57:28	1.326463	59.83408	49.111	Stabilising:0.0558%	
14:57:40	1.325446	59.83988	49.104	Stabilising:0.0354%	
14:57:52	1.324938	59.84088	49.1	Stabilising:0.0165%	
14:57:58	1.324772	59.84479	49.102	Stabilising:0.0125%	
14:58:10	1.324554	59.84779	49.11	Stabilising:0.0067%	
14:58:22	1.32443	59.85089	49.107	Stabilising:0.0039%	
14:58:28	1.324384	59.85238	49.107	Stabilising:0.0035%	
14:58:40	1.324325	59.85219	49.118	Stabilising:0.0019%	
14:58:52	1.324289	59.85222	49.118	Stabilising:0.0012%	
14:58:58	1.324279	59.85218	49.114	Stabilising:0.0008%	
14:59:10	1.324264	59.85243	49.116	Measuring	
14:59:22	1.324252	59.85171	49.118		
14:59:28	1.324252	59.85204	49.116		
14:59:40	1.324244	59.85157	49.126	Start	measurement
14:59:52	1.324314	59.85128	49.133	Loading	cell
14:59:58	1.327537	59.85039	49.126		
15:00:10	1.329223	59.84099	49.113		
15:00:22	1.327182	59.83397	49.108		
15:00:28	1.326435	59.83403	49.103	Stabilising:0.0562%	
15:00:40	1.325468	59.83383	49.095	Stabilising:0.0313%	
15:00:52	1.324927	59.83367	49.089	Stabilising:0.0176%	
15:00:58	1.324755	59.83388	49.092	Stabilising:0.0130%	
15:01:10	1.324505	59.8339	49.101	Stabilising:0.0075%	
15:01:22	1.324376	59.83381	49.1	Stabilising:0.0043%	
15:01:28	1.324335	59.83411	49.1	Stabilising:0.0031%	
15:01:40	1.324277	59.83458	49.111	Stabilising:0.0017%	
15:01:52	1.324237	59.83435	49.111	Stabilising:0.0014%	
15:01:58	1.324229	59.83428	49.106	Stabilising:0.0006%	
15:02:10	1.324212	59.83695	49.111	Measuring	
15:02:22	1.324203	59.83447	49.111		
15:02:28	1.3242	59.83507	49.11		
15:02:40	1.324191	59.83515	49.119	Start	measurement
15:02:52	1.32418	59.83385	49.126	Loading	cell
15:02:58	1.327037	59.83424	49.119		
15:03:10	1.32917	59.83394	49.109		
15:03:22	1.327087	59.83396	49.105		
15:03:28	1.326349	59.83397	49.101	Stabilising:0.0556%	
15:03:40	1.325406	59.83802	49.095	Stabilising:0.0299%	
15:03:52	1.324869	59.84242	49.092	Stabilising:0.0176%	
15:03:58	1.324697	59.84432	49.095	Stabilising:0.0130%	
15:04:10	1.324469	59.84408	49.104	Stabilising:0.0075%	
15:04:22	1.324335	59.84959	49.105	Stabilising:0.0050%	
15:04:28	1.32428	59.8524	49.109	Stabilising:0.0042%	
15:04:40	1.324223	59.85194	49.123	Stabilising:0.0022%	
15:04:52	1.32419	59.85216	49.127	Stabilising:0.0018%	
15:04:58	1.324181	59.85209	49.126	Measuring	
15:05:10	1.324159	59.85232	49.134		
15:05:22	1.324158	59.85236	49.14		
15:05:28	1.324152	59.85227	49.14	Done	
15:05:40	1.324149	59.85205	49.153	Start	measurement
15:05:52	1.324126	59.85255	49.163	Loading	cell
15:05:58	1.32713	59.85216	49.157		
15:06:10	1.32925	59.8523	49.149		
15:06:22	1.327301	59.85243	49.148		
15:06:28	1.326557	59.85205	49.146	Stabilising:0.0560%	
15:06:40	1.32557	59.85234	49.138	Stabilising:0.0280%	
15:06:52	1.325056	59.85213	49.136	Stabilising:0.0163%	
15:06:58	1.324884	59.8524	49.14	Stabilising:0.0130%	
15:07:10	1.324668	59.85219	49.147	Stabilising:0.0067%	
15:07:22	1.32454	59.85223	49.144	Stabilising:0.0042%	
15:07:28	1.324496	59.85173	49.144	Stabilising:0.0033%	
15:07:40	1.324445	59.85186	49.154	Stabilising:0.0017%	
15:07:52	1.324411	59.85198	49.151	Stabilising:0.0011%	
15:07:58	1.324399	59.85182	49.146	Stabilising:0.0009%	
15:08:10	1.32439	59.85246	49.149	Measuring	
15:08:22	1.324369	59.85035	49.151		
15:08:28	1.324369	59.85243	49.151		
15:08:40	1.324366	59.85254	49.161	Start	measurement
15:08:52	1.324434	59.85238	49.17	Loading	cell
15:08:58	1.327651	59.85182	49.164		
15:09:10	1.328959	59.85193	49.154		
15:09:22	1.327231	59.85197	49.152		
15:09:28	1.326548	59.8521	49.15	Stabilising:0.0514%	
15:09:40	1.325655	59.85223	49.143	Stabilising:0.0288%	
15:09:52	1.32514	59.85232	49.143	Stabilising:0.0167%	
15:09:58	1.324945	59.8524	49.149	Stabilising:0.0147%	
15:10:10	1.32473	59.85198	49.16	Stabilising:0.0069%	
15:10:22	1.324609	59.852	49.161	Stabilising:0.0037%	
15:10:28	1.324563	59.8521	49.162	Stabilising:0.0035%	
15:10:40	1.324509	59.8525	49.175	Stabilising:0.0017%	
15:10:52	1.324473	59.85234	49.177	Stabilising:0.0014%	
15:10:58	1.324459	59.85208	49.174	Stabilising:0.0011%	
15:11:10	1.324446	59.8523	49.177	Measuring	
15:11:22	1.32444	59.85227	49.178		
15:11:28	1.324433	59.85246	49.177		
15:11:40	1.324431	59.85236	49.187	Start	measurement
15:11:52	1.324434	59.8525	49.194	Loading	cell
15:11:58	1.326382	59.85234	49.187		

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14:18:10  1.335023  59.85259    50.201
14:18:22  1.334214  59.85229    50.176
14:18:28  1.333795  59.85246    50.161 Stabilising:0.0314%
14:18:40  1.333107  59.85234    50.129 Stabilising:0.0240%
14:18:52  1.332672  59.85236    50.102 Stabilising:0.0143%
14:18:58  1.332531  59.85249    50.097 Stabilising:0.0106%
14:19:10  1.332325  59.85216    50.089 Stabilising:0.0051%
14:19:22  1.332203  59.85281    50.068 Stabilising:0.0043%
14:19:28  1.332168  59.85488    50.061 Stabilising:0.0026%
14:19:40  1.332121  59.85269    50.061 Stabilising:0.0012%
14:19:52  1.332095  59.85343    50.053 Stabilising:0.0009%
14:19:58  1.332077  59.85565    50.042 Measuring
14:20:10  1.332074   59.8521    50.023
14:20:22   1.33207  59.85251    50.026
14:20:28  1.332052  59.85255    50.026 Done
14:20:40  1.332059   59.8527    50.034 Start       measurement
14:20:52  1.331907  59.85227    50.046 Loading     cell
14:20:58  1.334568  59.85225    50.041
14:21:10  1.335987  59.85265     50.03
14:21:22  1.334226  59.85255    50.023
14:21:28  1.333565  59.85266    50.018 Stabilising:0.0495%
14:21:40  1.332686  59.85222    50.005 Stabilising:0.0283%
14:21:52  1.332172  59.85204    49.995 Stabilising:0.0178%
14:21:58  1.332009  59.85249    49.996 Stabilising:0.0122%
14:22:10  1.331814  59.85277        50 Stabilising:0.0065%
14:22:22  1.331691  59.85229    49.994 Stabilising:0.0039%
14:22:28  1.331654  59.85251    49.989 Stabilising:0.0028%
14:22:40  1.331605  59.85261    49.994 Stabilising:0.0019%
14:22:52  1.331572  59.85255    49.989 Stabilising:0.0008%
14:22:58   1.33156  59.85306    49.981 Measuring
14:23:10  1.331553  59.85306    49.977
14:23:22  1.331539  59.85262    49.972
14:23:28  1.331536  59.85295    49.966 Done
14:23:40   1.33153  59.85274    49.966 Start       measurement
14:23:52  1.331528  59.85223    49.967 Loading     cell
14:23:58  1.333535  59.85222    49.956
14:24:10  1.334675   59.8524    49.935
14:24:22  1.332704  59.85214    49.919
14:24:28  1.332067  59.85232    49.909 Stabilising:0.0478%
14:24:40  1.331202  59.85204    49.889 Stabilising:0.0284%
14:24:52  1.330731  59.85219    49.875 Stabilising:0.0151%
14:24:58  1.330572  59.85225    49.871 Stabilising:0.0119%
14:25:10  1.330367  59.85202    49.872 Stabilising:0.0065%
14:25:22  1.330245  59.85166    49.857 Stabilising:0.0040%
14:25:28  1.330204  59.85198    49.853 Stabilising:0.0031%
14:25:40  1.330146  59.85234    49.855 Stabilising:0.0018%
14:25:52   1.33012  59.85216    49.846 Stabilising:0.0011%
14:25:58  1.330112  59.85169    49.837 Measuring
14:26:10  1.330099  59.85219    49.829
14:26:22   1.33009  59.85181    49.819
14:26:28  1.330089  59.85205    49.811 Done
14:26:40   1.33008  59.85223    49.807 Start       measurement
14:26:52  1.330109  59.85044    49.806 Loading     cell
14:26:58  1.332687  59.84814    49.792
14:27:10   1.33368  59.84181    49.769
14:27:22  1.331734  59.83403    49.753
14:27:28   1.33103   59.8341    49.743 Stabilising:0.0528%
14:27:40  1.330109  59.83403    49.724 Stabilising:0.0297%
14:27:52  1.329558  59.83403    49.708 Stabilising:0.0192%
14:27:58  1.329395  59.83446    49.706 Stabilising:0.0123%
14:28:10  1.329191  59.83814    49.706 Stabilising:0.0063%
14:28:22  1.329073  59.83437    49.696 Stabilising:0.0038%
14:28:28  1.329027   59.8343    49.695 Stabilising:0.0035%
14:28:40  1.328975  59.83871    49.703 Stabilising:0.0015%
14:28:52  1.328933  59.83526    49.701 Stabilising:0.0013%
14:28:58  1.328923   59.8372    49.695 Stabilising:0.0008%
14:29:10  1.328907  59.84004    49.692 Measuring
14:29:22  1.328902  59.83777    49.689
14:29:28  1.328898  59.83608    49.686
14:29:40  1.328902  59.84241    49.691 Start       measurement
14:29:52  1.328885  59.84515    49.697 Loading     cell
14:29:58  1.331385  59.84447    49.689
14:30:10  1.332772  59.83426    49.672
14:30:22  1.330764  59.83386    49.663
14:30:28  1.330072  59.83462    49.658 Stabilising:0.0519%
14:30:40  1.329153  59.83405    49.644 Stabilising:0.0297%
14:30:52  1.328655  59.83386    49.636 Stabilising:0.0159%
14:30:58  1.328492  59.83474    49.637 Stabilising:0.0123%
14:31:10  1.328269  59.83682    49.641 Stabilising:0.0072%
14:31:22  1.328138  59.83469    49.638 Stabilising:0.0047%
14:31:28  1.328091  59.83587    49.636 Stabilising:0.0035%
14:31:40  1.328047  59.83843    49.645 Stabilising:0.0016%
14:31:52  1.328018  59.84819    49.644 Stabilising:0.0011%
14:31:58   1.32799  59.85017    49.637 Stabilising:0.0021%
14:32:10  1.327985  59.85216    49.637 Measuring
14:32:22   1.32796  59.85222    49.634
14:32:28   1.32796  59.85219    49.632
14:32:40  1.327976  59.85219    49.638 Start       measurement
14:32:52   1.32797  59.85209    49.645 Loading     cell
14:32:58  1.330918  59.85148    49.639
14:33:10  1.332343  59.85218    49.624
14:33:22   1.33043  59.85238    49.618
14:33:28   1.32971  59.85204    49.614 Stabilising:0.0541%
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15:12:10  1.329437  59.85209    49.177
15:12:22  1.327459  59.85202    49.172
15:12:28  1.326734  59.85225    49.169 Stabilising:0.0546%
15:12:40  1.325822  59.85234    49.162 Stabilising:0.0289%
15:12:52  1.325299  59.85218    49.159 Stabilising:0.0168%
15:12:58  1.325136  59.85234    49.164 Stabilising:0.0123%
15:13:10   1.32491   59.8524    49.174 Stabilising:0.0070%
15:13:22  1.324769  59.85219    49.172 Stabilising:0.0040%
15:13:28  1.324734  59.85204    49.172 Stabilising:0.0026%
15:13:40  1.324671  59.85216    49.184 Stabilising:0.0023%
15:13:52   1.32464  59.85245    49.183 Stabilising:0.0012%
15:13:58  1.324629  59.85208    49.178 Stabilising:0.0008%
15:14:10  1.324613  59.85222    49.179 Measuring
15:14:22  1.324603  59.85243     49.18
15:14:28  1.324597  59.85261    49.178
15:14:40  1.324596  59.85227    49.187 Start       measurement
15:14:52  1.324593  59.85216    49.196 Loading     cell
15:14:58  1.327426  59.85243    49.189
15:15:10  1.329488  59.85241    49.179
15:15:22  1.327546  59.85197    49.174
15:15:28  1.326825  59.85216    49.171 Stabilising:0.0543%
15:15:40  1.325799  59.85223    49.162 Stabilising:0.0304%
15:15:52  1.325294  59.85216     49.16 Stabilising:0.0164%
15:15:58  1.325131  59.85261    49.164 Stabilising:0.0123%
15:16:10  1.324912  59.85214    49.175 Stabilising:0.0072%
15:16:22  1.324791  59.85225    49.174 Stabilising:0.0039%
15:16:28  1.324748  59.85222    49.176 Stabilising:0.0032%
15:16:40   1.32469  59.85229    49.188 Stabilising:0.0013%
15:16:52  1.324654  59.85246    49.189 Stabilising:0.0011%
15:16:58  1.324639  59.85198    49.185
15:17:10  1.324625   59.8523    49.187 Measuring
15:17:22  1.324617  59.85236    49.186
15:17:28  1.324612  59.85249    49.184
15:17:40  1.324612  59.85257    49.195 Start       measurement
15:17:52  1.324633  59.85219    49.203 Loading     cell
15:17:58  1.327707  59.85243    49.197
15:18:10  1.329508  59.85243    49.187
15:18:22  1.327544  59.85186    49.184
15:18:28  1.326825  59.85254    49.182 Stabilising:0.0541%
15:18:40  1.325894  59.85232    49.171 Stabilising:0.0305%
15:18:52  1.325342  59.85218    49.168 Stabilising:0.0194%
15:18:58   1.32518  59.85281    49.172 Stabilising:0.0122%
15:19:10  1.324963  59.85223    49.181 Stabilising:0.0070%
15:19:22  1.324842  59.85197    49.181 Stabilising:0.0040%
15:19:28  1.324797  59.85238    49.181 Stabilising:0.0034%
15:19:40  1.324744  59.85241    49.194 Stabilising:0.0017%
15:19:52  1.324707  59.85232    49.196 Stabilising:0.0011%
15:19:58  1.324695  59.85197    49.192 Stabilising:0.0009%
15:20:10  1.324677  59.85227    49.196 Measuring
15:20:22  1.324673   59.8524    49.197
15:20:28  1.324671  59.85236    49.196
15:20:40  1.324662  59.85204    49.206 Start       measurement
15:20:52  1.324666  59.85259    49.215 Loading     cell
15:20:58   1.32741  59.85218    49.208
15:21:10  1.329529   59.8524    49.198
15:21:22  1.327571  59.85218    49.193
15:21:28  1.326863  59.85205     49.19 Stabilising:0.0533%
15:21:40  1.325945  59.85225     49.18 Stabilising:0.0298%
15:21:52  1.325432  59.85243    49.179 Stabilising:0.0165%
15:21:58  1.325265  59.85219    49.185 Stabilising:0.0126%
15:22:10  1.325042  59.85254    49.196 Stabilising:0.0076%
15:22:22  1.324909  59.85236    49.196 Stabilising:0.0038%
15:22:28  1.324866  59.85246    49.196 Stabilising:0.0032%
15:22:40  1.324813  59.85241     49.21 Stabilising:0.0022%
15:22:52  1.324781  59.85227    49.209 Stabilising:0.0010%
15:22:58  1.324767  59.85222    49.206 Measuring
15:23:10  1.324748  59.85245    49.209
15:23:22  1.324741  59.85204    49.211
15:23:28  1.324744  59.85241     49.21 Done
15:23:40   1.32473  59.85241    49.221 Start       measurement
15:23:52  1.324735  59.85202    49.233 Loading     cell
15:23:58  1.327616  59.85209    49.229
15:24:10  1.329649  59.85222    49.221
15:24:22  1.327742   59.8525     49.22
15:24:28  1.326911   59.8523    49.218 Stabilising:0.0625%
15:24:40  1.326018  59.85198    49.212 Stabilising:0.0289%
15:24:52  1.325516   59.8524    49.214 Stabilising:0.0161%
15:24:58  1.325352  59.85218    49.219 Stabilising:0.0124%
15:25:10  1.325137  59.85232     49.23 Stabilising:0.0069%
15:25:22  1.325011  59.85218     49.23 Stabilising:0.0042%
15:25:28  1.324973  59.85194    49.232 Stabilising:0.0029%
15:25:40  1.324918  59.85225    49.247 Stabilising:0.0017%
15:25:52  1.324884   59.8524    49.249 Stabilising:0.0008%
15:25:58  1.324874  59.85223    49.245 Measuring
15:26:10  1.324854  59.85229    49.248
15:26:22   1.32485  59.85013    49.253
15:26:28  1.324852  59.85223    49.252 Done
15:26:40  1.324846  59.85216    49.264 Start       measurement
15:26:52  1.324859  59.85222    49.274 Loading     cell
15:26:58  1.327984  59.85216    49.271
15:27:10  1.329944  59.85197     49.26
15:27:22  1.327995  59.85194    49.255
15:27:28   1.32727  59.85208    49.254 Stabilising:0.0545%
```

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14:33:40 1.328795 59.85202   49.602 Stabilising:0.0289%
14:33:52 1.328247 59.85202   49.594 Stabilising:0.0161%
14:33:58 1.328088 59.85243   49.597 Stabilising:0.0120%
14:34:10 1.327877   59.8525  49.602 Stabilising:0.0069%
14:34:22  1.32775 59.85216   49.599 Stabilising:0.0041%
14:34:28 1.327714 59.85232   49.599 Stabilising:0.0027%
14:34:40 1.327659 59.85259   49.609 Stabilising:0.0018%
14:34:52 1.327623 59.85213   49.608 Stabilising:0.0011%
14:34:58 1.327609 59.85241   49.602
14:35:10  1.32759 59.85234   49.603 Measuring
14:35:22 1.327577 59.85243   49.599
14:35:28 1.327566 59.85259   49.596
14:35:40 1.327573 59.85219   49.598 Start      measurement
14:35:52 1.327572 59.85189   49.602 Loading    cell
14:35:58 1.327794 59.85216   49.594
14:36:10 1.331997 59.85125   49.577
14:36:22 1.330093 59.85225   49.569
14:36:28 1.329394 59.85225   49.565 Stabilising:0.0525%
14:36:40 1.328503 59.85219   49.553 Stabilising:0.0287%
14:36:52 1.328014 59.85218   49.545 Stabilising:0.0155%
14:36:58  1.32785 59.85246   49.547 Stabilising:0.0123%
14:37:10  1.32765 59.85205   49.553 Stabilising:0.0062%
14:37:22 1.327514 59.85198   49.549 Stabilising:0.0042%
14:37:28 1.327474 59.85222   49.547 Stabilising:0.0030%
14:37:40 1.327418 59.85236   49.555 Stabilising:0.0020%
14:37:52 1.327381 59.85209   49.552 Stabilising:0.0008%
14:37:58 1.327366 59.85229   49.546 Measuring
14:38:10 1.327346 59.85243   49.543
14:38:22 1.327333   59.8524   49.54
14:38:28  1.32733   59.8521  49.537 Done
14:38:40 1.327323 59.85225   49.544 Start      measurement
14:38:52 1.327326 59.85262   49.548 Loading    cell
14:38:58 1.328355 59.85257   49.539
14:39:10 1.331778 59.85227   49.523
14:39:22 1.329859 59.85208   49.513
14:39:28 1.329139 59.85238   49.507 Stabilising:0.0541%
14:39:40 1.328146 59.85265   49.493 Stabilising:0.0288%
14:39:52 1.327649 59.85222   49.481 Stabilising:0.0163%
14:39:58  1.32749 59.85204   49.482 Stabilising:0.0120%
14:40:10 1.327274 59.85222   49.486 Stabilising:0.0076%
14:40:22 1.327159 59.85243   49.479 Stabilising:0.0032%
14:40:28 1.327108 59.85197   49.478 Stabilising:0.0038%
14:40:40  1.32705 59.85223   49.484 Stabilising:0.0016%
14:40:52 1.327012 59.85241   49.479 Stabilising:0.0013%
14:40:58 1.327002 59.85205   49.474 Stabilising:0.0008%
14:41:10 1.326987 59.85227   49.471 Measuring
14:41:22 1.326985 59.85243   49.465
14:41:28 1.326979 59.85205   49.461
14:41:40 1.326976 59.85202   49.462 Start      measurement
14:41:52 1.327032 59.85197   49.465 Loading    cell
14:41:58 1.329891 59.85141   49.456
14:42:10 1.331348 59.85214   49.436
14:42:22  1.32936 59.85055   49.425
14:42:28 1.328639 59.85073   49.419 Stabilising:0.0542%
14:42:40 1.327712 59.85184   49.404 Stabilising:0.0300%
14:42:52 1.327178 59.85204   49.398 Stabilising:0.0172%
14:42:58 1.326984 59.85243   49.399 Stabilising:0.0146%
14:43:10 1.326772 59.85202   49.404 Stabilising:0.0069%
14:43:22 1.326649 59.85204   49.398 Stabilising:0.0035%
14:43:28 1.326606 59.85132   49.397 Stabilising:0.0032%
14:43:40 1.326538 59.85216   49.404 Stabilising:0.0020%
14:43:52 1.326516 59.85178     49.4 Stabilising:0.0009%
14:43:58 1.326505 59.84998   49.394 Measuring
14:44:10 1.326493 59.84942   49.391
14:44:22  1.32648 59.84866   49.385
14:44:28 1.326477 59.84749    49.38 Done
14:44:40 1.326469 59.84872   49.382 Start      measurement
14:44:52 1.326477 59.84457   49.385 Loading    cell
14:44:58 1.329278 59.84692   49.376
14:45:10  1.33088 59.83399   49.357
14:45:22 1.328784 59.83496   49.344
14:45:28 1.328081 59.83381   49.339 Stabilising:0.0529%
14:45:40 1.327157   59.8344  49.323 Stabilising:0.0299%
14:45:52 1.326639 59.83664   49.316 Stabilising:0.0167%
14:45:58 1.326466 59.84033   49.317 Stabilising:0.0130%
14:46:10  1.32625 59.84756   49.322 Stabilising:0.0066%
14:46:22 1.326121 59.85209   49.317 Stabilising:0.0041%
14:46:28 1.326074 59.85236   49.315 Stabilising:0.0035%
14:46:40 1.326012 59.85209   49.324 Stabilising:0.0022%
14:46:52 1.325981 59.85139   49.319 Stabilising:0.0006%
14:46:58  1.32597 59.85204   49.312 Measuring
14:47:10 1.325952 59.85213   49.309
14:47:22 1.325947 59.85213   49.306
14:47:28  1.32594 59.85223     49.3 Done
14:47:40 1.325933 59.85222   49.304 Start      measurement
14:47:52 1.325923 59.85243   49.307 Loading    cell
14:47:58 1.328766   59.8512  49.298
14:48:10  1.33033 59.84773    49.28
14:48:22 1.328348   59.8435   49.27
14:48:28 1.327635 59.84362   49.264 Stabilising:0.0536%
14:48:40 1.326605 59.84817    49.25 Stabilising:0.0366%
14:48:52 1.326104 59.85125   49.243 Stabilising:0.0160%
14:48:58 1.325936 59.85126   49.244 Stabilising:0.0127%
```

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15:27:40 1.326322 59.85213   49.246 Stabilising:0.0310%
15:27:52 1.325761 59.85216   49.247 Stabilising:0.0195%
15.27.58 1.325595 59.85087   49.252 Stabilising:0.0125%
15:28:10 1.325383 59.85238   49.264 Stabilising:0.0072%
15:28:22 1.325254 59.85216   49.267 Stabilising:0.0043%
15:28:28 1.325214 59.85188   49.268 Stabilising:0.0030%
15:28:40 1.325154 59.85162   49.285 Stabilising:0.0020%
15:28:52 1.325124 59.85189   49.288 Stabilising:0.0013%
15:28:58 1.325112 59.85227   49.287 Measuring
15:29:10 1.325092 59.85214   49.292
15:29:22 1.325085 59.85232   49.295
15:29:28 1.325081 59.85238   49.296 Done
15:29:40 1.325074 59.85238   49.306 Start      measurement
15:29:52 1.325076 59.85241   49.318 Loading    cell
15:29:58 1.327099 59.85223   49.314
15:30:10 1.329727 59.85223   49.306
15:30:22 1.328139 59.85227   49.305
15:30:28 1.327442 59.85205   49.303 Stabilising:0.0524%
15:30:40 1.326568 59.85205   49.298 Stabilising:0.0270%
15:30:52  1.32609 59.85202   49.299 Stabilising:0.0157%
15:30:58 1.325923 59.85219   49.306 Stabilising:0.0126%
15:31:10 1.325692 59.85238   49.318 Stabilising:0.0072%
15:31:22  1.32554 59.85218   49.321 Stabilising:0.0045%
15:31:28 1.325492 59.85241   49.323 Stabilising:0.0036%
15:31:40  1.32543   59.8524  49.338 Stabilising:0.0020%
15:31:52 1.325397 59.85219   49.341 Stabilising:0.0009%
15:31:58 1.325384    59.852  49.339 Measuring
15:32:10 1.325365 59.85269   49.343
15:32:22 1.325353   59.8524  49.346
15:32:28 1.325351 59.85246   49.345 Done
15:32:40 1.325345 59.85222   49.357 Start      measurement
15:32:52 1.325333 59.85218   49.368 Loading    cell
15:32:58 1.325584 59.85214   49.363
15:33:10 1.330578 59.85218   49.353
15:33:22 1.328634 59.85162   49.351
15:33:28 1.327786 59.85255   49.348 Stabilising:0.0638%
15:33:40 1.326887 59.85198   49.341 Stabilising:0.0286%
15:33:52 1.326378 59.85213   49.338 Stabilising:0.0164%
15:33:58 1.326208 59.85177   49.341 Stabilising:0.0128%
15:34:10 1.325991 59.84636   49.348 Stabilising:0.0072%
15:34:22 1.325873 59.85013   49.344 Stabilising:0.0038%
15:34:28 1.325828   59.8475  49.345 Stabilising:0.0034%
15:34:40  1.32577 59.84443   49.353 Stabilising:0.0021%
15:34:52 1.325735   59.8358  49.352 Stabilising:0.0005%
15:34:58  1.32572 59.83406   49.347 Measuring
15:35:10 1.325704 59.83444   49.346
15:35:22 1.325706 59.83394   49.345
15:35:28 1.325698 59.83428   49.344 Done
15:35:40 1.325685 59.83408   49.351 Start      measurement
15:35:52 1.325715 59.83458   49.361 Loading    cell
15:35:58 1.328742 59.83396   49.356
15:36:10 1.330281   59.8339  49.346
15:36:22 1.328541 59.83411   49.345
15:36:28 1.327818 59.83621   49.342 Stabilising:0.0544%
15:36:40 1.326897 59.83587   49.335 Stabilising:0.0292%
15:36:52 1.326336   59.8385  49.337 Stabilising:0.0199%
15:36:58 1.326185 59.84656   49.344 Stabilising:0.0114%
15:37:10 1.325966 59.85218   49.356 Stabilising:0.0077%
15:37:22 1.325838 59.85245   49.358 Stabilising:0.0044%
15:37:28 1.325796 59.85223    49.36 Stabilising:0.0032%
15:37:40 1.325745 59.85205   49.374 Stabilising:0.0018%
15:37:52 1.325707 59.85227   49.377 Stabilising:0.0011%
15:37:58 1.325693 59.85232   49.373
15:38:10 1.325676 59.85204   49.378 Measuring
15:38:22 1.325665 59.85214   49.381
15:38:28 1.325666 59.85209   49.381
15:38:40 1.325657 59.85216   49.394 Start      measurement
15:38:52 1.325648 59.85249   49.407 Loading    cell
15:38:58 1.328395 59.85241   49.403
15:39:10 1.330599   59.8524  49.397
15:39:22 1.328686 59.85243   49.398
15:39:28 1.327997 59.85251   49.396 Stabilising:0.0518%
15:39:40 1.327102   59.8523  49.392 Stabilising:0.0289%
15:39:52 1.326598 59.85223   49.396 Stabilising:0.0160%
15:39:58 1.326434 59.85262   49.402 Stabilising:0.0124%
15:40:10 1.326218 59.85238   49.414 Stabilising:0.0065%
15:40:22 1.326084 59.85219   49.414 Stabilising:0.0039%
15:40:28 1.326047 59.85246   49.416 Stabilising:0.0028%
15:40:40 1.325989 59.85284    49.43 Stabilising:0.0018%
15:40:52 1.325958 59.85214   49.433 Stabilising:0.0011%
15:40:58 1.325951 59.85229   49.431 Stabilising:0.0005%
15:41:10 1.325936   59.8527  49.435 Measuring
15:41:22 1.325926 59.85241   49.439
15:41:28 1.325921 59.85249   49.439
15:41:40 1.325915   59.8521  49.449 Start      measurement
15:41:52 1.325923 59.85257   49.461 Loading    cell
15:41:58 1.328877 59.85238   49.456
15:42:10 1.331032 59.85222   49.447
15:42:22 1.329142 59.85227   49.444
15:42:28 1.328426 59.85218   49.441 Stabilising:0.0538%
15:42:40  1.32745 59.85254   49.433 Stabilising:0.0281%
15:42:52 1.326954 59.85205   49.434 Stabilising:0.0158%
15:42:58 1.326795 59.85238   49.438 Stabilising:0.0120%
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14:49:10  1.325721  59.85197   49.248 Stabilising:0.0071%
14:49:22   1.32559  59.85234   49.242 Stabilising:0.0042%
14:49:28  1.325552  59.85048   49.241 Stabilising:0.0029%
14:49:40  1.325492  59.85202   49.248 Stabilising:0.0020%
14:49:52  1.325458  59.85225   49.243 Stabilising:0.0013%
14:49:58  1.325449  59.85024   49.238 Stabilising:0.0007%
14:50:10   1.32543   59.8512   49.232 Measuring
14:50:22  1.325426  59.84881   49.226
14:50:28   1.32542  59.84616   49.223
14:50:40  1.325415  59.83874   49.225 Start       measurement
14:50:52  1.325421  59.83406   49.227 Loading     cell
14:50:58  1.328503  59.83401   49.218
14:51:10  1.329888   59.8342   49.201
14:51:22  1.327856  59.83349   49.191
14:51:28  1.327127  59.83417   49.186 Stabilising:0.0548%
14:51:40  1.326162  59.83406   49.172 Stabilising:0.0313%
14:51:52  1.325627  59.83417   49.165 Stabilising:0.0176%
14:51:58   1.32545  59.83399   49.166 Stabilising:0.0133%
14:52:10  1.325207  59.83479   49.172 Stabilising:0.0071%
14:52:22  1.325082  59.83455   49.167 Stabilising:0.0039%
14:52:28  1.325038  59.83612   49.167 Stabilising:0.0033%
14:52:40  1.324974  59.83419   49.173 Stabilising:0.0019%
14:52:52  1.324937  59.83451   49.171 Stabilising:0.0011%
14:52:58  1.324929  59.83437   49.166 Stabilising:0.0006%
14:53:10  1.324915  59.83956   49.164 Measuring
14:53:22  1.324906  59.84046   49.162
14:53:28  1.324904  59.84235   49.159
14:53:40  1.324901   59.8423   49.165 Start       measurement
14:53:52  1.324898   59.8419   49.173 Loading     cell
14:53:58  1.327642  59.84614   49.165
14:54:10  1.329517  59.83369   49.151
14:54:22  1.327392   59.8339   49.143
14:54:28  1.326678  59.83414   49.139 Stabilising:0.0537%
14:54:40  1.325727   59.8342   49.129 Stabilising:0.0310%
14:54:52  1.325202  59.83478   49.123 Stabilising:0.0172%
14:54:58  1.325031  59.83438   49.125 Stabilising:0.0129%
14:55:10  1.324803  59.83457   49.131 Stabilising:0.0076%
14:55:22   1.32467  59.83462   49.128 Stabilising:0.0047%
14:55:28  1.324616  59.83426   49.128 Stabilising:0.0041%
14:55:40  1.324563  59.83414   49.138 Stabilising:0.0018%
14:55:52  1.324532  59.83385   49.135 Stabilising:0.0013%
14:55:58  1.324522  59.83406   49.129 Stabilising:0.0008%
14:56:10   1.32451  59.83403   49.127 Measuring
14:56:22  1.324503  59.83394   49.126
14:56:28  1.324495   59.8341   49.124
14:56:40  1.324479  59.83424   49.131 Start       measurement
```

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15:43:10  1.326581  59.85214   49.448 Stabilising:0.0070%
15:43:22  1.326458  59.85266   49.447 Stabilising:0.0040%
15:43:28  1.326414  59.85225   49.447 Stabilising:0.0033%
15:43:40  1.326355  59.85222   49.459 Stabilising:0.0017%
15:43:52  1.326325  59.85234   49.461 Stabilising:0.0010%
15:43:58  1.326313  59.85234   49.457 Measuring
15:44:10  1.326301  59.85259   49.455
15:44:22  1.326291  59.85255   49.457
15:44:28  1.326287  59.85257   49.455 Done
15:44:40  1.326279  59.85245   49.463 Start       measurement
15:44:52   1.32637  59.85225   49.471 Loading     cell
15:44:58   1.32955  59.85241   49.465
15:45:10  1.331129  59.85182   49.452
15:45:21  1.329209  59.85184   49.446
15:45:28  1.328506  59.85225   49.442 Stabilising:0.0528%
15:45:40  1.327606  59.85194   49.432 Stabilising:0.0292%
15:45:52  1.327083  59.85236   49.433 Stabilising:0.0163%
15:45:58  1.326892  59.85225   49.437 Stabilising:0.0144%
15:46:10  1.326681   59.8521   49.447 Stabilising:0.0070%
15:46:22  1.326564  59.85262   49.445 Stabilising:0.0044%
15:46:28  1.326523  59.85202   49.446 Stabilising:0.0031%
15:46:39  1.326471  59.85227   49.458 Stabilising:0.0015%
15:46:52  1.326432  59.85282   49.459 Stabilising:0.0014%
15:46:58  1.326419  59.85229   49.455 Stabilising:0.0010%
15:47:09  1.326404   59.8525   49.456 Measuring
15:47:22  1.326393  59.85223   49.457
15:47:27  1.326391   59.8523   49.455
15:47:40  1.326389  59.85372   49.464 Start       measurement
15:47:51  1.326383  59.85251   49.471 Loading     cell
15:47:57  1.329173  59.85188   49.464
15:48:10  1.331138  59.85173   49.451
15:48:21   1.32916  59.85234   49.443
15:48:27  1.328464  59.85229   49.438 Stabilising:0.0523%
15:48:40  1.327587  59.85223   49.425 Stabilising:0.0280%
15:48:51  1.327076  59.85257   49.421 Stabilising:0.0164%
15:48:57  1.326913  59.85259   49.423 Stabilising:0.0123%
15:49:09  1.326701  59.85249    49.43 Stabilising:0.0071%
15:49:21  1.326573  59.85218   49.427 Stabilising:0.0044%
15:49:28  1.326521  59.85259   49.427 Stabilising:0.0039%
15:49:39  1.326469  59.85249   49.438 Stabilising:0.0020%
15:49:51  1.326434   59.8524   49.436 Stabilising:0.0012%
15:49:57  1.326427  59.85238   49.432 Stabilising:0.0005%
15:50:09  1.326412  59.85238   49.432 Measuring
15:50:21  1.326402  59.85227   49.429
15:50:27  1.326402  59.85295   49.428
15:50:39  1.326393   59.8523   49.435 Start       measurement
```

Appendix 6.2
Experiment 2

Source: M160699 .SAMData Seg

Recordno	Runno	Time/Date	d10	d50	d90	Span	Resid	Obscur	SSA	1.32	1.6	1.95	2.38	2.9	3.53	4.3	5.24	6.39	7.78	9.48
1	1	6/16/99 12:41PM	23.6	176.1	254	1.3	20.49	0		0	0	0	0	0	0	0	0	0	0	0
2	2	6/16/99 12:42PM	512.2	557.1	591.4	0.1	31.85	0		0	0	0	0	0	0	0	0	0	0	0
3	3	6/16/99 12:42PM	23.6	32.9	56.7	1	27.57	0		0	0	0	0	0	0	0	0	0	0	0
4	4	6/16/99 12:43PM	25.8	34.8	47.1	0.6	20.03	0.2		0	0	0	0	0	0	0	0	0	0	0
5	5	6/16/99 12:43PM	19.1	28.2	34.7	0.6	50.61	0.3		0	0	0	0	0	0	0	0	0	0	0
6	6	6/16/99 12:44PM	8.9	10.5	12.5	0.3	64.43	0.6		0	0	0	0	0	0	0	0	0.03	1.42	19.97
7	7	6/16/99 12:44PM	18.3	30.7	35.9	0.6	44.8	1.1		0	0	0	0	0	0	0	0	0	0	0
8	8	6/16/99 12:45PM	14.2	29.2	36.4	0.8	34	1.2		0	0	0	0	0	0	0	0	0	0	0
9	9	6/16/99 12:45PM	40.4	48	55.8	0.3	65.76	1		0	0	0	0	0	0	0	0	0	0	0
10	10	6/16/99 12:46PM	34.7	45.8	59.7	0.5	52.51	1		0	0	0	0	0	0	0	0	0	0	0
11	11	6/16/99 12:46PM	512.9	557.4	591.5	0.1	32.43	1		0	0	0	0	0	0	0	0	0	0	0
12	12	6/16/99 12:47PM	514.5	558	591.6	0.1	30.04	0.6		0	0	0	0	0	0	0	0	0	0	0
13	13	6/16/99 12:48PM	260.5	430.8	579	0.7	13.14	0.4		0	0	0	0	0	0	0	0	0	0	0
14	14	6/16/99 12:48PM	515.9	558.5	591.7	0.1	26.64	0.2		0	0	0	0	0	0	0	0	0	0	0
15	15	6/16/99 12:49PM	37.7	44.1	51.4	0.3	93.89	0		0	0	0	0	0	0	0	0	0	0	0
16	16	6/16/99 12:49PM	37.7	44.1	51.4	0.3	93.89	0		0	0	0	0	0	0	0	0	0	0	0
17	17	6/16/99 12:50PM	51	543.1	589	1	41.92	-0.1		0	0	0	0	0	0	0	0	0	0	0
18	18	6/16/99 12:50PM	360.8	514.5	583.9	0.4	11.8	0		0	0	0	0	0	0	0	0	0	0	0
19	19	6/16/99 12:51PM	34.5	41.5	49.2	0.4	58.52	0		0	0	0	0	0	0	0	0	0	0	0
20	20	6/16/99 12:51PM	513.7	557.8	591.6	0.1	27.38	0		0	0	0	0	0	0	0	0	0	0	0
21	21	6/16/99 12:52PM	50.4	63.9	573.3	8.2	46.12	0		0	0	0	0	0	0	0	0	0	0	0
22	22	6/16/99 12:52PM	36.7	43.4	50.4	0.3	85.83	0		0	0	0	0	0	0	0	0	0	0	0
23	23	6/16/99 12:53PM	36.2	43.1	50	0.3	82.41	0		0	0	0	0	0	0	0	0	0	0	0
24	24	6/16/99 12:53PM	513.4	557.6	591.5	0.1	34.31	0		0	0	0	0	0	0	0	0	0	0	0
25	25	6/16/99 12:54PM	48.7	544	589.1	1	62.69	0		0	0	0	0	0	0	0	0	0	0	0
26	26	6/16/99 12:54PM	505.4	554.8	591	0.2	38.12	0		0	0	0	0	0	0	0	0	0	0	0
27	27	6/16/99 12:55PM	269.1	536.3	587.7	0.6	19.24	0		0	0	0	0	0	0	0	0	0	0	0
28	28	6/16/99 12:55PM	74.3	546.3	589.5	0.9	50.79	-0.1		0	0	0	0	0	0	0	0	0	0	0
29	29	6/16/99 12:56PM	511.9	557	591.4	0.1	34.14	-0.1		0	0	0	0	0	0	0	0	0	0	0
30	30	6/16/99 12:56PM	423.3	504.3	579.9	0.3	38.25	-0.1		0	0	0	0	0	0	0	0	0	0	0
31	31	6/16/99 12:57PM	423.3	504.3	579.9	0.3	0	-0.1		0	0	0	0	0	0	0	0	0	0	0
32	31	6/16/99 12:59PM	512.6	557.3	591.5	0.1	36.88	0.4		0	0	0	0	0	0	0	0	0	0	0
33	32	6/16/99 12:59PM	512.6	557.3	591.5	0.1	0	0.6		0	0	0	0	0	0	0	0	0	0	0
34	32	6/16/99 1:01PM	76.4	91.5	108	0.3	93.49	1.3		0	0	0	0	0	0	0	0	0	0	0
35	33	6/16/99 1:02PM	76.4	91.5	108	0.3	0	1.1		0	0	0	0	0	0	0	0	0	0	0
36	33	6/16/99 1:02PM	501.6	553.4	590.8	0.2	83.35	1.1		0	0	0	0	0	0	0	0	0	0	0
37	34	6/16/99 1:03PM	510.6	556.6	591.3	0.1	71.5	1.1		0	0	0	0	0	0	0	0	0	0	0
38	35	6/16/99 1:03PM	76.4	91.5	108	0.3	93.49	1.3		0	0	0	0	0	0	0	0	0	0	0
39	36	6/16/99 1:04PM	72.3	85.1	97.4	0.3	78.6	1		0	0	0	0	0	0	0	0	0	0	0
40	37	6/16/99 1:05PM	112.5	550.8	590.3	0.9	63.33	0.7		0	0	0	0	0	0	0	0	0	0	0
41	38	6/16/99 1:05PM	511.9	557	591.4	0.1	47.44	0.6		0	0	0	0	0	0	0	0	0	0	0
42	39	6/16/99 1:06PM	512.3	557.3	591.5	0.1	68.08	0.4		0	0	0	0	0	0	0	0	0	0	0
43	40	6/16/99 1:06PM	492.4	552.5	590.6	0.2	63.5	0.3		0	0	0	0	0	0	0	0	0	0	0
44	41	6/16/99 1:07PM	76.4	91.5	108	0.3	93.49	0.2		0	0	0	0	0	0	0	0	0	0	0
45	42	6/16/99 1:07PM	76.4	91.5	108	0.3	93.49	0.1		0	0	0	0	0	0	0	0	0	0	0
46	43	6/16/99 1:08PM	63.8	73.8	87.4	0.3	61.99	0		0	0	0	0	0	0	0	0	0	0	0
47	44	6/16/99 1:08PM	513.7	557.8	591.6	0.1	45.59	0		0	0	0	0	0	0	0	0	0	0	0
48	45	6/16/99 1:09PM	513.7	557.8	591.6	0.1	0	-0.1		0	0	0	0	0	0	0	0	0	0	0
49	45	6/16/99 1:10PM	76.4	91.5	108	0.3	93.49	-0.1		0	0	0	0	0	0	0	0	0	0	0
50	46	6/16/99 1:10PM	70.3	82.5	95.6	0.3	73.79	-0.1		0	0	0	0	0	0	0	0	0	0	0
51	47	6/16/99 1:11PM	100.3	550.4	590.3	0.9	59.84	-0.1		0	0	0	0	0	0	0	0	0	0	0
52	48	6/16/99 1:11PM	515.2	558.3	591.7	0.1	34.14	-0.1		0	0	0	0	0	0	0	0	0	0	0
53	49	6/16/99 1:12PM	64.3	75.6	88.6	0.3	54.95	-0.1		0	0	0	0	0	0	0	0	0	0	0
54	50	6/16/99 1:12PM	514.4	558	591.6	0.1	35.73	-0.1		0	0	0	0	0	0	0	0	0	0	0
55	51	6/16/99 1:13PM	63.5	74	88.8	0.3	48.33	-0.1		0	0	0	0	0	0	0	0	0	0	0
56	52	6/16/99 1:13PM	56.2	66.6	78.1	0.3	45.04	-0.1		0	0	0	0	0	0	0	0	0	0	0
57	53	6/16/99 1:14PM	53.6	66.2	79.6	0.4	32.05	-0.1		0	0	0	0	0	0	0	0	0	0	0
58	54	6/16/99 1:14PM	53.1	66.1	80.2	0.4	28.8	-0.1		0	0	0	0	0	0	0	0	0	0	0
59	55	6/16/99 1:15PM	56.7	69.5	86.8	0.4	23.29	-0.1		0	0	0	0	0	0	0	0	0	0	0
60	56	6/16/99 1:15PM	73.5	525.4	586.1	1	16.34	0		0	0	0	0	0	0	0	0	0	0	0
61	57	6/16/99 1:16PM	59.5	81.3	574.9	6.3	23.43	0		0	0	0	0	0	0	0	0	0	0	0
62	58	6/16/99 1:16PM	56.7	73.1	92.7	0.5	23.65	0		0	0	0	0	0	0	0	0	0	0	0
63	59	6/16/99 1:17PM	71.6	108.5	146.7	0.7	9.9	0		0	0	0	0	0	0	0	0	0	0	0
64	60	6/16/99 1:17PM	78.7	121.5	165.4	0.7	5.02	0		0	0	0	0	0	0	0	0	0	0	0
65	61	6/16/99 1:18PM	77.4	130.6	229.5	1.2	4.74	0.1		0	0	0	0	0	0	0	0	0	0	0
66	62	6/16/99 1:18PM	82.7	132.7	205.4	0.9	3.15	0.1		0	0	0	0	0	0	0	0	0	0	0
67	63	6/16/99 1:19PM	90	162.3	390.8	1.9	3.73	0.1		0	0	0	0	0	0	0	0	0	0	0
68	64	6/16/99 1:19PM	105.6	249.1	491.8	1.8	4.15	0.1		0	0	0	0	0	0	0	0	0	0	0
69	65	6/16/99 1:20PM	118.1	232	422.6	1.3	3.69	0.2		0	0	0	0	0	0	0	0	0	0	0
70	66	6/16/99 1:21PM	118.3	228.2	384.3	1.2	2.87	0.2		0	0	0	0	0	0	0	0	0	0	0
71	67	6/16/99 1:21PM	114.3	222.4	416.3	1.4	3.18	0.2		0	0	0	0	0	0	0	0	0	0	0
72	68	6/16/99 1:22PM	117.8	232.4	402.6	1.2	3.1	0.3		0	0	0	0	0	0	0	0	0	0	0
73	69	6/16/99 1:22PM	133.4	268	439.2	1.1	3.37	0.4		0	0	0	0	0	0	0	0	0	0	0
74	70	6/16/99 1:23PM	135.9	264.5	447.2	1.2	3.25	0.5		0	0	0	0	0	0	0	0	0	0	0
75	71	6/16/99 1:23PM	157.6	302	486.3	1.1	4.08	0.6		0	0	0	0	0	0	0	0	0	0	0
76	72	6/16/99 1:24PM	166.5	310	496.4	1.1	3.94	0.8		0	0	0	0	0	0	0	0	0	0	0
77	73	6/16/99 1:24PM	164.9	320.3	511.2	1.1	4.27	0.9		0	0	0	0	0	0	0	0	0	0	0
78	74	6/16/99 1:25PM	172.3	321.6	504	1	4.36	1.1		0	0	0	0	0	0	0	0	0	0	0
79	75	6/16/99 1:25PM	193.4	359.6	534.9	0.9	5.13	1.4		0	0	0	0	0	0	0	0	0	0	0
80	76	6/16/99 1:26PM	195.3	360	535.1	0.9	5.13	1.6		0	0	0	0	0	0	0	0	0	0	0
81	77	6/16/99 1:26PM	208.6	376.6	545.1	0.9	5.63	1.9		0	0	0	0	0	0	0	0	0	0	0
82	78	6/16/99 1:27PM	213.6	381.8	545.7	0.9	5.86	2.2		0	0	0	0	0	0	0	0	0	0	0
83	79	6/16/99 1:27PM	220.6	389.4	550.4	0.8	5.98	2.3		0	0	0	0	0	0	0	0	0	0	0
84	80	6/16/99 1:28PM	228.6	397	552.3	0.8	6.25	2.2		0	0	0	0	0	0	0	0	0	0	0
85	81	6/16/99 1:28PM	230.7	409	558.8	0.8	6.34	2.2		0	0	0	0	0	0	0	0	0	0	0
86	82	6/16/99 1:29PM	236.5	428.6	564.8	0.8	6.68	2.3		0	0	0	0	0	0	0	0	0	0	0
87	83	6/16/99 1:29PM	231.2	419.6	562.4	0.8	6.61	2.5		0	0	0	0	0	0	0	0	0	0	0
88	84	6/16/99 1:30PM	249.7	440.7	568.6	0.7	7.38	2.4		0	0	0	0	0	0	0	0	0	0	0
89	85	6/16/99 1:30PM	243.6	435.6	566.9	0.7	7.15	2.2		0	0	0	0	0	0	0	0	0	0	0
90	86	6/16/99 1:31PM	235.9	445.6	570.5	0.8	7.41	1.9		0	0	0	0	0	0	0	0	0	0	0
91	87	6/16/99 1:31PM	238.2	443.5	569.6	0.7	7.25	2		0	0	0	0	0	0	0	0	0	0	0
92	88	6/16/99 1:32PM	243.6	452.1	571.4	0.7	7.78	2.1		0	0	0	0	0	0	0	0	0	0	0
93	89	6/16/99 1:32PM	245.5	456.5	572.5	0.7	7.76	1.9		0	0	0	0	0	0	0	0	0	0	0
94	90	6/16/99 1:33PM	232.1	447.3	571.2	0.8	7.4	2		0	0	0	0	0	0	0	0	0	0	0
95	91	6/16/99 1:34PM	233.9	455.5	572.9	0.7	7.81	2		0	0	0	0	0	0	0	0	0	0	0
96	92	6/16/99 1:34PM	238.8	456.1	572.5	0.7	7.74	2.2		0	0	0	0	0	0	0	0	0	0	0
97	93	6/16/99 1:35PM	221	448.6	571.6	0.8	7.81	2		0	0	0	0	0	0	0	0	0	0	0
98	94	6/16/99 1:35PM	232	465.5	575	0.7	7.96	2.5		0	0	0	0	0	0	0	0	0	0	0
99	95	6/16/99 1:36PM	228.2	453.5	572.5	0.8	7.8	2.5		0	0	0	0	0	0	0	0	0	0	0
100	96	6/16/99 1:36PM	217.4	454.7	573	0.8	7.51	2.4		0	0	0	0	0	0	0	0	0	0	0
101	97	6/16/99 1:37PM	235.4	473.4	576.4	0.7	7.99	2.8		0	0	0	0	0	0	0	0	0	0	0
102	98	6/16/99 1:37PM	220.4	466.6	575.4	0.8	7.86	2.5		0	0	0	0	0	0	0	0	0	0	0
103	99	6/16/99 1:38PM	219.6	457.5	573.7	0.8	7.5	2.6		0	0	0	0	0	0	0	0	0	0	0
104	100	6/16/99 1:38PM	219	452.9	572.9	0.8	7.19	2.8		0	0	0	0	0	0	0	0	0	0	0
105	101	6/16/99 1:39PM	207.4	447.5	572.1	0.8	7.41	2.6		0	0	0	0	0	0	0	0	0	0	0
106	102	6/16/99 1:39PM	216.4	454.6	573.1	0.8	7.7	2.6		0	0	0	0	0	0	0	0	0	0	0
107	103	6/16/99 1:40PM	213.1	449.7	572.4	0.8	7.34	2.6		0	0	0	0	0	0	0	0	0	0	0
108	104	6/16/99 1:40PM	205.8	439.1	570.5	0.8	7.06	2.5		0	0	0	0	0	0	0	0	0	0	0
109	105	6/16/99 1:41PM	200.2	450.4	572.9	0.8	7.8	2.6		0	0	0	0	0	0	0	0	0	0	0
110	106	6/16/99 1:41PM	208.6	441	570.8	0.8	7.31	2.7		0	0	0	0	0	0	0	0	0	0	0
111	107	6/16/99 1:42PM	219.7	461.5	574.6	0.8	7.84	3.1		0	0	0	0	0	0	0	0	0	0	0
112	108	6/16/99 1:42PM	208.9	447.5	572	0.8	7.47	2.9		0	0	0	0	0	0	0	0	0	0	0
113	109	6/16/99 1:43PM	218.9	467	575.6	0.8	8.09	3.2		0	0	0	0	0	0	0	0	0	0	0
114	110	6/16/99 1:43PM	197.7	444.8	571.8	0.8	7.18	3.2		0	0	0	0	0	0	0	0	0	0	0
115	111	6/16/99 1:44PM	211.6	453.4	573.4	0.8	7.54	3.6		0	0	0	0	0	0	0	0	0	0	0
116	112	6/16/99 1:44PM	209.1	447.5	572.5	0.8	7.61	4.2		0	0	0	0	0	0	0	0	0	0	0
117	113	6/16/99 1:45PM	215.7	445.2	571.4	0.8	7.29	4.1		0	0	0	0	0	0	0	0	0	0	0
118	114	6/16/99 1:45PM	213.3	445.9	572	0.8	7.6	4.1		0	0	0	0	0	0	0	0	0	0	0
119	115	6/16/99 1:46PM	221.5	461.7	574.6	0.8	8.07	3.9		0	0	0	0	0	0	0	0	0	0	0
120	116	6/16/99 1:46PM	205.6	449.5	572.8	0.8	7.35	3.7		0	0	0	0	0	0	0	0	0	0	0
121	117	6/16/99 1:47PM	213.6	443	571.3	0.8	7.17	3.8		0	0	0	0	0	0	0	0	0	0	0
122	118	6/16/99 1:47PM	203.1	444.7	571.8	0.8	7.34	3.4		0	0	0	0	0	0	0	0	0	0	0
123	119	6/16/99 1:48PM	222.3	461.2	574.6	0.8	7.97	3.5		0	0	0	0	0	0	0	0	0	0	0
124	120	6/16/99 1:48PM	217.3	455.1	573.6	0.8	8.03	3.2		0	0	0	0	0	0	0	0	0	0	0
125	121	6/16/99 1:49PM	216.5	449.3	572.2	0.8	7.57	3.2		0	0	0	0	0	0	0	0	0	0	0
126	122	6/16/99 1:50PM	225.5	452.9	572.8	0.8	8.02	3.2		0	0	0	0	0	0	0	0	0	0	0
127	123	6/16/99 1:50PM	224.6	456.4	573.7	0.8	8.21	3.1		0	0	0	0	0	0	0	0	0	0	0
128	124	6/16/99 1:51PM	229.6	458.8	573.9	0.8	8.06	2.9		0	0	0	0	0	0	0	0	0	0	0
129	125	6/16/99 1:51PM	228.7	458.3	574.1	0.8	8.1	3.2		0	0	0	0	0	0	0	0	0	0	0
130	126	6/16/99 1:52PM	229.3	457.7	573.7	0.8	8.29	2.9		0	0	0	0	0	0	0	0	0	0	0
131	127	6/16/99 1:52PM	228.4	453.1	572.5	0.8	7.77	2.4		0	0	0	0	0	0	0	0	0	0	0

132	128	6/16/99 1:53PM	225.2	456.1	573.4	0.8	8.09	2.4	0	0	0	0	0	0	0	0	0	0	0
133	129	6/16/99 1:53PM	236.6	452.9	572.4	0.7	8.16	2	0	0	0	0	0	0	0	0	0	0	0
134	130	6/16/99 1:54PM	246.5	459.7	573.4	0.7	8.3	1.9	0	0	0	0	0	0	0	0	0	0	0
135	131	6/16/99 1:54PM	248.3	452.4	571.9	0.7	7.84	1.7	0	0	0	0	0	0	0	0	0	0	0
136	132	6/16/99 1:55PM	250.5	438	567.8	0.7	7.4	1.7	0	0	0	0	0	0	0	0	0	0	0
137	133	6/16/99 1:55PM	222.1	412.4	560.6	0.8	6.2	1	0	0	0	0	0	0	0	0	0	0	0
138	134	6/16/99 1:56PM	192.9	370.4	543.6	0.9	5.69	0.8	0	0	0	0	0	0	0	0	0	0	0
139	135	6/16/99 1:56PM	145	291.1	480	1.2	4.43	0.3	0	0	0	0	0	0	0	0	0	0	0
140	136	6/16/99 1:57PM	93.1	176.6	550	2.6	8.81	0.1	0	0	0	0	0	0	0	0	0	0	0
141	137	6/16/99 1:57PM	84.1	539.8	588.4	0.9	38.07	0	0	0	0	0	0	0	0	0	0	0	0
142	138	6/16/99 1:58PM	99	546.9	589.6	0.9	35.3	0	0	0	0	0	0	0	0	0	0	0	0
143	139	6/16/99 1:58PM	484.3	551.7	590.5	0.2	33.42	0	0	0	0	0	0	0	0	0	0	0	0
144	140	6/16/99 1:59PM	475.3	550.7	590.3	0.2	36.68	0.1	0	0	0	0	0	0	0	0	0	0	0
145	141	6/16/99 1:59PM	97.3	541.5	588.6	0.9	29.52	0.1	0	0	0	0	0	0	0	0	0	0	0
146	142	6/16/99 2:00PM	103.2	538.7	588.1	0.9	19.11	0.1	0	0	0	0	0	0	0	0	0	0	0
147	143	6/16/99 2:00PM	85.4	548.5	589.9	0.9	36.68	0.1	0	0	0	0	0	0	0	0	0	0	0
148	144	6/16/99 2:01PM	477.7	550.9	590.3	0.2	35.41	0.1	0	0	0	0	0	0	0	0	0	0	0
149	145	6/16/99 2:01PM	114.5	505.6	581.9	0.9	17.63	0.1	0	0	0	0	0	0	0	0	0	0	0
150	146	6/16/99 2:02PM	114.4	545.9	589.4	0.9	26.56	0.1	0	0	0	0	0	0	0	0	0	0	0
151	147	6/16/99 2:02PM	508.9	556	591.2	0.1	33.98	0.1	0	0	0	0	0	0	0	0	0	0	0
152	148	6/16/99 2:03PM	107.6	539.2	588.2	0.9	23.53	0.2	0	0	0	0	0	0	0	0	0	0	0
153	149	6/16/99 2:04PM	108.1	543.8	589.1	0.9	28.15	0.2	0	0	0	0	0	0	0	0	0	0	0
154	150	6/16/99 2:04PM	109.7	540.6	588.4	0.9	33.81	0.3	0	0	0	0	0	0	0	0	0	0	0
155	151	6/16/99 2:05PM	99	542.4	588.8	0.9	33.46	0.4	0	0	0	0	0	0	0	0	0	0	0
156	152	6/16/99 2:05PM	93.5	132	582.4	3.7	27.46	0.6	0	0	0	0	0	0	0	0	0	0	0
157	153	6/16/99 2:06PM	78.9	115.1	581.4	4.4	36.68	0.8	0	0	0	0	0	0	0	0	0	0	0
158	154	6/16/99 2:06PM	78.3	95	111.4	0.3	28.71	1.1	0	0	0	0	0	0	0	0	0	0	0
159	155	6/16/99 2:07PM	87.9	104.8	123.8	0.3	23.08	1.4	0	0	0	0	0	0	0	0	0	0	0
160	156	6/16/99 2:07PM	78.4	90.6	108.7	0.3	34.02	1.4	0	0	0	0	0	0	0	0	0	0	0
161	157	6/16/99 2:08PM	72.9	86	99	0.3	36.33	1.2	0	0	0	0	0	0	0	0	0	0	0
162	158	6/16/99 2:08PM	72.9	85.9	98.4	0.3	34.61	1.2	0	0	0	0	0	0	0	0	0	0	0
163	159	6/16/99 2:09PM	77.5	90.1	107.9	0.3	31.66	1.2	0	0	0	0	0	0	0	0	0	0	0
164	160	6/16/99 2:09PM	73.8	86.9	100	0.3	33.82	1.4	0	0	0	0	0	0	0	0	0	0	0
165	161	6/16/99 2:10PM	83.2	106.8	577	4.6	33.07	1.2	0	0	0	0	0	0	0	0	0	0	0
166	162	6/16/99 2:10PM	79.6	93.7	110.5	0.3	30.74	1	0	0	0	0	0	0	0	0	0	0	0
167	163	6/16/99 2:11PM	71	83.4	96.2	0.3	41.47	0.8	0	0	0	0	0	0	0	0	0	0	0
168	164	6/16/99 2:11PM	72.3	85.2	97.7	0.3	36.33	0.7	0	0	0	0	0	0	0	0	0	0	0
169	165	6/16/99 2:12PM	76.1	89.1	105.9	0.3	36.89	0.5	0	0	0	0	0	0	0	0	0	0	0
170	166	6/16/99 2:12PM	86.8	525.7	586.1	0.9	41.66	0.4	0	0	0	0	0	0	0	0	0	0	0
171	167	6/16/99 2:13PM	70.9	83.2	96.1	0.3	41.53	0.3	0	0	0	0	0	0	0	0	0	0	0
172	168	6/16/99 2:13PM	79.6	510.8	584.4	1	39.48	0.2	0	0	0	0	0	0	0	0	0	0	0
173	169	6/16/99 2:14PM	80.2	100.4	576	4.9	34.52	0.1	0	0	0	0	0	0	0	0	0	0	0
174	170	6/16/99 2:14PM	68.1	79.7	92.9	0.3	52.82	0.1	0	0	0	0	0	0	0	0	0	0	0
175	171	6/16/99 2:15PM	82.5	523.6	585.9	1	41.87	0	0	0	0	0	0	0	0	0	0	0	0
176	172	6/16/99 2:16PM	71.4	84.2	97	0.3	35.67	0	0	0	0	0	0	0	0	0	0	0	0
177	173	6/16/99 2:16PM	74.7	87.9	101.9	0.3	37.3	0	0	0	0	0	0	0	0	0	0	0	0
178	174	6/16/99 2:17PM	74.4	87.7	101.7	0.3	35.71	-0.1	0	0	0	0	0	0	0	0	0	0	0
179	175	6/16/99 2:17PM	79.2	454.2	582	1.1	37.53	-0.1	0	0	0	0	0	0	0	0	0	0	0
180	176	6/16/99 2:18PM	86.9	542.1	588.8	0.9	50.31	-0.1	0	0	0	0	0	0	0	0	0	0	0
181	177	6/16/99 2:18PM	81.7	521.8	585.6	1	39.3	-0.1	0	0	0	0	0	0	0	0	0	0	0
182	178	6/16/99 2:19PM	76.1	89.1	105.7	0.3	36.77	-0.1	0	0	0	0	0	0	0	0	0	0	0
183	179	6/16/99 2:19PM	72.9	85.8	98.2	0.3	38.57	-0.1	0	0	0	0	0	0	0	0	0	0	0
184	180	6/16/99 2:20PM	75.4	88.5	104	0.3	35.95	-0.1	0	0	0	0	0	0	0	0	0	0	0
185	181	6/16/99 2:20PM	66.2	78.4	91.1	0.3	50.24	-0.1	0	0	0	0	0	0	0	0	0	0	0
186	182	6/16/99 2:21PM	80.6	109.3	578.9	4.6	32.93	-0.1	0	0	0	0	0	0	0	0	0	0	0
187	183	6/16/99 2:21PM	71.1	83.6	96.4	0.3	41.85	-0.1	0	0	0	0	0	0	0	0	0	0	0
188	184	6/16/99 2:22PM	65	77.5	89.8	0.3	48.7	-0.1	0	0	0	0	0	0	0	0	0	0	0
189	185	6/16/99 2:22PM	70.8	82.9	95.6	0.3	57.73	-0.1	0	0	0	0	0	0	0	0	0	0	0
190	186	6/16/99 2:23PM	71.3	83.7	96.3	0.3	53.47	-0.1	0	0	0	0	0	0	0	0	0	0	0
191	187	6/16/99 2:23PM	68.7	80.4	93.6	0.3	53.8	-0.1	0	0	0	0	0	0	0	0	0	0	0
192	188	6/16/99 2:24PM	74.5	87.4	100.4	0.3	40.12	-0.1	0	0	0	0	0	0	0	0	0	0	0
193	189	6/16/99 2:24PM	69.9	81.8	94.7	0.3	57.13	-0.1	0	0	0	0	0	0	0	0	0	0	0
194	190	6/16/99 2:25PM	69.7	81.6	94.6	0.3	46.35	-0.1	0	0	0	0	0	0	0	0	0	0	0
195	191	6/16/99 2:25PM	69.4	81.1	94.1	0.3	57.06	-0.1	0	0	0	0	0	0	0	0	0	0	0
196	192	6/16/99 2:26PM	76.4	88.6	101.4	0.3	78.48	0	0	0	0	0	0	0	0	0	0	0	0
197	193	6/16/99 2:26PM	73.9	86.6	98.5	0.3	66.62	0	0	0	0	0	0	0	0	0	0	0	0
198	194	6/16/99 2:27PM	65.3	77.5	89.6	0.3	82.45	0	0	0	0	0	0	0	0	0	0	0	0
199	195	6/16/99 2:28PM	71.2	83.7	96.3	0.3	53.57	0	0	0	0	0	0	0	0	0	0	0	0
200	196	6/16/99 2:28PM	69.1	80.8	94	0.3	52.55	0	0	0	0	0	0	0	0	0	0	0	0
201	197	6/16/99 2:29PM	76.4	91.5	108	0.3	93.49	0	0	0	0	0	0	0	0	0	0	0	0
202	198	6/16/99 2:29PM	503.1	553.9	590.9	0.2	72.12	0	0	0	0	0	0	0	0	0	0	0	0
203	199	6/16/99 2:30PM	93.1	545.9	589.5	0.9	56.1	0	0	0	0	0	0	0	0	0	0	0	0
204	200	6/16/99 2:30PM	469.3	550.5	590.3	0.2	62.62	0	0	0	0	0	0	0	0	0	0	0	0
205	201	6/16/99 2:31PM	69.9	81.9	95	0.3	42.52	0	0	0	0	0	0	0	0	0	0	0	0
206	202	6/16/99 2:31PM	78.4	89.9	105.5	0.3	87.48	0	0	0	0	0	0	0	0	0	0	0	0
207	203	6/16/99 2:32PM	70.9	83.1	95.9	0.3	49.57	0	0	0	0	0	0	0	0	0	0	0	0
208	204	6/16/99 2:32PM	88.6	541.2	588.6	0.9	50.21	0.1	0	0	0	0	0	0	0	0	0	0	0
209	205	6/16/99 2:33PM	76.7	89.3	105.1	0.3	50.61	0.1	0	0	0	0	0	0	0	0	0	0	0
210	206	6/16/99 2:33PM	78.8	526.6	586.4	1	44.32	0.1	0	0	0	0	0	0	0	0	0	0	0
211	207	6/16/99 2:34PM	65.5	77.9	90.4	0.3	49.16	0.1	0	0	0	0	0	0	0	0	0	0	0
212	208	6/16/99 2:34PM	66.8	78.8	91.6	0.3	50.71	0.2	0	0	0	0	0	0	0	0	0	0	0
213	209	6/16/99 2:35PM	60.4	112	215.4	1.4	1.17	5.9	0.06	0.15	0.2	0.2	0.17	0.12	0.1	0.11	0.15	0.22	0.3
214	210	6/16/99 2:35PM	65.9	112.8	187.7	1.1	1.08	6.6	0.06	0.16	0.23	0.23	0.19	0.14	0.1	0.11	0.14	0.2	0.27
215	211	6/16/99 2:36PM	69.7	117.1	191.5	1	1.07	6.8	0.21	0.54	0.02	0	0.01	0.28	0.16	0.12	0.14	0.18	0.23
216	212	6/16/99 2:36PM	73.2	122.2	199.9	1	1.12	7.2	0.2	0.51	0.02	0	0.01	0.29	0.15	0.1	0.12	0.16	0.21
217	213	6/16/99 2:37PM	76.3	127.3	207.4	1	1.16	7.7	0.18	0.48	0.02	0	0.01	0.3	0.15	0.09	0.11	0.15	0.19
218	214	6/16/99 2:37PM	79.9	133	216.3	1	1.22	8.2	0.16	0.45	0.02	0	0.01	0.3	0.15	0.08	0.09	0.13	0.18
219	215	6/16/99 2:38PM	83.9	138	224.9	1	1.3	8.8	0.15	0.43	0.02	0	0.01	0.31	0.15	0.07	0.08	0.12	0.17
220	216	6/16/99 2:38PM	87.1	142.2	229.9	1	1.33	9.1	0.14	0.41	0.02	0	0.01	0.31	0.15	0.07	0.07	0.12	0.16
221	217	6/16/99 2:39PM	89.2	146.1	236.6	1	1.35	9.7	0.12	0.39	0.02	0	0.01	0.32	0.16	0.07	0.06	0.11	0.15
222	218	6/16/99 2:39PM	92.1	149.4	240.4	1	1.35	10.3	0.12	0.38	0.02	0	0.01	0.32	0.16	0.06	0.05	0.1	0.15
223	219	6/16/99 2:40PM	95.2	155.2	249.6	1	1.42	10.7	0.1	0.35	0.01	0	0.01	0.32	0.17	0.07	0.05	0.09	0.14
224	220	6/16/99 2:40PM	98.2	159.5	252.6	1	1.52	10.7	0.09	0.33	0.01	0	0.01	0.33	0.17	0.06	0.04	0.08	0.14
225	221	6/16/99 2:41PM	102	164.5	261	1	1.53	11.2	0.04	0.23	0.38	0.01	0	0	0.24	0.09	0.04	0.09	0.15
226	222	6/16/99 2:42PM	103.2	166.5	262.5	1	1.55	11.7	0.04	0.22	0.37	0.01	0	0	0.24	0.1	0.04	0.09	0.15
227	223	6/16/99 2:42PM	105.2	169.7	269	1	1.62	11.5	0	0.2	0.38	0.01	0	0	0.26	0.09	0.03	0.08	0.15
228	224	6/16/99 2:43PM	107.8	172.9	272.8	1	1.67	12.2	0.01	0.19	0.37	0.01	0	0	0.28	0.1	0.01	0.06	0.14
229	225	6/16/99 2:43PM	110	175.4	273	0.9	1.72	12.2	0	0	0	0	0	0	0	0	0.01	0.9	0.23
230	226	6/16/99 2:44PM	110.2	178.4	281.1	1	1.74	12.2	0	0.15	0.35	0.01	0	0	0.31	0.12	0.02	0.04	0.12
231	227	6/16/99 2:44PM	111.9	181.2	283.1	0.9	1.77	12	0.01	0.16	0.33	0.01	0	0	0.3	0.13	0.02	0.03	0.11
232	228	6/16/99 2:45PM	114.9	183.1	282.5	0.9	1.83	12.3	0	0	0	0	0	0	0	0	0.01	0.84	0.25
233	229	6/16/99 2:45PM	116.5	186.6	289.9	0.9	1.87	12.6	0	0	0	0	0	0	0	0	0	0.01	0.76
234	230	6/16/99 2:46PM	118.9	187.8	288.3	0.9	1.86	12.8	0	0	0	0	0	0	0	0	0	0.01	0.81
235	231	6/16/99 2:46PM	121.3	192.8	297.1	0.9	1.97	13.2	0	0	0	0	0	0	0	0	0	0.01	0.68
236	232	6/16/99 2:47PM	123.7	194.6	295.2	0.9	1.92	13.2	0	0	0	0	0	0	0	0	0	0.01	0.73
237	233	6/16/99 2:47PM	126	197.4	299.4	0.9	1.96	13.6	0	0	0	0	0	0	0	0	0	0.01	0.72
238	234	6/16/99 2:48PM	126.4	199.8	306.6	0.9	2	14	0	0	0	0	0	0	0	0	0	0.01	0.64
239	235	6/16/99 2:48PM	127.8	201.1	307.4	0.9	2.07	13.9	0	0	0	0	0	0	0	0	0	0.01	0.62
240	236	6/16/99 2:49PM	129.2	203.6	311.5	0.9	2.1	14.1	0	0	0	0	0	0	0	0	0	0.01	0.59
241	237	6/16/99 2:49PM	131.5	206.5	311	0.9	2.11	14.7	0	0	0	0	0	0	0	0	0	0.01	0.54
242	238	6/16/99 2:50PM	131.7	208.7	316.8	0.9	2.18	14.8	0	0	0	0	0	0	0	0	0	0	0.01
243	239	6/16/99 2:50PM	132.6	208.6	311.9	0.9	2.16	14.9	0	0	0	0	0	0	0	0	0	0	0.44
244	240	6/16/99 2:51PM	133.2	211.6	319.8	0.9	2.19	14.9	0	0	0	0	0	0	0	0	0	0	0.01
245	241	6/16/99 2:51PM	134.5	212.6	319.7	0.9	2.3	15.4	0	0	0	0	0	0	0	0	0	0	0.01
246	242	6/16/99 2:52PM	135.9	215.4	326.2	0.9	2.3	15.4	0	0	0	0	0	0	0	0	0	0	0.01
247	243	6/16/99 2:52PM	134.3	217.9	335	0.9	2.43	15.7	0	0	0	0	0	0	0	0	0	0	0.01
248	244	6/16/99 2:53PM	135.2	219.9	337	0.9	2.45	15.8	0	0	0	0	0	0	0	0	0	0	0.01
249	245	6/16/99 2:53PM	140.7	222	332.2	0.9	2.4	16.1	0	0	0	0	0	0	0	0	0	0	0.01
250	246	6/16/99 2:54PM	137.5	224.2	342.9	0.9	2.52	15.9	0	0	0	0	0	0	0	0	0	0	0.01
251	247	6/16/99 2:54PM	137.6	224.6	343.8	0.9	2.53	16.2	0	0	0	0	0	0	0	0	0	0	0.01
252	248	6/16/99 2:55PM	143.7	229	348	0.9	2.62	16.2	0	0	0	0	0	0	0	0	0	0	0.01
253	249	6/16/99 2:56PM	145.3	231.8	352.5	0.9	2.61	16.5	0	0	0	0	0	0	0	0	0	0	0.01
254	250	6/16/99 2:56PM	142.2	231.1	352.7	0.9	2.66	16.5	0	0	0	0	0	0	0	0	0	0	0.01
255	251	6/16/99 2:57PM	142.8	232.3	356.2	0.9	2.69	17.1	0	0	0	0	0	0	0	0	0	0	0.01
256	252	6/16/99 2:57PM	144.1	233.3	354.7	0.9	2.75	17	0	0	0	0	0	0	0	0	0	0	0
257	253	6/16/99 2:58PM	150.2	237	357.1	0.9	2.82	17.1	0	0	0	0	0	0	0	0	0	0	0
258	254	6/16/99 2:58PM	151.9	239.9	361.5	0.9	2.84	17.7	0	0	0	0	0	0	0	0	0	0	0
259	255	6/16/99 2:59PM	147.6	238.5	362.7	0.9	2.79	17.8	0	0	0	0	0	0	0	0	0	0	0
260	256	6/16/99 2:59PM	148.7	240.1	363.7	0.9	2.87	17.3	0	0	0	0	0	0	0	0	0	0	0
261	257	6/16/99 3:00PM	155	243.8	369.6	0.9	2.94	18.3	0	0	0	0	0	0	0	0	0	0	0
262	258	6/16/99 3:00PM	151.4	243.3	369.5	0.9	2.91	17.9	0	0	0	0	0	0	0	0	0	0	0
263	259	6/16/99 3:01PM	153.5	246.1	374.4	0.9	2.93	18.3	0	0	0	0	0	0	0	0	0	0	0
264	260	6/16/99 3:01PM	154.5	247.8	371.9	0.9	3.07	19.1	0	0	0	0	0	0	0	0	0	0	0
265	261	6/16/99 3:02PM	159.5	251.2	376.4	0.9	3.16	19.5	0	0	0	0	0	0	0	0	0	0	0
266	262	6/16/99 3:02PM	154.9	250.1	380.5	0.9	3.04	19.8	0	0	0	0	0	0	0	0	0	0	0

267	263	6/16/99 3:03PM	156.1	250.9	379.4	0.9	3.15	19.8	0	0	0	0	0	0	0	0	0	0	0
268	264	6/16/99 3:03PM	160.1	253	380.4	0.9	3.13	19.2	0	0	0	0	0	0	0	0	0	0	0
269	265	6/16/99 3:04PM	158.7	254.7	392.2	0.9	3.17	19.5	0	0	0	0	0	0	0	0	0	0	0
270	266	6/16/99 3:04PM	159	255.9	389.1	0.9	3.16	19.5	0	0	0	0	0	0	0	0	0	0	0
271	267	6/16/99 3:05PM	158.8	255.6	386.2	0.9	3.23	19.3	0	0	0	0	0	0	0	0	0	0	0
272	268	6/16/99 3:05PM	160.4	257	386.6	0.9	3.17	20.2	0	0	0	0	0	0	0	0	0	0	0
273	269	6/16/99 3:06PM	160.6	257.9	391.5	0.9	3.26	20.1	0	0	0	0	0	0	0	0	0	0	0
274	270	6/16/99 3:06PM	160	257.7	389.7	0.9	3.26	19.4	0	0	0	0	0	0	0	0	0	0	0
275	271	6/16/99 3:07PM	161.1	261.4	404.6	0.9	3.33	20.4	0	0	0	0	0	0	0	0	0	0	0
276	272	6/16/99 3:07PM	162.3	261.3	396.1	0.9	3.29	20.1	0	0	0	0	0	0	0	0	0	0	0
277	273	6/16/99 3:08PM	163.6	262.9	397.1	0.9	3.35	20.4	0	0	0	0	0	0	0	0	0	0	0
278	274	6/16/99 3:09PM	162.2	263.4	407.1	0.9	3.43	21.1	0	0	0	0	0	0	0	0	0	0	0
279	275	6/16/99 3:09PM	163.7	264.4	404.5	0.9	3.51	20.6	0	0	0	0	0	0	0	0	0	0	0
280	276	6/16/99 3:10PM	162.7	264.1	405.2	0.9	3.4	20.5	0	0	0	0	0	0	0	0	0	0	0
281	277	6/16/99 3:10PM	164.9	267.7	415	0.9	3.57	21.3	0	0	0	0	0	0	0	0	0	0	0
282	278	6/16/99 3:11PM	164.9	268.1	413.8	0.9	3.57	20.9	0	0	0	0	0	0	0	0	0	0	0
283	279	6/16/99 3:11PM	166.8	270.1	417.1	0.9	3.54	21	0	0	0	0	0	0	0	0	0	0	0
284	280	6/16/99 3:12PM	165.9	269.2	413.4	0.9	3.63	20.7	0	0	0	0	0	0	0	0	0	0	0
285	281	6/16/99 3:12PM	166.4	269.8	415.6	0.9	3.58	20.9	0	0	0	0	0	0	0	0	0	0	0
286	282	6/16/99 3:13PM	167.4	272.3	422.3	0.9	3.56	21.8	0	0	0	0	0	0	0	0	0	0	0
287	283	6/16/99 3:13PM	169.3	274.9	426	0.9	3.65	21.5	0	0	0	0	0	0	0	0	0	0	0
288	284	6/16/99 3:14PM	169.4	275.3	428.3	0.9	3.75	22.3	0	0	0	0	0	0	0	0	0	0	0
289	285	6/16/99 3:14PM	170.5	275.2	423.3	0.9	3.62	22.3	0	0	0	0	0	0	0	0	0	0	0
290	286	6/16/99 3:15PM	169.7	276.4	427.7	0.9	3.73	21.4	0	0	0	0	0	0	0	0	0	0	0
291	287	6/16/99 3:15PM	169.5	274.6	422.1	0.9	3.64	21.5	0	0	0	0	0	0	0	0	0	0	0
292	288	6/16/99 3:16PM	171.1	277.9	431.8	0.9	3.83	21.9	0	0	0	0	0	0	0	0	0	0	0
293	289	6/16/99 3:16PM	172.5	278.7	430.1	0.9	3.85	22.2	0	0	0	0	0	0	0	0	0	0	0
294	290	6/16/99 3:17PM	172.6	280.4	434.1	0.9	3.82	22.4	0	0	0	0	0	0	0	0	0	0	0
295	291	6/16/99 3:17PM	174.1	280.6	432.6	0.9	3.92	22.3	0	0	0	0	0	0	0	0	0	0	0
296	292	6/16/99 3:18PM	172.1	282.2	441.4	1	3.95	21.6	0	0	0	0	0	0	0	0	0	0	0
297	293	6/16/99 3:18PM	172.3	279.2	431.9	0.9	3.73	21.4	0	0	0	0	0	0	0	0	0	0	0
298	294	6/16/99 3:19PM	172.7	279.6	432.1	0.9	3.73	22.1	0	0	0	0	0	0	0	0	0	0	0
299	295	6/16/99 3:19PM	174.5	282.9	437.4	0.9	3.87	22	0	0	0	0	0	0	0	0	0	0	0
300	296	6/16/99 3:20PM	174.2	282.6	436	0.9	3.9	22	0	0	0	0	0	0	0	0	0	0	0
301	297	6/16/99 3:20PM	172.6	279.8	433.4	0.9	3.89	21.8	0	0	0	0	0	0	0	0	0	0	0
302	298	6/16/99 3:21PM	173.2	281	435.4	0.9	3.9	21.9	0	0	0	0	0	0	0	0	0	0	0
303	299	6/16/99 3:21PM	172.1	280.2	432.2	0.9	3.81	22.1	0	0	0	0	0	0	0	0	0	0	0
304	300	6/16/99 3:22PM	173.9	285.1	445.4	1	4.06	22.7	0	0	0	0	0	0	0	0	0	0	0
305	301	6/16/99 3:23PM	171.6	282.8	441.8	1	3.96	21.8	0	0	0	0	0	0	0	0	0	0	0
306	302	6/16/99 3:23PM	174	282.5	436.1	0.9	3.95	21.6	0	0	0	0	0	0	0	0	0	0	0
307	303	6/16/99 3:24PM	174.9	283	437.1	0.9	3.95	21.9	0	0	0	0	0	0	0	0	0	0	0
308	304	6/16/99 3:24PM	174.8	283.3	438.8	0.9	3.88	21.9	0	0	0	0	0	0	0	0	0	0	0
309	305	6/16/99 3:25PM	174.2	282.1	435.6	0.9	3.92	21.8	0	0	0	0	0	0	0	0	0	0	0
310	306	6/16/99 3:25PM	174.7	282	431.9	0.9	3.82	21.6	0	0	0	0	0	0	0	0	0	0	0
311	307	6/16/99 3:26PM	171.7	282.9	442.1	1	4.01	21.2	0	0	0	0	0	0	0	0	0	0	0
312	308	6/16/99 3:26PM	174.3	283.3	438.4	0.9	3.91	21.9	0	0	0	0	0	0	0	0	0	0	0
313	309	6/16/99 3:27PM	173.5	281.4	433.4	0.9	3.89	21.3	0	0	0	0	0	0	0	0	0	0	0
314	310	6/16/99 3:27PM	173.9	281.7	434.4	0.9	3.88	21.2	0	0	0	0	0	0	0	0	0	0	0
315	311	6/16/99 3:28PM	172.1	283.5	443	1	4.08	21.8	0	0	0	0	0	0	0	0	0	0	0
316	312	6/16/99 3:28PM	174.8	282.8	434.8	0.9	3.92	21.4	0	0	0	0	0	0	0	0	0	0	0
317	313	6/16/99 3:29PM	174.3	282.7	437.6	0.9	3.89	20.9	0	0	0	0	0	0	0	0	0	0	0
318	314	6/16/99 3:29PM	173.7	285.5	446.8	1	3.99	21.6	0	0	0	0	0	0	0	0	0	0	0
319	315	6/16/99 3:30PM	173.1	280.6	432.2	0.9	3.82	21	0	0	0	0	0	0	0	0	0	0	0
320	316	6/16/99 3:30PM	173.3	282.4	438.3	0.9	3.81	21.3	0	0	0	0	0	0	0	0	0	0	0
321	317	6/16/99 3:31PM	172.1	281.2	433.9	0.9	3.76	20.5	0	0	0	0	0	0	0	0	0	0	0
322	318	6/16/99 3:31PM	175.4	284.3	438.1	0.9	3.9	20.4	0	0	0	0	0	0	0	0	0	0	0
323	319	6/16/99 3:32PM	172.7	283.5	442.5	1	4.06	20.3	0	0	0	0	0	0	0	0	0	0	0
324	320	6/16/99 3:32PM	174.9	284.6	440.1	0.9	3.85	20.5	0	0	0	0	0	0	0	0	0	0	0
325	321	6/16/99 3:33PM	173.7	285	444.6	1	3.98	20.5	0	0	0	0	0	0	0	0	0	0	0
326	322	6/16/99 3:33PM	171.9	282.3	435.5	0.9	4.1	20.9	0	0	0	0	0	0	0	0	0	0	0
327	323	6/16/99 3:34PM	172.8	284.1	443.1	1	4.06	20.6	0	0	0	0	0	0	0	0	0	0	0
328	324	6/16/99 3:35PM	174.2	285.8	445	0.9	4.17	21.1	0	0	0	0	0	0	0	0	0	0	0
329	325	6/16/99 3:35PM	173.1	284.4	444.9	1	4.1	20.2	0	0	0	0	0	0	0	0	0	0	0
330	326	6/16/99 3:36PM	173.4	281.6	434.3	0.9	4	20.5	0	0	0	0	0	0	0	0	0	0	0
331	327	6/16/99 3:36PM	171.3	281.5	437.6	0.9	4.09	20.2	0	0	0	0	0	0	0	0	0	0	0
332	328	6/16/99 3:37PM	171.9	282	439.8	1	4.01	20.7	0	0	0	0	0	0	0	0	0	0	0
333	329	6/16/99 3:37PM	172.9	284.3	443.9	1	4.05	20.4	0	0	0	0	0	0	0	0	0	0	0
334	330	6/16/99 3:38PM	175.6	286.2	446.2	0.9	4.15	21.2	0	0	0	0	0	0	0	0	0	0	0
335	331	6/16/99 3:38PM	173	284.3	445.2	1	4.07	20.8	0	0	0	0	0	0	0	0	0	0	0
336	332	6/16/99 3:40PM	173.7	285.2	447.9	1	4.08	21.4	0	0	0	0	0	0	0	0	0	0	0
337	333	6/16/99 3:40PM	174.3	285.5	443	0.9	4.12	21	0	0	0	0	0	0	0	0	0	0	0
338	334	6/16/99 3:41PM	174.8	287.2	449.6	1	4.18	20.5	0	0	0	0	0	0	0	0	0	0	0
339	335	6/16/99 3:41PM	173.2	284.7	445.3	1	4.03	20.3	0	0	0	0	0	0	0	0	0	0	0
340	336	6/16/99 3:42PM	171.6	282.1	439.4	0.9	4.1	20	0	0	0	0	0	0	0	0	0	0	0
341	337	6/16/99 3:42PM	171.8	283.7	445.4	1	4.07	20.1	0	0	0	0	0	0	0	0	0	0	0
342	338	6/16/99 3:43PM	171.6	282.6	441.9	1	4.03	20.6	0	0	0	0	0	0	0	0	0	0	0
343	339	6/16/99 3:43PM	172.1	279.9	432.6	0.9	3.86	20	0	0	0	0	0	0	0	0	0	0	0
344	340	6/16/99 3:44PM	168.4	278.5	437.2	1	3.96	20.4	0	0	0	0	0	0	0	0	0	0	0
345	341	6/16/99 3:45PM	170.5	277.2	428.9	0.9	3.84	19.9	0	0	0	0	0	0	0	0	0	0	0
346	342	6/16/99 3:45PM	167.8	274.3	424.9	0.9	3.72	19.3	0	0	0	0	0	0	0	0	0	0	0
347	343	6/16/99 3:46PM	164.8	270.8	419.7	0.9	3.69	19.3	0	0	0	0	0	0	0	0	0	0	0
348	344	6/16/99 3:46PM	163.9	269.3	417.2	0.9	3.55	18.9	0	0	0	0	0	0	0	0	0	0	0
349	345	6/16/99 3:47PM	162.5	266.9	411.9	0.9	3.55	18.5	0	0	0	0	0	0	0	0	0	0	0
350	346	6/16/99 3:47PM	161.2	265.9	415.4	1	3.6	18.3	0	0	0	0	0	0	0	0	0	0	0
351	347	6/16/99 3:48PM	159.4	265.9	420.4	1	3.69	18.5	0	0	0	0	0	0	0	0	0	0	0
352	348	6/16/99 3:48PM	158.6	263.4	413.8	1	3.5	18	0	0	0	0	0	0	0	0	0	0	0
353	349	6/16/99 3:49PM	156.7	259	401.2	0.9	3.47	17	0	0	0	0	0	0	0	0	0	0	0
354	350	6/16/99 3:49PM	155.6	257.3	401.4	1	3.48	17.4	0	0	0	0	0	0	0	0	0	0	0
355	351	6/16/99 3:50PM	154.7	256.5	399.5	1	3.44	17.2	0	0	0	0	0	0	0	0	0	0	0
356	352	6/16/99 3:50PM	154	256.3	401.1	1	3.44	17.6	0	0	0	0	0	0	0	0	0	0	0
357	353	6/16/99 3:51PM	153.1	254.3	398.9	1	3.36	16.5	0	0	0	0	0	0	0	0	0	0	0
358	354	6/16/99 3:51PM	151.4	252.2	394.6	1	3.29	16.8	0	0	0	0	0	0	0	0	0	0	0.01
359	355	6/16/99 3:52PM	152.9	253.4	396.8	1	3.36	16.6	0	0	0	0	0	0	0	0	0	0	0
360	356	6/16/99 3:52PM	151.5	252.2	395.4	1	3.27	16.3	0	0	0	0	0	0	0	0	0	0	0.01
361	357	6/16/99 3:53PM	150.7	250.4	388.7	1	3.28	16.8	0	0	0	0	0	0	0	0	0	0	0.01
362	358	6/16/99 3:53PM	149.7	249	389.1	1	3.14	16.1	0	0	0	0	0	0	0	0	0	0	0.01
363	359	6/16/99 3:54PM	149	248.5	388.7	1	3.15	15.9	0	0	0	0	0	0	0	0	0	0	0.01
364	360	6/16/99 3:54PM	147.8	246.7	386	1	3.06	15.4	0	0	0	0	0	0	0	0	0	0	0.01
365	361	6/16/99 3:55PM	147.1	247.3	386.6	1	3.09	15.8	0	0	0	0	0	0	0	0	0	0	0.01
366	362	6/16/99 3:55PM	146	244.2	380.6	1	3.08	15.4	0	0	0	0	0	0	0	0	0	0	0.01
367	363	6/16/99 3:56PM	146.7	245.7	385.4	1	3.12	15.3	0	0	0	0	0	0	0	0	0	0	0.01
368	364	6/16/99 3:56PM	146.2	244	379.3	1	3.14	15.1	0	0	0	0	0	0	0	0	0	0	0.01
369	365	6/16/99 3:57PM	146.6	245	382.6	1	3.01	15.3	0	0	0	0	0	0	0	0	0	0	0.01
370	366	6/16/99 3:57PM	145	242.7	376.8	1	3.09	14.7	0	0	0	0	0	0	0	0	0	0	0.01
371	367	6/16/99 3:58PM	144.6	242.3	376.5	1	2.92	15.3	0	0	0	0	0	0	0	0	0	0	0.01
372	368	6/16/99 3:58PM	145.5	244.1	382.7	1	2.89	15.1	0	0	0	0	0	0	0	0	0	0	0.01
373	369	6/16/99 3:59PM	147.5	246	384.7	1	2.98	15.3	0	0	0	0	0	0	0	0	0	0	0.01
374	370	6/16/99 4:00PM	147	246.9	388	1	3.08	15	0	0	0	0	0	0	0	0	0	0	0.01
375	371	6/16/99 4:00PM	147.4	246.3	386.2	1	3.05	15.3	0	0	0	0	0	0	0	0	0	0	0.01
376	372	6/16/99 4:01PM	147.3	246.7	386	1	3.05	14.7	0	0	0	0	0	0	0	0	0	0	0.01
377	373	6/16/99 4:01PM	148	246.8	384.6	1	3.07	15.4	0	0	0	0	0	0	0	0	0	0	0.01
378	374	6/16/99 4:02PM	148.2	246.5	383.5	1	3.08	15.2	0	0	0	0	0	0	0	0	0	0	0
379	375	6/16/99 4:02PM	149.9	248.8	388.7	1	3.15	15.3	0	0	0	0	0	0	0	0	0	0	0
380	376	6/16/99 4:03PM	153.3	252	395.2	1	3.3	15.4	0	0	0	0	0	0	0	0	0	0	0
381	377	6/16/99 4:03PM	152.9	252.3	394.8	1	3.21	15.5	0	0	0	0	0	0	0	0	0	0	0
382	378	6/16/99 4:04PM	151.8	250.8	392.1	1	3.16	15.3	0	0	0	0	0	0	0	0	0	0	0
383	379	6/16/99 4:04PM	152.1	251.1	392.9	1	3.12	15.3	0	0	0	0	0	0	0	0	0	0	0
384	380	6/16/99 4:05PM	153.1	253.7	397.6	1	3.18	15.7	0	0	0	0	0	0	0	0	0	0	0
385	381	6/16/99 4:05PM	153.8	254.5	400.9	1	3.23	15.7	0	0	0	0	0	0	0	0	0	0	0
386	382	6/16/99 4:06PM	154.1	254.7	398.2	1	3.27	15.5	0	0	0	0	0	0	0	0	0	0	0
387	383	6/16/99 4:06PM	154.8	255.6	404	1	3.35	15.6	0	0	0	0	0	0	0	0	0	0	0
388	384	6/16/99 4:07PM	153.7	254.4	398.6	1	3.21	15.5	0	0	0	0	0	0	0	0	0	0	0
389	385	6/16/99 4:07PM	156	255.9	401.3	1	3.38	15.4	0	0	0	0	0	0	0	0	0	0	0
390	386	6/16/99 4:08PM	155.2	256.2	402	1	3.29	15.5	0	0	0	0	0	0	0	0	0	0	0
391	387	6/16/99 4:08PM	157.2	258.2	407.2	1	3.31	15.4	0	0	0	0	0	0	0	0	0	0	0
392	388	6/16/99 4:09PM	157.5	258.9	409.4	1	3.43	15.8	0	0	0	0	0	0	0	0	0	0	0
393	389	6/16/99 4:09PM	154.9	254.9	397.6	1	3.26	15.2	0	0	0	0	0	0	0	0	0	0	0
394	390	6/16/99 4:10PM	156.2	255.6	401.1	1	3.3	14.9	0	0	0	0	0	0	0	0	0	0	0
395	391	6/16/99 4:10PM	156.1	256.2	399.8	1	3.37	15	0	0	0	0	0	0	0	0	0	0	0
396	392	6/16/99 4:11PM	157.9	259.1	408.8	1	3.36	15.1	0	0	0	0	0	0	0	0	0	0	0

11.55	14.08	17.15	20.9	25.46	31.01	37.79	46.03	56.09	68.33	83.26	101.44	123.59	150.57	183.44	223.51	272.31	331.77	404.21	492.47	600
0	0.9	2.01	3.8	5.72	7.66	7.83	8.24	7.74	2.62	0.02	0	0.02	1.15	3.19	13.99	33.12	1.98	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1.83	98.16
0	0	0.21	2.71	14.79	25.4	19.42	13	13.77	9.75	0.96	0	0	0	0	0	0	0	0	0	0
0	0	0.32	2.28	6.87	18.12	38.78	22.21	9.15	2.11	0.15	0	0	0	0	0	0	0	0	0	0
0	0.03	4.43	11.72	17.71	35.17	28.96	1.93	0.05	0	0	0	0	0	0	0	0	0	0	0	0
53.74	23.97	0.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.05	8.03	12.24	8.99	25.16	44.26	3.2	0.07	0	0	0	0	0	0	0	0	0	0	0	0
0.01	9.56	15.19	8.26	6.99	15.68	39.17	4.8	0.33	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.09	4.24	32.63	53.68	9.29	0.07	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.68	21.41	28.6	31.44	17.22	0.65	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.66	98.33
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.31	98.69
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.21	1.95	11.02	16.95	16.63	10.41	42.82
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1	98.99
0	0	0	0	0	0.42	9.77	53.57	35.33	0.9	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.42	9.77	53.57	35.33	0.9	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.21	3.49	12.72	6.72	0.28	0	0	0	0	0	0	0	0.01	1.15	75.42
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3.47	17.14	20.66	58.43
0	0	0	0	0.01	1.29	19.81	60.72	17.96	0.22	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1.47	98.52
0	0	0	0	0	0	0.15	3.39	22.15	32.18	7.89	0.5	0	0.01	0	0	0	0	0.01	1.92	31.82
0	0	0	0	0	0.59	12.13	56.73	30	0.55	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.68	13.3	57.89	27.7	0.44	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1.56	98.44
0	0	0	0	0	0.02	0.93	6.66	6.83	0.4	-0.02	0	0	0	0	0	0	0.05	0.05	6.45	78.61
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.18	5.05	94.75
0	0	0	0	0	0	0	0	0.01	0.08	0.28	0.45	0.86	2.17	0.09	1.58	4.82	5.65	5.14	8.35	70.52
0	0	0	0	0	0	0	0.03	0.9	5.58	7.49	1.88	0.07	0	0	0	0	0	0.09	3.18	80.77
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	1.93	98.05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	5.29	38.15	56.49
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	5.29	38.15	56.49
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.73	98.27
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.73	98.27
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	7.08	92.84
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.31	2.27	97.41
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.12	4.35	38.55	52.49	4.48	0.02	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.05	1.26	6.28	3.44	0.04	0	0	0	0	0.27	1.7	86.95
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1.93	98.05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.45	1.61	97.94
0	0	0	0	0	0	0	0	0.01	0.37	2.96	3.94	0.28	-0.01	0	0	0	0	0.27	2.21	89.99
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.02	1.53	22.56	60.47	15.26	0.16	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	1.47	98.5
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	1.47	98.5
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.25	6.85	45.72	44.56	2.61	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.01	0.47	3.98	5.76	0.54	-0.02	0	0	0	0	0.22	2.39	86.63
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	1.15	98.63
0	0	0	0	0	0	0	0.02	1.31	19.22	57.46	21.58	0.41	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	1.31	98.67
0	0	0	0	0	0	0	0.03	1.7	22.6	58.22	17.19	0.26	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.46	9.41	47.83	39.18	3.11	0.01	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.94	12.88	44.95	35.34	5.76	0.13	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.01	1.12	13.75	43.94	34.39	6.59	0.2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.55	8.6	36.36	40.91	12.76	0.8	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.21	1.79	5.2	8.34	8.97	3.82	0.16	0	0	0	0.08	0.4	8.52	62.49
0	0	0	0	0	0	0	0.46	5.52	20.23	26.54	12.65	1.3	0.02	0	0	0	0	0	0.48	32.81
0	0	0	0	0	0	0	0.78	8.43	27.69	37.57	22.34	3.15	0.04	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.1	1.74	5.92	11.45	20.96	29.84	21.56	7.41	1.02	0	0	0	0	0
0	0	0	0	0	0	0	0.11	1.61	4.25	6.36	12.59	27.92	28.36	14.15	3.84	0.77	0.04	0	0	0
0	0	0	0	0	0	0	0.36	1.97	4.09	6.41	11.24	19.71	21.12	15.41	8.77	5.57	3.59	1.75	0.01	0
0	0	0	0	0	0	0	0.17	1.32	3.11	5.67	10.41	20.37	24.36	18.43	9.8	4.73	1.57	0.07	0	0
0	0	0	0	0	0	0	0.1	0.99	2.37	4.11	7.1	12.96	16.3	15.11	11.22	8.36	6.53	5.82	5.02	4.03
0	0	0	0	0.02	0.07	0.18	0.41	0.79	1.43	2.35	3.72	6.15	8.22	9.79	10.58	11.68	12.11	11.97	10.61	9.93
0	0	0	0	0	0	0	0	0	0.87	1.88	3.17	5.64	8.71	11.95	14.71	16.36	14.12	10.68	7.2	4.71
0	0	0	0	0	0	0	0	0	0.65	1.9	3.25	5.75	6.83	12.24	15.55	17.68	15.54	10.86	5.88	2.05
0	0	0	0	0	0	0	0	0	1.08	2.06	3.46	6.25	9.76	13.09	14.67	15.04	13.12	10.22	6.86	4.38
0	0.02	0.02	0.09	0.33	0.44	0.11	0	0.01	0.59	1.63	2.95	5.42	8.71	12	14.5	16.41	15.32	11.63	6.75	3.07
0	0	0.01	0.06	0.22	0.43	0.55	0.21	0	0.01	0.8	2.06	3.73	5.66	8.28	12.1	17.41	18.76	15.33	9.31	5.07
0	0.09	0.11	0.2	0.38	0.44	0.2	0	0	0.01	0.61	1.82	3.55	6.19	9.62	13.05	16.22	17.07	14.75	9.8	5.87
0	0	0.06	0.15	0.29	0.44	0.49	0.18	0	0	0.02	0.91	2.29	3.95	6.29	9.96	15.31	18.82	18.14	13.4	9.29
0	0	0.08	0.17	0.29	0.39	0.4	0.11	0	0	0.01	0.59	1.92	3.46	5.74	9.62	15.15	18.65	18.45	14.47	10.5
0	0	0.04	0.15	0.3	0.42	0.47	0.27	0.01	0	0.01	0.76	2	3.39	5.41	8.76	13.71	17.62	18.51	15.62	12.55
0	0	0.08	0.21	0.33	0.4	0.41	0.18	0	0	0	0.37	1.65	3.12	5.16	8.67	13.98	18.53	19.45	15.92	11.53
0	0	0	0.12	0.26	0.35	0.41	0.3	0.01	0	0	0.01	0.95	2.26	3.91	6.54	10.9	16	20.32	20.06	17.6
0	0	0	0.17	0.27	0.33	0.37	0.27	0.01	0	0	0.01	0.87	2.16	3.83	6.56	10.98	16.06	20.3	20.15	17.65
0	0	0	0.16	0.27	0.32	0.34	0.3	0.09	0	0	0	0.43	1.59	3.18	5.7	9.92	15.17	20.11	21.63	20.78
0	0	0	0.09	0.24	0.32	0.36	0.37	0.21	0	0	0	0.3	1.46	2.94	5.26	9.28	14.74	20.82	22.48	21.13
0	0	0	0.11	0.24	0.29	0.33	0.37	0.27	0	0	0.01	0.08	1.22	2.63	4.85	8.82	14.46	20.55	22.86	22.9
0	0	0	0.06	0.25	0.31	0.36	0.41	0.38	0.03	0	0	0.01	0.9	2.26	4.3	8.12	14.07	20.52	23.97	23.96
0	0	0	0	0.18	0.27	0.33	0.4	0.44	0.25	0	0	0.01	0.88	2.23	4.1	7.49	12.75	19.32	24.13	27.21
0	0	0	0	0.03	0.23	0.29	0.36	0.46	0.51	0.28	0.01	0.01	0.66	2.04	3.7	6.27	10.65	17.76	25.25	31.5
0	0	0	0	0.12	0.24	0.3	0.36	0.44	0.41	0.11	0	0.01	0.91	2.26	3.95	6.79	11.52	18.35	24.62	29.61
0	0	0	0	0	0.22	0.31	0.37	0.49	0.57	0.35	0.01	0	0.04	1.52	3.31	5.85	10.11	17.05	25.08	34.74
0	0	0	0	0	0.2	0.28	0.36	0.46	0.53	0.33	0.01	0	0.36	1.83	3.5	5.92	10.17	17.4	25.42	33.24
0	0	0	0	0	0.15	0.27	0.35	0.45	0.56	0.56	0.32	0.12	0.59	1.85	3.5	5.83	9.53	15.63	23.9	36.41
0	0	0	0	0.01	0.18	0.3	0.37	0.47	0.59	0.58	0.27	0.01	0.48	1.82	3.45	5.66	9.46	16.17	24.54	35.66
0	0	0	0	0.01	0.18	0.3	0.38	0.49	0.61	0.56	0.17	0	0.16	1.6	3.4	5.63	9.13	15.24	24.45	37.69
0	0	0	0	0	0.1	0.28	0.37	0.48	0.64	0.72	0.44	0.01	0.07	1.47	3.26	5.29	8.58	14.89	24.47	38.94
0	0	0	0	0.01	0.19	0.32	0.39	0.48	0.58	0.59	0.4	0.22	0.61	1.8	3.51	5.84	9.41	15.26	23.33	37.06
0	0	0	0	0	0.11	0.3	0.38	0.48	0.61	0.69	0.57	0.32	0.53	1.64	3.33	5.54	8.84	14.42	23.1	39.14
0	0	0	0	0	0.09	0.27	0.35	0.46	0.63	0.74	0.58	0.2	0.36	1.56	3.27	5.32	8.48	14.61	24.17	38.92
0	0	0	0	0.01	0.18	0.34	0.39	0.48	0.59	0.65	0.6	0.55	0.9	1.96	3.62	5.87	9.07	14.4	22.88	37.51
0	0	0	0	0	0.04	0.27	0.37	0.46	0.58	0.69	0.64	0.46	0.59	1.61	3.4	5.64	8.41	13.09	21.95	41.8
0	0	0	0	0	0.1	0.3	0.38	0.48	0.61	0.71	0.64	0.47	0.71	1.74	3.39	5.63	8.83	14.26	23.13	38.61
0	0	0	0	0	0.24	0.37	0.43	0.51	0.64	0.75	0.76	0.68	0.91	1.83	3.46	5.68	8.65	13.62	22.32	39.14
0	0	0	0	0	0	0.25	0.37	0.47	0.62	0.8	0.84	0.56	0.43	1.33	3.15	5.27	7.79	12.38	21.77	43.96
0	0	0	0	0	0	0.29	0.42	0.52	0.67	0.83	0.9	0.8	0.87	1.69	3.32	5.49	8.15	12.54	21.26	42.25
0	0	0	0	0	0.09	0.33	0.43	0.53	0.67	0.79	0.78	0.69	0.86	1.77	3.44	5.73	8.63	13.4	21.93	39.91
0	0	0	0	0	0.12	0.32	0.43	0.52	0.64	0.74	0.73	0.66	0.92	1.87	3.51	5.79	8.97	13.94	21.97	38.87
0	0	0	0	0	0.14	0.32	0.4	0.48	0.6	0.72	0.8	0.9	1.28	2.21	3.83	6.14	9.13	13.77	21.47	37.8
0	0	0	0	0	0.08	0.3	0.4	0.49	0.61	0.73	0.77	0.77	1.03	1.96	3.58	5.78	8.71	13.58	21.99	39.22
0	0	0	0	0	0.17	0.32	0.39	0.48	0.56	0.64	0.68	0.76	1.14	2.16	3.85	6.15	9.11	13.72	21.68	38.21
0	0	0	0	0	0.15	0.32	0.4	0.5	0.61	0.71	0.77	0.89	1.32	2.28	3.92	6.4	9.67	14.41	21.64	35.99
0	0	0	0	0	0.07	0.31	0.42	0.51	0.64	0.79	0.93	1.08	1.45	2.32	3.87	6.05	8.8	13.15	20.95	38.66
0	0	0	0	0	0.14	0.31	0.39	0.47	0.57	0.67	0.73	0.85	1.28	2.28	3.87	6.2	9.52	14.58	21.51	36.34
0	0	0	0	0	0.02	0.29	0.38	0.47	0.6	0.74	0.8	0.77	0.97	1.85	3.49	5.76	8.8	13.02	21.21	41.02
0	0	0	0	0	0.1	0.31	0.41	0.49	0.61	0.72	0.78	0.87	1.24	2.19	3.81	6.12	9.16	13.82	21.63	37.73
0	0	0	0	0	0	0.27	0.39	0.48	0.61	0.77	0.87	0.86	0.99	1.8	3.41	5.58	8.23	12.45	20.82	42.46
0	0	0	0	0	0.09	0.33	0.42	0.5	0.62	0.78	0.93	1.11	1.51	2.42	3.95	6.17	9.05	13.55	21.25	37.31
0	0	0	0	0	0.05	0.29	0.38	0.45	0.56	0.69	0.79	0.89	1.23	2.15	3.75	5.99	8.89	13.43	21.2	39.26
0	0	0	0	0	0.11	0.32	0.4	0.47	0.56	0.66	0.75	0.88	1.27	2.23	3.88	6.29	9.37	13.76	20.97	38.06
0	0	0	0	0	0.18	0.34	0.41	0.49	0.59	0.67	0.67	0.69	1.06	2.04	3.67	6.09	9.43	14.49	22.07	37.1
0	0	0	0	0	0.13	0.31	0.38	0.44	0.54	0.64	0.69	0.78	1.18	2.18	3.84	6.27	9.54	14.18	21.36	37.56
0	0	0	0	0	0	0.26	0.37	0.45	0.57	0.72	0.8	0.78	0.96	1.85	3.44	5.6	8.51	13.21	21.45	41.03
0	0	0	0	0	0.06	0.3	0.38	0.45	0.56	0.69	0.82	0.98	1.4	2.34	3.92	6.21	9.1	13.38	20.88	38.52
0	0	0	0	0.01	0.19	0.32	0.39	0.45	0.53	0.61	0.64	0.73	1.17	2.2	3.85	6.31	9.67	14.46	21.68	36.81
0	0	0	0	0	0.09	0.29	0.38	0.45	0.54	0.66	0.79	1	1.48	2.48	4.06	6.3	9.23	13.7	21.23	37.33
0	0	0	0	0	0	0.27	0.38	0.47	0.6	0.73	0.78	0.72	0.91	1.81	3.47	5.74	8.67	13.18	21.33	40.95
0	0	0	0	0	0.03	0.29	0.39	0.46	0.57	0.69	0.76	0.77	1.06	1.99	3.61	5.95	8.96	13.48	21.38	39.58
0	0	0	0	0	0.09	0.3	0.39	0.46	0.56	0.64	0.67	0.72	1.1	2.09	3.73	6.08	9.18	14.01	21.99	37.99
0	0	0	0	0	0.07	0.23	0.37	0.44	0.55	0.63	0.59	0.53	0.85	1.89	3.59	5.94	9.09	14.12	22.3	38.77
0	0	0	0	0	0.07	0.29	0.36	0.43	0.53	0.62	0.61	0.58	0.89	1.9	3.61	6.04	9.11	13.62	21.53	39.82
0	0	0	0	0	0.06	0.23	0.36	0.44	0.55	0.64	0.59	0.46	0.71	1.75	3.5	5.85	8.9	13.66	22.04	40.2
0	0	0	0	0	0.1	0.31	0.38	0.44	0.53	0.6	0.56	0.47	0.74	1.79	3.54	5.93	9.06	13.74	21.55	40.28
0	0	0	0	0	0.09	0.3	0.37	0.43	0.53	0.62	0.57	0.46	0.73	1.77	3.51	5.86	8.97	13.79	22.01	39.95
0	0	0	0	0	0.05	0.27	0.36	0.44	0.55	0.62	0.56	0.45	0.78	1.86	3.55	5.82	8.95	14.23	22.92	38.59

0	0	0	0	0	0.11	0.31	0.36	0.41	0.5	0.57	0.56	0.54	0.88	1.92	3.63	5.99	8.95	13.66	22.03	39.55
0	0	0	0	0.01	0.19	0.32	0.36	0.42	0.5	0.49	0.3	0.1	0.52	1.77	3.57	6	9.34	14.65	22.99	38.48
0	0	0	0	0	0.17	0.31	0.37	0.46	0.57	0.57	0.24	0	0.03	1.4	3.38	5.66	8.85	14.5	23.52	39.96
0	0	0	0	0.01	0.18	0.31	0.35	0.43	0.52	0.46	0.05	0	0.14	1.61	3.43	5.83	9.46	15.34	23.79	38.09
0	0	0	0	0.05	0.28	0.33	0.36	0.43	0.45	0.18	0	0	0.06	1.58	3.34	5.93	10.32	17.48	25.2	34.01
0	0	0	0.17	0.26	0.29	0.34	0.36	0.42	0.33	0.02	0	0.19	1.16	2.42	4.28	7.48	12.01	18.14	23.93	28.26
0	0	0.26	0.26	0.27	0.29	0.32	0.32	0.19	0	0	0.15	1.05	2.14	3.55	5.89	9.96	14.86	19.51	20.82	20.17
0	0.04	0.14	0.19	0.26	0.36	0.39	0.16	0	0	0.48	1.59	2.88	4.5	6.82	10.49	15.63	18.19	16.89	12.29	8.68
0	0	0	0	0	0	0	0	0.2	1.41	4.21	8.61	13.77	13.91	9.31	5.43	3.99	3.85	5.77	9.77	19.76
0	0	0	0	0	0	0	0	0.06	1.35	8.01	10.46	2.17	0	0	0	0	0.02	0.04	4.7	73.21
0	0	0	0	0	0	0	0	0.01	0.37	3.35	6.98	2.24	0.01	0	0	0	0.01	0.06	4.93	82.03
0	0	0	0	0	0	0	0	0.04	0.89	4.23	3.35	0.18	-0.01	0	0	0	0	0.04	2.58	88.71
0	0	0	0	0	0	0	0	0.03	0.7	3.7	3.32	0.19	-0.01	0	0	0	0	0.08	4.43	87.56
0	0	0	0	0	0	0	0	0.13	1.36	4.49	4.78	1.12	0	0	0	0.01	0.06	1.01	10.48	76.56
0	0	0	0	0	0	0	0	0.02	0.4	2.43	6.46	6.96	1.19	-0.02	0	0	0.09	1.13	8.49	72.86
0	0	0	0	0	0	0	0.03	0.58	3.19	5.59	3.15	0.26	-0.01	0	0	0	0	0.04	3.23	83.93
0	0	0	0	0	0	0	0	0	0.2	2.22	4.86	0.91	-0.03	0	0	0	0	0.05	4.01	87.79
0	0	0	0	0	0	0	0	0	0.12	1.24	4.6	6.19	2.26	0.03	0.01	0.58	2.58	8.01	18.97	55.41
0	0	0	0	0	0	0	0.01	0.16	1.16	3.3	4.24	1.34	0.01	0	0	0	0.05	0.38	7.88	81.48
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	3.41	96.56
0	0	0	0	0	0	0	0	0	0.04	0.92	6.03	9.6	2.3	0	0	0	0.05	0.66	7.23	73.17
0	0	0	0	0	0	0	0	0	0.05	1.09	6.24	6.78	0.35	0	0	0	0.02	0.46	6.56	78.45
0	0	0	0	0	0	0	0	0	0.06	1.24	6.12	5.06	0.08	0	0	0.01	0.09	0.86	10.84	75.65
0	0	0	0	0	0	0	0	0	0.1	2	9.11	6.69	0.23	0	0	0	0.02	0.13	5.36	76.35
0	0	0	0	0	0	0	0	0	0.1	2.5	17.6	26.91	6.59	0.24	0	0	0	0	0.34	45.7
0	0	0	0	0	0	0	0	0.07	2.17	18.19	26.8	3.47	0.04	0	0	0	0.02	0.05	3.42	45.77
0	0	0	0	0	0	0	0	0	0.98	15.24	54.12	28.51	1.14	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.2	5.08	34.89	49.66	9.94	0.22	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.02	1.38	20.95	59.43	17.94	0.28	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.12	4.03	35.39	53.52	6.9	0.04	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.11	3.95	36	53.8	6.11	0.03	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.03	1.64	22.58	58.89	16.6	0.26	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.08	3.24	32.69	56	7.93	0.06	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.61	9.44	32.81	16.06	0.49	0	0	0	0.02	0.03	3.4	37.15
0	0	0	0	0	0	0	0	0.02	1.07	16.52	55.47	26.1	0.82	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.19	5.87	43.54	47.34	3.05	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.12	4.44	38.13	52.19	5.1	0.02	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.05	2.23	25.75	57.66	14.15	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.01	0.3	4.78	16.68	7.86	0.19	0	0	0	0.09	0.11	7.49	62.52
0	0	0	0	0	0	0	0	0.19	6.02	43.96	46.88	2.94	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.03	1.39	13.41	23.34	3.8	0.05	0	0	0	0.01	0.07	3.44	54.44
0	0	0	0	0	0	0	0	0.02	1.12	14.19	35.78	10.45	0.25	0	0	0	0.02	0.01	2.67	35.49
0	0	0	0	0	0	0	0	0.43	10.01	53.57	35.04	0.94	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.02	0.93	9.99	20.08	3.92	0.06	0	0	0	0.02	0.1	4.38	60.51
0	0	0	0	0	0	0	0	0.17	5.34	41.15	49.27	4.06	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.07	2.84	29.63	56.81	10.56	0.09	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.08	3	30.24	56.29	10.3	0.08	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.04	1.45	14.68	27.52	4.99	0.08	0	0	0	0.03	0.05	3.74	47.42
0	0	0	0	0	0	0	0	0.02	0.78	6.78	10.28	1.21	-0.02	0	0	0	0.01	0.15	4.88	75.93
0	0	0	0	0	0	0	0	0.1	1.65	10.02	18.35	4.92	0.09	0	0	0	0.05	0.05	5.23	59.55
0	0	0	0	0	0	0	0	0.05	2.23	25.81	57.77	13.99	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.1	3.91	36.14	53.99	5.83	0.03	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.06	2.55	27.72	57.25	12.3	0.12	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.59	12.33	56.68	29.82	0.57	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.01	0.9	11.77	32.13	11.21	0.32	0	0	0	0.02	0.02	3.39	40.23
0	0	0	0	0	0	0	0	0.18	5.65	42.91	48.06	3.2	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.74	14.2	58.58	26.11	0.37	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.19	6.13	45.2	46.15	2.33	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.16	5.41	42.76	48.68	2.99	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.37	8.95	51.88	37.65	1.15	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.06	2.8	30.89	57.7	8.49	0.06	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.27	7.23	48.11	42.62	1.77	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.28	7.49	48.38	42.05	1.8	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.3	7.91	50.12	40.32	1.35	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.03	1.92	26.66	61.44	9.89	0.06	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.07	3.04	33.45	57.48	5.93	0.02	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.68	13.74	59.41	25.88	0.28	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.16	5.43	42.82	48.6	2.98	0.01	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.33	8.4	50.6	39.29	1.37	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1.09	19.26	62.39	17.11	0.15	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.14	6.26	93.58
0	0	0	0	0	0	0	0	0	0.26	3.73	10.3	2.46	0	0	0	0	0	0.15	2.91	80.18
0	0	0	0	0	0	0	0	0	0.21	2.5	5.18	0.61	-0.01	0	0	0	0	0.14	4.14	87.22
0	0	0	0	0	0	0	0	0.27	7.23	47.49	42.96	2.04	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.02	1.31	21.87	62.72	13.98	0.1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.19	5.97	44.41	48.82	2.61	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.01	0.49	5.65	12.12	2.36	-0.07	0	0	0	0	0.15	4.57	74.71
0	0	0	0	0	0	0	0	0.04	1.92	24.8	59.71	13.44	0.09	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.05	1.68	13.52	17.81	1.73	0.02	0	0	0	0	0.08	2.98	62.14
0	0	0	0	0	0	0	0	0.67	13.41	57.83	27.63	0.45	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.54	11.59	55.89	31.33	0.65	0	0	0	0	0	0	0	0
0.39	0.35	0.01	0	0	0	0.43	1.68	3.36	6.22	10.85	15.97	17.7	14.62	10.56	7.24	4.87	2.87	1.11	0.01	0
0.4	0.49	0.24	0	0	0	0.01	1.03	2.32	4.7	9.7	17.44	22.06	17.79	11.14	6.24	3.24	1.27	0.11	0	0
0.34	0.48	0.4	0.01	0	0	0.01	0.73	1.86	3.78	8.11	16.01	22.72	19.62	12.34	6.78	3.45	1.34	0.14	0	0
0.31	0.45	0.46	0.01	0	0	0	0.46	1.5	3.09	6.74	14.18	22.34	21.05	13.83	7.8	4.08	1.66	0.26	0	0
0.28	0.42	0.52	0.06	0	0	0	0.27	1.32	2.65	5.87	12.35	21.25	22.15	15.4	8.91	4.73	1.97	0.36	0	0
0.25	0.37	0.47	0.22	0	0	0	0.04	1.12	2.32	4.83	10.69	19.58	22.4	16.97	10.41	5.72	2.47	0.53	0	0
0.23	0.33	0.43	0.29	0	0	0	0.02	0.88	1.99	4.11	9.28	18.19	22.67	18.27	11.54	6.51	2.97	0.77	0	0
0.22	0.3	0.4	0.34	0	0	0	0.01	0.7	1.76	3.59	8.17	16.87	22.77	19.51	12.66	7.16	3.23	0.82	0	0
0.21	0.28	0.38	0.36	0	0	0	0.01	0.51	1.55	3.19	7.3	15.69	22.57	20.41	13.55	7.82	3.89	1.07	0	0
0.2	0.26	0.36	0.38	0	0	0	0	0.35	1.37	2.83	6.5	14.75	22.6	21.21	14.33	8.36	3.97	1.16	0.01	0
0.19	0.25	0.35	0.39	0	0	0	0	0.15	1.22	2.57	5.74	13.05	21.28	21.88	15.76	9.56	4.75	1.54	0.01	0
0.18	0.24	0.32	0.39	0.08	0	0	0	0.01	1.1	2.34	5.08	11.79	20.48	22.54	16.92	10.35	5.18	1.73	0.01	0
0.19	0.22	0.29	0.36	0.13	0	0	0	0.01	0.88	2.07	4.45	10.41	19.33	22.95	17.92	11.31	5.99	2.21	0.01	0
0.18	0.22	0.28	0.35	0.16	0	0	0	0.01	0.8	1.98	4.24	9.9	18.78	23.21	18.53	11.67	6.15	2.27	0.01	0
0.19	0.22	0.28	0.34	0.17	0	0	0	0.01	0.66	1.85	4	9.32	17.94	22.84	19.02	12.51	6.85	2.61	0.01	0
0.18	0.21	0.26	0.33	0.2	0	0	0	0	0.51	1.67	3.65	8.58	17.16	23.05	19.83	13.1	7.21	2.82	0.06	0
0.27	0.17	0.17	0.21	0.17	0	0	0	0	0.4	1.5	3.27	7.77	16.52	23.84	20.88	13.56	7.29	2.76	0.07	0
0.17	0.2	0.25	0.32	0.25	0.01	0	0	0	0.34	1.47	3.22	7.45	15.61	22.9	20.95	14.21	7.99	3.28	0.25	0
0.16	0.19	0.24	0.32	0.28	0.01	0	0	0	0.25	1.4	3.03	6.95	14.85	22.69	21.47	14.87	8.42	3.46	0.31	0
0.28	0.16	0.16	0.2	0.21	0.01	0	0	0.01	0.14	1.27	2.79	6.46	14.36	23.06	22.33	15.34	8.5	3.35	0.26	0
0.47	0.28	0.22	0.23	0.21	0.01	0	0	0.01	0.05	1.16	2.65	6.1	13.54	22.25	22.4	15.96	9.22	3.98	0.52	0
0.46	0.26	0.19	0.2	0.22	0.01	0	0	0	0.02	1.09	2.47	5.63	13.01	22.68	23.32	16.25	9.08	3.79	0.51	0
0.49	0.28	0.21	0.23	0.24	0.01	0	0	0	0.01	0.95	2.31	5.2	11.9	21.38	23.39	17.27	10.13	4.51	0.81	0
0.49	0.25	0.18	0.19	0.22	0.03	0	0	0	0.01	0.88	2.16	4.82	11.26	21.29	24.3	17.98	10.21	4.29	0.68	0
0.48	0.25	0.17	0.18	0.22	0.06	0	0	0	0.01	0.78	2.01	4.5	10.65	20.75	24.45	18.52	10.74	4.65	0.85	0
0.5	0.27	0.2	0.2	0.23	0.08	0	0	0	0.01	0.73	1.99	4.45	10.3	19.92	23.84	18.7	11.33	5.29	1.21	0
0.51	0.27	0.2	0.2	0.23	0.09	0	0	0	0.01	0.67	1.9	4.26	9.99	19.7	24.17	19.07	11.52	5.36	1.22	0
0.53	0.28	0.19	0.19	0.23	0.11	0	0	0	0.01	0.61	1.82	4.06	9.47	19.07	24.19	19.52	12	5.71	1.41	0
0.62	0.26	0.17	0.16	0.2	0.13	0	0	0	0	0.48	1.61	3.62	8.67	18.52	25	20.59	12.42	5.68	1.32	0
0.94	0.36	0.25	0.21	0.23	0.13	0	0	0	0	0.44	1.6	3.62	8.47	17.81	24.42	20.77	12.91	6.18	1.64	0.01
0.7	0.27	0.17	0.16	0.2	0.15	0	0	0	0	0.43	1.58	3.48	8.23	17.87	25.09	21.31	12.84	5.75	1.32	0
0.93	0.36	0.24	0.2	0.23	0.15	0	0	0	0	0.37	1.53	3.44	7.98	17.04	24.3	21.41	13.55	6.52	1.72	0.01
0.92	0.36	0.24	0.2	0.23	0.16	0	0	0	0	0.31	1.45	3.32	7.77	16.86	24.5	21.76	13.69	6.51	1.72	0.01
0.91	0.35	0.23	0.19	0.22	0.17	0	0	0	0	0.28	1.4	3.18	7.36	16.16	24.14	22.01	14.22	7.06	2.08	0.01
0.87	0.36	0.23	0.19	0.23	0.19	0	0	0	0	0.28	1.62	3.41	7.31	15.36	23.01	21.72	14.75	7.83	2.62	0.02
0.85	0.37	0.23	0.19	0.23	0.2	0	0	0	0	0.22	1.58	3.33	7.06	14.84	22.84	22.2	15.09	7.98	2.75	0.02
0.85	0.37	0.23	0.19	0.22	0.2	0	0	0	0	0.1	1.22	2.81	6.38	14.51	23.78	23.52	15.54	7.7	2.36	0.01
0.81	0.38	0.24	0.19	0.23	0.21	0	0	0	0	0.11	1.52	3.16	6.56	13.93	22.26	22.54	15.87	8.69	3.21	0.08
0.83	0.38	0.23	0.19	0.23	0.21	0	0	0	0	0.11	1.51	3.16	6.53	13.83	22.19	22.59	15.87	8.72	3.26	0.12
0.61	0.44	0.28	0.24	0.27	0.24	0	0	0	0	0.02	1.09	2.62	5.81	13.05	22.26	23.67	16.75	9.03	3.33	0.24
0.62	0.43	0.28	0.24	0.27	0.25	0	0	0	0	0.02	1.04	2.52	3.54	12.49	21.6	23.71	17.04	9.49	3.76	0.51
0.72	0.44	0.24	0.2	0.23	0.23	0	0	0	0	0.03	1.28	2.83	5.79	12.51	21.42	23.34	16.96	9.51	3.8	0.47
0.7	0.44	0.25	0.2	0.22	0.22	0	0	0	0	0.03	1.25	2.79	5.72	12.29	21.19	23.32	17	9.66	4.04	0.68
0.57	0.64	0.27	0.21	0.23	0.23	0	0	0	0	0.03	1.18	2.7	5.52	11.99	21.2	23.84	17.33	9.64	3.92	0.6
0.39	0.57	0.32	0.26	0.28	0.27	0.02	0	0	0	0.02	0.85	2.22	4.9	11.29	21.17	24.72	18.04	9.95	4.04	0.72
0	0.8	0.39	0.3	0.3	0.27	0.03	0	0	0	0.02	0.79	2.14	4.69	10.76	20.53	24.78	18.6	10.4	4.29	0.91
0.53	0.55	0.27	0.2	0.22	0.22	0.03	0	0	0	0.02	1.04	2.49	5.06	10.98	20.31	24.25	18.13	10.3	4.42	0.36
0	0.91	0.36	0.26	0.25	0.24	0.05	0	0	0	0.02	0.98	2.43	4.9	10.64	20.03	24.5	18.52	10.47	4.47	1
0	0.79	0.39	0.29	0.29	0.26	0.05	0	0	0	0.01	0.68	1.96	4.34	10.04	19.83	24.94	19.04	10.91	4.83	1.32
0	0.9	0.35	0.25	0.24	0.23	0.06	0	0	0	0.02	0.88	2.28	4.62	10.11	19.47	24.55	18.96	10.97	4.85	1.26
0	0.86	0.36	0.25	0.24	0.23	0.08	0	0	0	0.02	0.81	2.18	4.4	9.61	18.93	24.66	19.39	11.31	5.15	1.52
0	0.86	0.36	0.25	0.24	0.23	0.1	0	0	0	0.01	0.74	2.12	4.25	9.23	18.54	25.11	20.09	11.55	5.01	1.31
0	0.72	0.4	0.29	0.28	0.27	0.12	0	0	0	0.01	0.49	1.68	3.72	8.6	18.27	25.64	20.76	11.96	5.27	1.53
0	0.87	0.36	0.25	0.23	0.23	0.11	0	0	0	0.01	0.71	2.07	4.16	8.94	18.02	24.66	20.08	11.99	5.57	1.75

0	0.85	0.36	0.24	0.23	0.23	0.11	0	0	0	0.01	0.65	2	4.05	8.76	17.89	25.03	20.43	11.97	5.47	1.71
0	0.73	0.39	0.28	0.28	0.26	0.12	0	0	0	0.01	0.48	1.66	3.66	8.41	17.85	25.36	20.96	12.3	5.55	1.71
0	0.71	0.39	0.28	0.27	0.26	0.13	0	0	0	0.01	0.6	1.96	4.02	8.53	17.05	23.99	20.44	12.72	6.33	2.31
0	0.82	0.36	0.24	0.22	0.22	0.12	0	0	0	0.01	0.56	1.88	3.77	8.06	16.85	24.75	21.09	12.77	6.13	2.16
0	0.82	0.36	0.24	0.23	0.22	0.12	0	0	0	0.01	0.56	1.88	3.81	8.12	16.87	24.83	21.24	12.73	5.95	2.02
0	0.81	0.37	0.24	0.22	0.22	0.13	0	0	0	0.01	0.48	1.79	3.65	7.86	16.65	24.98	21.61	12.98	6.01	1.98
0	0.79	0.37	0.24	0.22	0.22	0.13	0	0	0	0.01	0.49	1.79	3.64	7.82	16.5	24.69	21.45	13.11	6.3	2.24
0	0.79	0.37	0.25	0.23	0.23	0.14	0	0	0	0.01	0.51	1.84	3.67	7.78	16.43	24.81	21.53	13.09	6.2	2.14
0	0.64	0.4	0.29	0.27	0.26	0.15	0	0	0	0	0.45	1.76	3.61	7.63	15.82	23.75	21.27	13.66	7.12	2.92
0	0.75	0.38	0.24	0.23	0.22	0.15	0	0	0	0	0.44	1.75	3.49	7.35	15.74	24.54	22.02	13.62	6.6	2.47
0	0.76	0.39	0.25	0.22	0.22	0.15	0	0	0	0	0.38	1.69	3.39	7.15	15.42	24.51	22.34	13.94	6.73	2.46
0	0.64	0.4	0.28	0.27	0.25	0.16	0	0	0	0	0.41	1.71	3.52	7.4	15.41	23.62	21.82	13.98	7.27	3.05
0	0.59	0.43	0.29	0.27	0.26	0.17	0	0	0	0	0.34	1.64	3.4	7.16	15.2	23.93	22.1	14.17	7.19	2.85
0	0.63	0.4	0.28	0.27	0.26	0.16	0	0	0	0	0.38	1.7	3.49	7.26	15.21	23.77	21.98	14.1	7.19	2.92
0	0.55	0.43	0.29	0.27	0.26	0.17	0	0	0	0	0.32	1.61	3.32	6.91	14.61	23.34	22.05	14.58	7.82	3.44
0	0.54	0.44	0.3	0.27	0.26	0.18	0	0	0	0	0.31	1.61	3.33	6.9	14.53	23.27	22.21	14.73	7.77	3.34
0	0.53	0.44	0.3	0.28	0.26	0.19	0	0	0	0	0.26	1.54	3.19	6.63	14.19	23.19	22.44	15.04	8.03	3.5
0	0.54	0.44	0.29	0.27	0.26	0.18	0	0	0	0	0.28	1.58	3.26	6.72	14.29	23.3	22.54	14.95	7.79	3.28
0	0.49	0.46	0.31	0.28	0.27	0.18	0	0	0	0	0.26	1.56	3.22	6.66	14.21	23.24	22.51	15	7.93	3.42
0	0.52	0.44	0.29	0.27	0.26	0.19	0	0	0	0	0.24	1.53	3.16	6.5	13.81	22.78	22.48	15.35	8.39	3.79
0	0.35	0.53	0.33	0.3	0.28	0.21	0	0	0	0	0.18	1.47	3.03	6.21	13.36	22.61	22.81	15.67	8.64	4.03
0	0.39	0.51	0.32	0.29	0.27	0.2	0	0	0	0	0.18	1.46	3.02	6.19	13.3	22.49	22.68	15.7	8.79	4.19
0	0.4	0.5	0.32	0.29	0.27	0.21	0	0	0	0	0.13	1.42	2.97	6.1	13.25	22.82	23.18	15.81	8.52	3.81
0	0.37	0.52	0.33	0.29	0.27	0.2	0	0	0	0	0.16	1.46	3.02	6.12	13.09	22.34	22.88	16	8.84	4.09
0	0.44	0.49	0.31	0.28	0.27	0.2	0	0	0	0	0.16	1.45	3.03	6.23	13.38	22.72	23.08	15.79	8.46	3.72
0	0.35	0.54	0.33	0.29	0.27	0.2	0	0	0	0	0.13	1.41	2.93	5.99	12.88	22.17	22.93	16.1	9.05	4.42
0	0.01	0.71	0.39	0.34	0.3	0.22	0	0	0	0	0.08	1.35	2.66	5.86	12.73	22.3	23.27	16.31	9.02	4.25
0	0.22	0.59	0.35	0.31	0.29	0.22	0	0	0	0	0.08	1.37	2.66	5.79	12.45	21.87	23.22	16.54	9.3	4.53
0	0.04	0.71	0.39	0.34	0.3	0.22	0	0	0	0.01	0.03	1.3	2.78	5.66	12.39	22.12	23.5	16.59	9.23	4.4
0	0.1	0.53	0.39	0.37	0.35	0.26	0	0	0	0	0.06	1.34	2.9	5.9	12.41	21.16	22.6	16.71	9.87	5.05
0	0.36	0.53	0.32	0.29	0.27	0.2	0	0	0	0	0.09	1.38	2.88	5.82	12.6	22.16	23.29	16.31	9.07	4.42
0	0.06	0.69	0.38	0.33	0.29	0.21	0	0	0	0	0.07	1.35	2.85	5.82	12.59	22.1	23.29	16.4	9.14	4.4
0	0.01	0.71	0.39	0.34	0.3	0.22	0	0	0	0.01	0.03	1.3	2.77	5.59	12.1	21.6	23.4	16.31	9.61	4.73
0	0.01	0.7	0.39	0.34	0.3	0.23	0	0	0	0.01	0.03	1.33	2.79	5.58	12.06	21.66	23.52	16.91	9.5	4.63
0	0.17	0.64	0.37	0.32	0.28	0.21	0	0	0	0	0.08	1.36	2.86	5.8	12.55	22.03	23.19	16.43	9.24	4.49
0	0.34	0.53	0.32	0.28	0.26	0.21	0	0	0	0	0.07	1.35	2.83	5.74	12.4	21.81	23.22	16.62	9.41	4.61
0	0.24	0.61	0.35	0.31	0.27	0.2	0	0	0	0	0.09	1.39	2.9	5.83	12.45	21.87	23.32	16.59	9.21	4.38
0	0.01	0.56	0.42	0.38	0.35	0.26	0	0	0	0	0.01	1.29	2.82	5.67	11.94	20.85	22.79	17.06	10.2	5.37
0	0.02	0.57	0.41	0.39	0.36	0.26	0	0	0	0	0.07	1.37	2.95	5.91	12.28	20.98	22.6	16.83	9.93	5.07
0	0.19	0.62	0.36	0.31	0.28	0.22	0	0	0	0.01	0.04	1.34	2.8	5.59	12.08	21.56	23.46	16.9	9.52	4.64
0	0.01	0.72	0.39	0.33	0.29	0.22	0	0	0	0.01	0.02	1.29	2.76	5.56	12.06	21.64	23.44	16.96	9.65	4.67
0	0.01	0.73	0.39	0.33	0.29	0.22	0	0	0	0.01	0.03	1.3	2.75	5.54	12.02	21.56	23.37	16.92	9.69	4.85
0	0.35	0.54	0.32	0.28	0.26	0.2	0	0	0	0.01	0.04	1.31	2.79	5.64	12.19	21.72	23.43	16.83	9.51	4.58
0	0.01	0.72	0.39	0.33	0.29	0.22	0	0	0	0	0.01	1.29	2.77	5.6	12.15	21.9	23.78	16.95	9.31	4.29
0	0.1	0.55	0.4	0.37	0.35	0.25	0	0	0	0	0.07	1.38	2.94	5.87	12.22	20.99	22.7	16.8	9.89	5.12
0	0.36	0.53	0.32	0.28	0.26	0.2	0	0	0	0.01	0.04	1.31	2.79	5.59	12.05	21.46	23.3	16.99	9.73	4.78
0	0.23	0.61	0.35	0.3	0.27	0.2	0	0	0	0.01	0.05	1.34	2.83	5.68	12.27	21.83	23.45	16.8	9.36	4.42
0	0.29	0.58	0.34	0.29	0.26	0.2	0	0	0	0.01	0.04	1.32	2.8	5.66	12.23	21.81	23.5	16.77	9.36	4.52
0	0.2	0.51	0.38	0.35	0.33	0.24	0	0	0	0	0.06	1.36	2.92	5.83	12.14	20.93	22.66	16.9	10.02	5.16
0	0.05	0.71	0.38	0.32	0.28	0.21	0	0	0	0	0.01	1.29	2.77	5.56	12.04	21.7	23.66	17.01	9.46	4.53
0	0.37	0.52	0.32	0.28	0.26	0.2	0	0	0	0.01	0.04	1.32	2.78	5.59	12.09	21.65	23.38	16.84	9.58	4.77
0	0.08	0.56	0.4	0.36	0.33	0.24	0	0	0	0.01	0.02	1.3	2.84	5.68	11.91	20.72	22.67	17.08	10.32	5.48
0	0.33	0.56	0.33	0.28	0.26	0.19	0	0	0	0	0.06	1.34	2.85	5.76	12.41	21.92	23.4	16.68	9.26	4.35
0	0.48	0.47	0.3	0.26	0.24	0.19	0	0	0	0	0.08	1.35	2.84	5.7	12.21	21.49	23.14	16.8	9.64	4.82
0	0.4	0.52	0.32	0.27	0.25	0.19	0	0	0	0	0.09	1.39	2.92	5.83	12.33	21.58	23.28	16.79	9.38	4.47
0	0.01	0.72	0.39	0.32	0.28	0.21	0	0	0	0	0.01	1.28	2.74	5.5	11.86	21.39	23.57	17.23	9.74	4.74
0	0.17	0.51	0.38	0.35	0.32	0.24	0	0	0	0	0.04	1.32	2.89	5.84	12.19	20.96	22.74	16.92	9.98	5.13
0	0.08	0.7	0.38	0.31	0.28	0.21	0	0	0	0.01	0.03	1.3	2.77	5.53	11.86	21.23	23.33	17.21	9.9	4.89
0	0.05	0.58	0.41	0.37	0.33	0.24	0	0	0	0.01	0.02	1.29	2.84	5.72	11.98	20.79	22.77	17.15	10.18	5.28
0	0.27	0.49	0.36	0.33	0.31	0.22	0	0	0	0	0.05	1.34	2.94	5.93	12.35	21.09	22.79	16.96	9.79	4.77
0	0.11	0.55	0.4	0.36	0.33	0.23	0	0	0	0.01	0.04	1.34	2.9	5.77	12.03	20.92	22.81	17	10.03	5.17
0	0.01	0.59	0.42	0.38	0.34	0.25	0	0	0	0	0.01	1.27	2.81	5.66	11.87	20.7	22.83	17.29	10.29	5.28
0	0.2	0.51	0.37	0.34	0.31	0.22	0	0	0	0.01	0.04	1.32	2.88	5.78	12.1	20.83	22.6	17.01	10.17	5.32
0	0.4	0.53	0.32	0.27	0.24	0.18	0	0	0	0	0.06	1.33	2.84	5.73	12.3	21.68	23.33	16.87	9.43	4.48
0	0.27	0.5	0.37	0.33	0.3	0.22	0	0	0	0	0.07	1.38	2.98	5.97	12.4	21.25	22.79	16.78	9.65	4.73
0	0.18	0.53	0.38	0.34	0.31	0.22	0	0	0	0	0.06	1.36	2.94	5.91	12.36	21.22	22.78	16.72	9.72	4.95
0	0.25	0.49	0.36	0.33	0.31	0.23	0	0	0	0.01	0.04	1.33	2.89	5.78	12.06	20.85	22.73	17.02	10.09	5.23
0	0.01	0.59	0.41	0.37	0.33	0.24	0	0	0	0	0.01	1.21	2.72	5.56	11.84	20.82	22.89	17.26	10.34	5.4
0	0.24	0.49	0.36	0.33	0.31	0.23	0	0	0	0	0.05	1.31	2.87	5.79	12.1	20.84	22.59	16.95	10.17	5.36
0	0.26	0.49	0.36	0.32	0.3	0.22	0	0	0	0	0.04	1.29	2.84	5.73	12	20.72	22.51	16.99	10.34	5.59
0	0.01	0.59	0.42	0.37	0.34	0.24	0	0	0	0	0.01	1.27	2.81	5.64	11.85	20.81	23.05	17.33	10.14	5.12
0	0.01	0.59	0.41	0.37	0.33	0.24	0	0	0	0	0.01	1.26	2.79	5.61	11.74	20.44	22.62	17.34	10.55	5.69
0	0.16	0.53	0.38	0.35	0.32	0.23	0	0	0	0.01	0.04	1.3	2.86	5.78	12.06	20.77	22.61	17.06	10.2	5.35
0	0.35	0.46	0.34	0.31	0.29	0.21	0	0	0	0	0.07	1.37	2.97	5.96	12.39	21.1	22.68	16.83	9.8	4.86
0	0.31	0.48	0.35	0.32	0.29	0.2	0	0	0	0	0.09	1.37	2.95	5.9	12.2	20.77	22.4	16.83	10.14	5.39
0	0.34	0.48	0.35	0.31	0.29	0.2	0	0	0	0	0.08	1.36	2.95	5.96	12.37	20.94	22.51	16.83	9.96	5.07
0	0.59	0.44	0.27	0.23	0.22	0.16	0	0	0	0	0.1	1.38	2.92	5.9	12.58	21.86	23.13	16.58	9.23	4.4
0	0.46	0.44	0.33	0.29	0.27	0.18	0	0	0	0	0.18	1.47	3.15	6.35	12.95	21.3	22.16	16.22	9.47	4.78
0	0.51	0.44	0.28	0.23	0.21	0.14	0	0	0	0	0.15	1.42	3.01	6.13	13.05	22.15	22.89	16.19	8.96	4.16
0	0.66	0.42	0.27	0.22	0.2	0.13	0	0	0	0	0.23	1.53	3.18	6.45	13.49	22.35	22.56	15.77	8.63	3.91
0	0.7	0.42	0.27	0.23	0.21	0.13	0	0	0	0	0.32	1.64	3.36	6.82	14.05	22.53	22.16	15.3	8.26	3.6
0	0.71	0.42	0.27	0.23	0.21	0.12	0	0	0	0	0.36	1.69	3.43	6.94	14.28	22.7	22.06	15.04	8.04	3.5
0	0.71	0.42	0.27	0.22	0.2	0.11	0	0	0	0	0.4	1.74	3.54	7.21	14.68	22.93	21.93	14.73	7.69	3.21
0	0.76	0.41	0.26	0.22	0.2	0.1	0	0	0	0	0.46	1.79	3.64	7.4	14.89	22.69	21.39	14.49	7.83	3.47
0	0.61	0.43	0.32	0.28	0.25	0.12	0	0	0	0.01	0.48	1.86	3.83	7.69	14.9	21.99	20.81	14.53	8.16	3.75
0	0.76	0.41	0.27	0.22	0.2	0.09	0	0	0	0.01	0.57	1.93	3.86	7.8	15.27	22.48	20.85	14.16	7.69	3.41
0.31	0.59	0.35	0.24	0.21	0.19	0.08	0	0	0	0.01	0.62	2.01	4.04	8.25	16.05	22.99	20.73	13.64	6.97	2.71
0.49	0.48	0.31	0.22	0.2	0.18	0.07	0	0	0	0.01	0.67	2.07	4.17	8.54	16.36	22.85	20.3	13.36	6.93	2.77
0.45	0.51	0.33	0.23	0.2	0.19	0.07	0	0	0	0.01	0.72	2.14	4.22	8.57	16.46	22.94	20.23	13.22	6.8	2.71
0.55	0.44	0.3	0.21	0.19	0.18	0.03	0	0	0	0.01	0.76	2.19	4.33	8.73	16.44	22.62	20.03	13.27	6.9	2.77
0.57	0.44	0.3	0.21	0.2	0.18	0.05	0	0	0	0.01	0.8	2.23	4.42	8.95	16.81	22.73	19.73	12.91	6.71	2.72
0.6	0.43	0.29	0.21	0.2	0.19	0.05	0	0	0	0.02	0.87	2.34	4.6	9.28	17.1	22.64	19.52	12.75	6.48	2.43
0.22	0.4	0.4	0.37	0.36	0.3	0.05	0	0	0	0.01	0.71	2.16	4.56	9.37	16.99	22.29	19.81	13.02	6.68	2.49
0.62	0.41	0.29	0.2	0.19	0.18	0.04	0	0	0	0.02	0.87	2.33	4.63	9.33	17.1	22.58	19.47	12.71	6.51	2.51
0.62	0.42	0.29	0.21	0.2	0.18	0.04	0	0	0	0.02	0.89	2.38	4.72	9.52	17.41	22.84	19.5	12.52	6.15	2.1
0.63	0.42	0.29	0.21	0.2	0.19	0.03	0	0	0	0.02	0.95	2.43	4.82	9.76	17.65	22.64	19.12	12.33	6.15	2.15
0.61	0.42	0.29	0.21	0.2	0.18	0.02	0	0	0	0.02	0.97	2.48	4.9	9.89	17.71	22.61	19	12.18	6.1	2.18
0.66	0.41	0.29	0.21	0.2	0.18	0.01	0	0	0	0.02	1.01	2.55	5.04	10.16	18	22.54	18.75	11.98	5.95	2.04
0.69	0.39	0.28	0.2	0.2	0.19	0.02	0	0	0	0.02	1.06	2.61	5.08	10.09	17.78	22.32	18.84	12.2	6.01	2.02
0.69	0.4	0.26	0.21	0.2	0.18	0	0	0	0	0.02	1.09	2.66	5.25	10.53	18.36	22.6	18.54	11.63	5.59	1.76
0.67	0.4	0.28	0.21	0.21	0.19	0.01	0	0	0	0.02	1.08	2.62	5.14	10.31	18.11	22.44	18.52	11.84	5.91	2.03
0.65	0.42	0.29	0.21	0.2	0.18	0	0	0	0	0.02	1.08	2.65	5.23	10.53	18.45	22.73	18.57	11.58	5.5	1.7
0.65	0.41	0.29	0.22	0.21	0.19	0	0	0	0	0.02	1.07	2.62	5.16	10.43	18.28	22.49	18.57	11.79	5.72	1.86
0.67	0.41	0.29	0.21	0.21	0.18	0	0	0	0	0.02	1.13	2.72	5.35	10.77	18.61	22.57	18.45	11.49	5.36	1.53
0.68	0.41	0.29	0.21	0.21	0.18	0	0	0	0	0.02	1.15	2.75	5.4	10.81	18.66	22.55	18.38	11.4	5.32	1.55
0.66	0.41	0.29	0.21	0.21	0.18	0	0	0	0	0.02	1.12	2.7	5.3	10.59	18.35	22.28	18.35	11.71	5.74	1.87
0.62	0.42	0.29	0.21	0.21	0.19	0	0	0	0	0.02	1.02	2.56	5.11	10.32	18.14	22.42	18.66	11.96	5.87	1.97
0.6	0.42	0.29	0.21	0.21	0.19	0	0	0	0	0.02	1.06	2.61	5.14	10.26	17.84	22.16	18.67	12.11	6.07	2.13
0.65	0.41	0.29	0.21	0.21	0.19	0	0	0	0	0.02	1.02	2.57	5.12	10.32	18.04	22.27	18.64	12.02	5.96	2.05
0.64	0.41	0.28	0.21	0.2	0.19	0.01	0	0	0	0.02	1.05	2.59	5.08	10.19	17.94	22.39	18.74	12.06	5.96	2.02
0.63	0.41	0.28	0.21	0.21	0.19	0.02	0	0	0	0.02	0.99	2.54	5.03	10.16	17.98	22.58	18.88	12.04	5.88	1.94
0.56	0.45	0.3	0.22	0.21	0.19	0.02	0	0	0	0.02	0.99	2.53	5.02	10.17	18.1	22.67	18.88	11.99	5.8	1.87
0.49	0.49	0.31	0.22	0.21	0.19	0.03	0	0	0	0.02	0.92	2.42	4.84	9.86	17.76	22.64	19.07	12.26	6.11	2.16
0.15	0.41	0.4	0.37	0.36	0.3	0.05	0	0	0	0.01	0.68	2.12	4.6	9.61	17.4	22.37	19.38	12.8	6.55	2.43
0.08	0.43	0.42	0.38	0.38	0.31	0.05	0	0	0	0.01	0.68	2.12	4.59	9.54	17.28	22.39	19.51	12.9	6.56	2.37
0.17	0.68	0.37	0.26	0.23	0.2	0.04	0	0	0	0.01	0.82	2.29	4.66	9.54	17.47	22.73	19.37	12.53	6.32	2.32
0.35	0.57	0.32	0.23	0.21	0.19	0.04	0	0	0	0.01	0.81	2.27	4.63	9.52	17.47	22.71	19.35	12.58	6.38	2.35
0	0.78	0.39	0.27	0.24	0.2	0.05	0	0	0	0.01	0.77	2.21	4.5	9.2	16.96	22.51	19.64	13	6.7	2.57
0.05	0.74	0.37	0.26	0.23	0.2	0.06	0	0	0	0.01	0.74	2.16	4.41	9.1	16.92	22.46	19.58	13.04	6.88	2.77
0	0.77	0.38	0.26	0.23	0.2	0.06	0	0	0	0.01	0.73	2.15	4.39	9.02	16.85	22.66	19.85	13.09	6.74	2.51
0.05	0.42	0.41	0.37	0.36	0.31	0.07	0	0	0	0.01	0.61	2	4.38	9.17	16.82	22.17	19.6	13.27	7.09	2.89
0	0.76	0.39	0.27	0.24	0.21	0.06	0	0	0	0.01	0.75	2.18	4.4	9.04	16.9	22.59	19.73	13.07	6.77	2.62
0	0.43	0.43	0.38	0.37	0.31	0.07	0	0	0	0.01	0.55	1.91	4.27	9.05	16.85	22.51	19.91	13.27	6.95	2.74
0	0.74	0.39	0.27	0.23	0.2	0.06	0	0	0	0.01	0.68	2.08	4.29	8.84	16.63	22.62	19.95	13.26	6.96	2.8
0	0.41	0.42	0.39	0.38	0.32	0.09	0	0	0	0.01	0.51	1.83	4.11	8.79	16.53	22.27	20	13.62	7.3	3.02
0	0.41	0.41	0.38	0.37	0.32	0.09	0	0	0	0.01	0.51	1.83	4.08	8.66	16.39	22.28	20.01	13.68	7.42	3.15
0	0.76	0.39	0.27	0.23	0.2	0.05	0	0	0	0.01	0.68	2.09	4.32	8.94	16.9	22.87	19.96	13.06	6.69	2.57
0	0.42	0.43	0.39	0.37	0.31	0.07	0	0	0	0.01	0.54	1.89	4.24	9.08	16.98	22.59	19.82	13.21	6.93	2.75
0	0.42	0.43	0.39	0.38	0.31	0.08	0	0	0	0.01	0.54	1.9	4.25	9	16.8	22.54	20.05	13.39	6.92	2.61
0	0.41	0.41	0.37	0.37	0.31	0.09	0	0	0	0.01	0.49	1.8	4.06	8.68	16.38	22.3	20.13	13.68	7.38	3.13

Time	Density	Box Temp	Cry Temp	Status	
14:21:00	1.332517	59.87051	50.363		
14:21:12	1.332507	59.87071	50.345	Done	
14:21:24	1.332504	59.87067	50.344		
14:21:30	1.332506	59.87085	50.348	Start	measurement
14:21:42	1.334993	59.87067	50.334	Loading	cell
14:21:54	1.33663	59.87037	50.316		
14:22:00	1.335876	59.8706	50.31		
14:22:12	1.334399	59.87105	50.299	Stabilising:0.0465%	
14:22:24	1.33358	59.87089	50.279	Measuring	
14:22:30	1.333317	59.87063	50.273		
14:22:42	1.332977	59.87119	50.275		
14:22:54	1.332768	59.87067	50.284	Done	
14:23:00	1.332711	59.87037	50.281		
14:23:12	1.332631	59.87076	50.276		
14:23:24	1.332579	59.8708	50.283		
14:23:30	1.332564	59.87065	50.29		
14:23:42	1.332552	59.87035	50.283		
14:23:54	1.332529	59.87053	50.287		
14:24:00	1.332531	59.87049	50.287		
14:24:12	1.33252	59.87105	50.279		
14:24:24	1.332517	59.87078	50.285		
14:24:30	1.332509	59.87057	50.293	Start	measurement
14:24:42	1.334966	59.87078	50.287	Loading	cell
14:24:54	1.336742	59.8704	50.273		
14:25:00	1.335954	59.87031	50.271		
14:25:12	1.334443	59.87085	50.261	Stabilising:0.0477%	
14:25:24	1.333557	59.87062	50.249	Measuring	
14:25:30	1.333305	59.8706	50.244		
14:25:42	1.33297	59.87098	50.248		
14:25:54	1.332787	59.87062	50.249	Done	
14:26:00	1.332721	59.87146	50.248		
14:26:12	1.332634	59.87086	50.25		
14:26:24	1.332578	59.87074	50.266		
14:26:30	1.332564	59.87133	50.271		
14:26:42	1.332542	59.87092	50.269		
14:26:54	1.332533	59.87121	50.274		
14:27:00	1.332527	59.87058	50.276		
14:27:12	1.332523	59.87132	50.268		
14:27:24	1.332514	59.87051	50.277		
14:27:30	1.33252	59.87069	50.282	Start	measurement
14:27:42	1.3346	59.87074	50.275	Loading	cell
14:27:54	1.336455	59.87083	50.262		
14:28:00	1.335573	59.87098	50.259		
14:28:12	1.334118	59.87062	50.247	Stabilising:0.0463%	
14:28:24	1.333329	59.87069	50.234	Measuring	
14:28:30	1.333074	59.87069	50.229		
14:28:42	1.332739	59.87054	50.231		
14:28:54	1.332544	59.87062	50.24	Done	
14:29:00	1.332471	59.87045	50.236		
14:29:12	1.332392	59.8706	50.229		
14:29:24	1.332339	59.87074	50.237		
14:29:30	1.332326	59.87045	50.239		
14:29:42	1.332301	59.87112	50.231		
14:29:54	1.332303	59.87112	50.231		
14:30:00	1.332293	59.87051	50.229		
14:30:12	1.332284	59.87316	50.217		
14:30:24	1.332274	59.87203	50.22		
14:30:30	1.332273	59.87228	50.225	Start	measurement
14:30:42	1.333622	59.87085	50.214	Loading	cell
14:30:54	1.335962	59.87078	50.2		
14:31:00	1.335254	59.87048	50.194		
14:31:12	1.333764	59.87053	50.184	Stabilising:0.0474%	
14:31:24	1.332949	59.87073	50.168	Measuring	
14:31.30	1.332653	59.8709	50.161		
14:31.42	1.332321	59.87049	50.165		
14:31:54	1.332137	59.87062	50.175	Done	
14:32:00	1.332077	59.87048	50.17		
14:32:12	1.332003	59.87109	50.163		
14:32:24	1.331948	59.87054	50.174		
14:32:30	1.331931	59.87078	50.174		
14:32:42	1.331908	59.87031	50.168		
14:32:54	1.331897	59.87123	50.169		
14:33:00	1.331888	59.87171	50.169		
14:33:12	1.331884	59.87048	50.159		
14:33:24	1.331876	59.87329	50.163		
14:33:30	1.331883	59.87178	50.167	Start	measurement
14:33:42	1.332377	59.87074	50.158	Loading	cell
14:33:54	1.335672	59.87039	50.142		
14:34:00	1.33469	59.87101	50.138		
14:34:12	1.333234	59.8708	50.128	Stabilising:0.0461%	
14:34:24	1.332434	59.87049	50.113	Measuring	
14:34:30	1.33218	59.87051	50.108		
14:34:42	1.331852	59.87067	50.111		
14:34:54	1.331655	59.87096	50.12	Done	
14:35:00	1.331593	59.8711	50.117		
14:35:12	1.331498	59.87067	50.109		
14:35:24	1.331452	59.87119	50.117		
14:35:30	1.331429	59.8709	50.119		
14:35:42	1.331409	59.87153	50.108		
14:35:54	1.331401	59.87042	50.11		
14:36:00	1.331394	59.87049	50.108		
14:36:12	1.331386	59.87085	50.096		

Time	Density	Box Temp	Cry Temp	Status	
15:12:41	1.32833	59.87037	49.336	Loading	cell
15:12:53	1.330233	59.87042	49.324		
15:12:59	1.329275	59.87069	49.322		
15:13:11	1.327725	59.87065	49.316	Stabilising:0.0493%	
15:13:23	1.326881	59.87063	49.303	Measuring	
15:13:29	1.326604	59.87074	49.3		
15:13:41	1.326242	59.87074	49.306		
15:13:53	1.326022	59.8709	49.315	Done	
15:13:59	1.325965	59.87067	49.315		
15:14:11	1.325869	59.87081	49.311		
15:14:23	1.325818	59.87076	49.323		
15:14:29	1.325801	59.87062	49.325		
15:14:41	1.325777	59.87073	49.319		
15:14:53	1.325762	59.87074	49.325		
15:14:59	1.325752	59.87076	49.325		
15:15:11	1.325747	59.87086	49.318		
15:15:23	1.325745	59.87042	49.327		
15:15:29	1.32575	59.87051	49.333	Start	measurement
15:15:41	1.328263	59.87073	49.326	Loading	cell
15:15:53	1.330146	59.87078	49.315		
15:15:59	1.329275	59.87092	49.313		
15:16:11	1.327602	59.87029	49.305	Stabilising:0.0570%	
15:16:23	1.326771	59.8706	49.295	Measuring	
15:16:29	1.326498	59.8708	49.293		
15:16:41	1.326145	59.87074	49.3		
15:16:53	1.325945	59.87062	49.31	Done	
15:16:59	1.325885	59.8708	49.308		
15:17:11	1.325796	59.87039	49.304		
15:17:23	1.325735	59.87184	49.317		
15:17:29	1.32572	59.87092	49.32		
15:17:41	1.325688	59.87112	49.313		
15:17:53	1.325679	59.87081	49.319		
15:17:59	1.325676	59.87092	49.321		
15:18:11	1.325664	59.8706	49.314		
15:18:23	1.325657	59.87074	49.323		
15:18:29	1.325658	59.87049	49.33	Start	measurement
15:18:41	1.328468	59.87067	49.322	Loading	cell
15:18:53	1.330143	59.8709	49.311		
15:18:59	1.329211	59.87083	49.31		
15:19:11	1.327636	59.87083	49.306	Stabilising:0.0504%	
15:19:23	1.326764	59.87062	49.293	Measuring	
15:19:29	1.32649	59.87101	49.291		
15:19:41	1.326098	59.87065	49.299		
15:19:53	1.325899	59.87078	49.311	Done	
15:19:59	1.325831	59.87078	49.31		
15:20:11	1.325749	59.87123	49.305		
15:20:23	1.325699	59.87078	49.318		
15:20:29	1.325674	59.87098	49.32		
15:20:41	1.325653	59.87121	49.313		
15:20:53	1.325637	59.87074	49.319		
15:20:59	1.325636	59.87086	49.321		
15:21:11	1.325631	59.87083	49.312		
15:21:23	1.325622	59.87157	49.321		
15:21:29	1.325622	59.87067	49.329	Start	measurement
15:21:41	1.328181	59.8708	49.319	Loading	cell
15:21:53	1.330149	59.87044	49.308		
15:21:59	1.329178	59.87053	49.307		
15:22:11	1.327609	59.87037	49.3	Stabilising:0.0501%	
15:22:23	1.326742	59.87051	49.29	Measuring	
15:22:29	1.326466	59.87083	49.286		
15:22:41	1.326108	59.87071	49.295		
15:22:53	1.325897	59.87096	49.306	Done	
15:22:59	1.325825	59.8709	49.305		
15:23:11	1.325734	59.87042	49.3		
15:23:23	1.325679	59.87076	49.313		
15:23:29	1.325659	59.87074	49.315		
15:23:41	1.32564	59.87078	49.309		
15:23:53	1.325623	59.87086	49.314		
15:23:59	1.32561	59.87083	49.314		
15:24:11	1.325616	59.87085	49.308		
15:24:23	1.325614	59.8706	49.317		
15:24:29	1.325608	59.87051	49.324	Start	measurement
15:24:41	1.328364	59.87078	49.317	Loading	cell
15:24:53	1.330142	59.87062	49.306		
15:24:59	1.329249	59.87039	49.304		
15:25:11	1.327633	59.87051	49.3	Stabilising:0.0516%	
15:25:23	1.326706	59.87117	49.29	Measuring	
15:25:29	1.326427	59.8709	49.287		
15:25:41	1.32608	59.87085	49.296		
15:25:53	1.325873	59.87069	49.309	Done	
15:25:59	1.325803	59.87053	49.305		
15:26:11	1.325725	59.87083	49.302		
15:26:23	1.325659	59.87067	49.315		
15:26:29	1.325648	59.87092	49.318		
15:26:41	1.325613	59.87085	49.312		
15:26:53	1.325619	59.87031	49.318		
15:26:59	1.325607	59.87039	49.32		
15:27:11	1.325593	59.87042	49.314		
15:27:23	1.32559	59.87089	49.322		
15:27:29	1.325585	59.87089	49.33	Start	measurement
15:27:41	1.328509	59.87065	49.322	Loading	cell
15:27:53	1.330032	59.87049	49.312		

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14:36:24   1.33138  59.87119     50.1
14:36:30  1.331384  59.87096   50.105 Start        measurement
14:36:42  1.333852  59.87124   50.091 Loading      cell
14:36:54  1.335238  59.87065   50.076
14:37:00  1.334338  59.87071    50.07
14:37:12  1.332839   59.8704   50.058 Stabilising:0.0475%
14:37:24  1.332013  59.87067   50.042 Measuring
14:37:30  1.331746  59.87083   50.039
14:37:42  1.331375    59.871   50.039
14:37:54  1.331186  59.87137   50.048 Done
14:38:00  1.331131  59.87057   50.046
14:38:12  1.331034  59.87086   50.033
14:38:24  1.330987  59.87069   50.042
14:38:30  1.330975   59.8706   50.044
14:38:42  1.330953  59.87051   50.035
14:38:54  1.330944  59.87109   50.037
14:39:00  1.330931  59.87096   50.035
14:39:12  1.330923  59.87123   50.024
14:39:24  1.330926  59.87069   50.031
14:39:30  1.330925  59.87067   50.037 Start        measurement
14:39:42  1.332868  59.87085   50.024 Loading      cell
14:39:54  1.334791  59.87033   50.009
14:40:00  1.333986  59.87024   50.004
14:40:12  1.332321  59.87053   49.995 Stabilising:0.0475%
14:40:24  1.331514  59.87071   49.978 Measuring
14:40:30  1.331254  59.87071   49.975
14:40:42  1.330918  59.87085   49.979
14:40:54  1.330718  59.87062   49.988 Done
14:41:00  1.330651  59.87037   49.983
14:41:12  1.330562  59.87078   49.976
14:41:24  1.330502  59.87073   49.987
14:41:30  1.330488  59.87151   49.987
14:41:42  1.330458  59.87065   49.978
14:41:54  1.330449  59.87053   49.978
14:42:00   1.33044  59.87044   49.977
14:42:12  1.330433  59.87081   49.965
14:42:24  1.330424  59.87069   49.968
14:42:30  1.330423  59.87051   49.973 Start        measurement
14:42:42  1.331025  59.87094   49.962 Loading      cell
14:42:54  1.334322  59.87049   49.945
14:43:00  1.333439  59.87042    49.94
14:43:12  1.331926  59.87074   49.928 Stabilising:0.0476%
14:43:24  1.331099  59.87074   49.915 Measuring
14:43:30  1.330835  59.87054   49.908
14:43:42  1.330455  59.87081   49.911
14:43:54  1.330269  59.87067   49.916 Done
14:44:00   1.33021  59.87083   49.912
14:44:12  1.330124  59.87105   49.902
14:44:24  1.330074    59.871    49.91
14:44:30  1.330061  59.87096   49.908
14:44:42  1.330032  59.87144   49.897
14:44:54   1.33002  59.87058   49.898
14:45:00  1.330012  59.87123   49.898
14:45:12  1.330003  59.87073   49.886
14:45:24  1.330007  59.87069   49.891
14:45:30  1.330008  59.87085   49.894 Start        measurement
14:45:42  1.332277  59.87083   49.883 Loading      cell
14:45:54  1.333877  59.87063    49.87
14:46:00   1.33303  59.87076   49.864
14:46:12   1.33138  59.87086   49.854 Stabilising:0.0468%
14:46:24  1.330554  59.87098   49.838 Measuring
14:46:30  1.330295  59.87106   49.833
14:46:42  1.329952  59.87098   49.836
14:46:54  1.329752  59.87067   49.843 Done
14:47:00  1.329691  59.87092   49.835
14:47:12  1.329595  59.87033   49.828
14:47:24  1.329547   59.8709   49.837
14:47:30  1.329533  59.87069   49.837
14:47:42  1.329512  59.87065   49.827
14:47:54  1.329503  59.87105   49.826
14:48:00  1.329492  59.87069   49.825
14:48:12  1.329486  59.87065   49.814
14:48:24  1.329481  59.87063   49.816
14:48:30  1.329479  59.87098   49.822 Start        measurement
14:48:42  1.331851  59.87078   49.809 Loading      cell
14:48:54  1.333345  59.87076   49.793
14:49:00    1.3324  59.87089   49.788
14:49:12  1.330927  59.87085   49.777 Stabilising:0.0473%
14:49:24  1.330088  59.87089   49.761 Measuring
14:49:30  1.329823  59.87063   49.754
14:49:42   1.32945  59.87073   49.757
14:49:54  1.329257  59.87085   49.762 Done
14:50:00  1.329192  59.87086   49.758
14:50:12  1.329108  59.87085   49.748
14:50:24  1.329064  59.87089   49.753
14:50:30  1.329044  59.87058   49.751
14:50:42  1.329018   59.8704    49.74
14:50:54  1.329004   59.8708   49.739
14:51:00     1.329  59.87076   49.737
14:51:12  1.328987  59.87057   49.724
14:51:24  1.328985  59.87035   49.728
14:51:30  1.328985  59.87037   49.733 Start        measurement
14:51:42  1.331162  59.87051   49.722 Loading      cell
```

```
15:27:59    1.3292  59.87042   49.311
15:28:11  1.327635  59.87065   49.306 Stabilising:0.0492%
15:28:23   1.32676    59.871   49.295 Measuring
15:28:29  1.326488  59.87051   49.292
15:28:41  1.326099  59.87048     49.3
15:28:53  1.325894  59.87042   49.311 Done
15:28:59  1.325832  59.87078   49.309
15:29:11  1.325742  59.87086   49.304
15:29:23  1.325698  59.87078   49.315
15:29:29  1.325674  59.87076   49.318
15:29:41  1.325642  59.87049   49.311
15:29:53  1.325639  59.87033   49.316
15:29:59  1.325633  59.87078   49.318
15:30:11  1.325632   59.8708   49.311
15:30:23  1.325624  59.87221    49.32
15:30:29  1.325621  59.87092   49.328 Start        measurement
15:31:11  1.328455  59.87053   49.291 Loading      cell
15:31:23  1.330534  59.87069   49.282
15:31:29    1.3306  59.87089   49.284
15:31:41  1.330511  59.87031   49.297
15:31:53  1.328546  59.87042   49.314 Stabilising:0.0679%
15:31:59  1.327775  59.87078   49.316 Stabilising:0.0580%
15:32:11  1.326696  59.87067   49.317 Stabilising:0.0309%
15:32:23  1.326154  59.87045   49.327 Stabilising:0.0232%
15:32:29  1.325984  59.87076   49.329 Stabilising:0.0128%
15:32:41  1.325742  59.87112   49.321 Stabilising:0.0078%
15:32:53  1.325597  59.87039   49.328 Stabilising:0.0063%
15:32:59  1.325555  59.87073   49.336 Stabilising:0.0032%
15:33:11  1.325489  59.87051   49.331 Stabilising:0.0025%
15:33:23  1.325457  59.87081   49.337 Stabilising:0.0016%
15:33:29  1.325456  59.87074   49.344 Measuring
15:33:41  1.325431    59.871   49.344
15:33:53  1.325424   59.8706   49.351
15:33:59  1.325416  59.87094   49.361 Start        measurement
15:34:11  1.325742  59.87054   49.371 Loading      cell
15:34:23  1.329507  59.87053   49.367
15:34:29  1.330086  59.87044   49.366
15:34:41  1.328314  59.87069    49.37
15:34:53  1.327224  59.87058    49.37 Stabilising:0.0473%
15:34:59  1.326885   59.8704    49.37 Stabilising:0.0255%
15:35:11  1.326448  59.87067    49.38 Stabilising:0.0140%
15:35:23  1.326192    59.871   49.403 Stabilising:0.0110%
15:35:29    1.3261  59.87096   49.411 Stabilising:0.0069%
15:35:41  1.325986  59.87074   49.415 Stabilising:0.0044%
15:35:53  1.325918  59.87115   49.433 Stabilising:0.0033%
15:35:59  1.325894  59.87044   49.444 Stabilising:0.0018%
15:36:11  1.325866  59.87049   49.451 Stabilising:0.0007%
15:36:23  1.325844  59.87074   49.464 Measuring
15:36:29  1.325829   59.8711   49.472
15:36:41  1.325822  59.87083   49.479
15:36:53  1.325816  59.87089   49.491 Done
15:36:59  1.325813  59.87133   49.504 Start        measurement
15:37:11  1.324361  59.87101   49.517 Loading      cell
15:37:23  1.330896  59.87078   49.515
15:37:29  1.330932  59.87065   49.516
15:37:41  1.329146  59.87094    49.52
15:37:53     1.328  59.87071    49.52 Stabilising:0.0529%
15:37:59  1.327675  59.87069    49.52 Stabilising:0.0245%
15:38:11  1.327236  59.87103   49.531 Stabilising:0.0136%
15:38:23  1.326984  59.87092   49.553 Stabilising:0.0107%
15:38:29  1.326907  59.87184   49.561 Stabilising:0.0058%
15:38:41  1.326791  59.87074   49.564 Stabilising:0.0035%
15:38:53  1.326721  59.87086    49.58 Stabilising:0.0030%
15:38:59  1.326694  59.87058   49.594 Stabilising:0.0020%
15:39:11  1.326677  59.87094   49.599 Stabilising:0.0012%
15:39:23  1.326656  59.87058   49.609 Measuring
15:39:29  1.326653  59.87092   49.616
15:39:41  1.326643  59.87083   49.622
15:39:53  1.326634  59.87184   49.632 Done
15:39:59  1.326635  59.87076   49.643 Start        measurement
15:40:11  1.327422  59.87198   49.655 Loading      cell
15:40:23  1.331823  59.87069   49.648
15:40:29  1.331804  59.87062   49.648
15:40:41  1.330009  59.87074   49.652
15:40:53  1.328941  59.87106    49.65 Stabilising:0.0463%
15:40:59  1.328596  59.87078   49.649 Stabilising:0.0259%
15:41:11  1.328121  59.87081   49.656 Stabilising:0.0169%
15:41:23  1.327866  59.87071   49.675 Stabilising:0.0109%
15:41:29  1.327794  59.87071   49.681 Stabilising:0.0054%
15:41:41  1.327692  59.87083   49.681 Stabilising:0.0033%
15:41:53  1.327615  59.87117   49.693 Stabilising:0.0029%
15:41:59  1.327601  59.87103   49.703 Stabilising:0.0011%
15:42:11  1.327569  59.87098   49.705 Stabilising:0.0013%
15:42:23  1.327554  59.87112   49.712 Stabilising:0.0002%
15:42:29   1.32755  59.87112   49.717 Measuring
15:42:41  1.327538  59.87057   49.718
15:42:53  1.327529  59.87086   49.723
15:42:59   1.32753  59.87057   49.732 Start        measurement
15:43:11   1.32792  59.87092   49.742 Loading      cell
15:43:23  1.332404  59.87096   49.733
15:43:29  1.332474   59.8706   49.732
15:43:41  1.330614  59.87062   49.733
15:43:53  1.329544  59.87067   49.728 Stabilising:0.0463%
```

```
14:51:54  1.332882   59.8706    49.704
14:52:00  1.331883  59.87051    49.699
14:52:12  1.330351  59.87057    49.688 Stabilising:0.0488%
14:52:24  1.329507  59.87071    49.671 Measuring
14:52:30  1.329234  59.87045    49.666
14:52:42  1.328878  59.87033    49.669
14:52:54  1.328685  59.87161    49.676 Done
14:53:00  1.328618  59.87053    49.672
14:53:12  1.328516   59.8706    49.662
14:53:24  1.328468  59.87092    49 669
14:53:30  1.328453  59.87074    49.668
14:53:42  1.328423  59.87083    49.659
14:53:54  1.328408  59.87114     49.66
14:54:00  1.328406  59.87173    49.658
14:54:12  1.328398  59.87071    49.644
14:54:24  1.328395  59.87083    49.651
14:54:30  1.328389  59.87054    49.657 Start      measurement
14:54:42  1.330943  59.87074    49.646 Loading    cell
14:54:54  1.332329  59.87069    49.628
14:55:00  1.331427  59.87039    49.625
14:55:12  1.329846  59.87083    49.613 Stabilising:0.0506%
14:55:24  1.328999  59.87067    49.599 Measuring
14:55:30  1.328687  59.87044    49.594
14:55:42  1.328334  59.87058      49.6
14:55:54  1.328139  59.87063    49.609 Done
14:56:00   1.32808  59.87101    49.605
14:56:12   1.32799  59.87033      49.6
14:56:24   1.32794  59.87098    49.607
14:56:30   1.32792  59.87053    49.609
14:56:42  1.327896  59.87171    49.597
14:56:54  1.327885  59.87078    49.598
14:57:00  1.327876  59.87092    49.597
14:57:12  1.327868  59.87074    49.589
14:57:24   1.32786  59.87081    49.589
14:57:30   1.32786  59.87144    49.594 Start      measurement
14:57:42   1.33053   59.8709    49.587 Loading    cell
14:57:54   1.33188  59.87045    49.567
14:58:00  1.330938  59.87067    49.563
14:58:12  1.329404  59.87076    49.553 Stabilising:0.0492%
14:58:24  1.328567  59.87063    49.538 Stabilising:0.0265%
14:58:30  1.328292  59.87076    49.532 Stabilising:0.0207%
14:58:42  1.327932  59.87081    49.536 Stabilising:0.0118%
14:58:54  1.327732  59.87062    49.544 Stabilising:0.0063%
14:59:00   1.32766  59.87071    49.539 Stabilising:0.0054%
14:59:12  1.327567  59.87078    49.532 Stabilising:0.0035%
14:59:24   1.32752   59.8708     49.54 Stabilising:0.0016%
14:59:30  1.327498  59.87063    49.541 Stabilising:0.0017%
14:59:42  1.327486   59.8706     49.53 Stabilising:0.0007%
14:59:54  1.327461  59.87069    49.531 Measuring
14:59:59  1.327464  59.87049    49.529
15:00:12  1.327458  59.87045    49.518
15:00:24  1.327453  59.87121    49.522 Done
15:00:29  1.327445   59.8711    49 527 Start      measurement
15:00:42  1.329952  59.87101    49.514 Loading    cell
15:00:53  1.328963  59.87065    49.497
15:01:00  1.330654  59.87048    49.495
15:01:12   1.32906  59.87089    49.484 Stabilising:0.0512%
15:01:23  1.328126  59.87057     49.47 Measuring
15:01:30   1.32786  59.87062    49.463
15:01:41  1.327506  59.87067    49.469
15:01:54  1.327295  59.87063    49.472 Done
15:02:00  1.327239  59.87029     49.47
15:02:11  1.327145  59.87049    49.462
15:02:24  1.327088  59.87062    49.471
15:02:30  1.327066   59.8706     49.47
15:02:41  1.327045  59.87042    49.461
15:02:54  1.327038  59.87074    49.463
15:02:59  1.327036  59.87042    49.461
15:03:11   1.32702  59.87117    49 451
15:03:23  1.327014  59.87105    49.457
15:03:29  1.327016  59.87065    49.462 Start      measurement
15:03:42  1.329498  59.87081     49.45 Loading    cell
15:03:53  1.331051  59.87071    49.438
15:03:59  1.330129  59.87074    49.431
15:04:11  1.328561  59.87054    49.421 Stabilising:0.0501%
15:04:23  1.327699  59.87286    49.405 Measuring
15:04:29  1.327421  59.87307    49.401
15:04:41  1.327057  59.87153    49.404
15:04:53  1.326837  59.87092    49.412 Done
15:04:59  1.326778  59.87042    49.408
15:05:11  1.326683  59.87074    49.399
15:05:23  1.326628  59.87109    49.408
15:05:29  1.326612  59.87086     49.41
15:05:41  1.326583  59.87239    49.398
15:05:53  1.326579  59.87083    49 401
15:05:59   1.32657   59.8708      49.4
15:06:11  1.326569  59.87094    49.389
15:06:23   1.32656  59.87037    49.392
15:06:29  1.326561  59.87065    49.397 Start      measurement
15:06:41  1.328878  59.87031    49.384 Loading    cell
15:06:53  1.330724  59.87021    49.368
15:06:59  1.329882  59.87039    49.364
15:07:11  1.328143   59.8704    49.353 Stabilising:0.0495%
```

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15:43:59  1.329205  59.87074    49.725 Stabilising:0.0255%
15:44:11  1.328748  59.87105    49.729 Stabilising:0.0149%
15:44:23  1.328498  59.87115    49.745 Stabilising:0.0106%
15:44:29  1.328416  59.87089    49.751 Stabilising:0.0062%
15:44:41  1.328299   59.8709    49.749 Stabilising:0.0039%
15:44:53   1.32823  59.87086    49.759 Stabilising:0.0027%
15:44:59  1.328213   59.8706    49.768 Stabilising:0.0013%
15:45:11  1.328192  59.87105    49.768 Stabilising:0.0007%
15:45:23  1.328166   59.8709    49.773 Measuring
15:45:29  1.328162  59.87089    49.777
15:45:41  1.328149  59.87083    49.778
15:45:53  1.328138  59.87225    49.785 Done
15:45:59  1.328143  59.87045    49.792 Start      measurement
15:46.11  1.328832  59.87042    49.799 Loading    cell
15:46:23  1.332825  59.87057     49.79
15:46:29  1.332864  59.87051    49.787
15:46:41  1.331046  59.87105    49.787
15:46:53  1.329963  59 87089    49.779 Stabilising:0.0462%
15:46.59  1.329616  59.87067    49.777 Stabilising:0.0261%
15:47:11  1.329122  59.87076    49.778 Stabilising:0.0141%
15:47:23  1.328874  59.87067    49.792 Stabilising:0.0105%
15:47:29  1.328797  59.87078    49.797 Stabilising:0.0058%
15:47:41  1.328687  59.87076    49.793 Stabilising:0.0038%
15:47:53  1.328628   59.8709    49.802 Stabilising:0.0029%
15:47:59  1.328604   59.8709    49.812 Stabilising:0.0018%
15:48:11  1.328572  59.87074    49.809 Stabilising:0.0009%
15:48:23   1.32855  59.87058    49.808 Measuring
15:48:29  1.328555  59.87086    49.812
15:48:41  1.328538  59.87067     49.81
15:48:53  1.328537  59.87157    49.811 Done
15:48:59  1.328536  59.87135    49.817 Start      measurement
15:49:11  1.328853  59.87112    49.823 Loading    cell
15:49:23  1.333042  59.87085    49.811
15:49:29  1.332979  59.87062    49.805
15:49:41  1.331168  59.87073    49.801
15:49:53  1.330119  59.87081    49.792 Stabilising:0.0456%
15:49:59   1.32979  59.87073    49.786 Stabilising:0.0247%
15:50:11  1.329349  59.87092    49.784 Stabilising:0.0133%
15:50:23  1.329099  59.87114    49.797 Stabilising:0.0102%
15:50:29  1.329014  59.87109    49.801 Stabilising:0.0064%
15:50:41    1.3289   59.8706    49.794 Stabilising:0.0032%
15:50:53  1.328841  59.87071      49.8 Stabilising:0.0022%
15:50:59  1.328813  59.87073    49.806 Stabilising:0.0021%
15:51:11  1.328789  59.87067    49.802 Stabilising:0.0009%
15:51:23  1.328784  59.87071    49.803 Measuring
15:51:29  1.328779    59.871    49.806
15:51:41  1.328751  59.87067    49.802
15:51:53  1.328749  59.87109    49.803 Done
15:51:59  1.328746   59.8708     49.81 Start      measurement
15:52:11  1.329337  59.87363    49.812 Loading    cell
15:52:23  1.332994  59.87083    49.799
15:52:29   1.33303  59.87092    49.795
15:52:41   1.33123  59.87085    49.789
15:52:53  1.330139  59.87074    49.779 Stabilising:0.0468%
15:52:59   1.32975  59.87073    49.772 Stabilising:0.0292%
15:53:11  1.329316  59.87039    49.768 Stabilising:0.0140%
15:53:23  1.329068  59.87058    49.779 Stabilising:0.0106%
15:53:29   1.32899  59.87067    49.782 Stabilising:0.0059%
15:53:41  1.328884  59.87219    49.773 Stabilising:0.0036%
15:53:53  1.328822  59.87081    49.776 Stabilising:0.0029%
15:53:59  1.328797   59.8709    49.781 Stabilising:0.0019%
15:54:11  1.328764  59.87085    49.778 Stabilising:0.0008%
15:54:23  1.328755  59.87073    49.778 Measuring
15:54:29  1.328746  59.87045    49.779
15:54:41  1.328738  59.87053    49.775
15:54:53  1.328728  59.87085    49.776 Done
15:54:59  1.328732  59.87054    49.781 Start      measurement
15:55:11  1.328998  59.87074    49.787 Loading    cell
15:55:23  1.332881  59.87076    49.774
15:55:29  1.332892  59.87035    49.769
15:55:41  1.331059  59.87083    49.766
15:55:53  1.329989  59.87073    49.756 Stabilising:0.0462%
15:55:59  1.329645  59.87048    49.752 Stabilising:0.0259%
15:56:11  1.329202  59.87044    49.751 Stabilising:0.0138%
15:56:23   1.32894  59.87073    49.763 Stabilising:0.0106%
15:56:29  1.328855  59.87065    49.766 Stabilising:0.0064%
15:56:41  1.328732  59.87016    49.761 Stabilising:0.0046%
15:56:53  1.328681  59.87045    49.766 Stabilising:0.0023%
15:56:59  1.328658   59.8708    49.772 Stabilising:0.0017%
15:57:11  1.328628   59.8709    49.767 Stabilising:0.0015%
15:57:23  1.328612  59.87076    49.769 Measuring
15:57:29  1.328605  59.87112     49.77
15:57:41  1.328588  59.87078    49.767
15:57:53  1.328589   59.8706    49.769 Done
15:57:59  1.328586  59.87057    49.776 Start      measurement
15:58:11  1.328982  59.87146    49.781 Loading    cell
15:58:23  1.332724  59.87054    49.769
15:58:29  1.332804  59.87078    49.765
15:58:41  1.331014  59.87071    49.762
15:58:53  1.329866  59.87067    49.753 Stabilising:0.0471%
15:58:59  1.329536  59.87074    49.748 Stabilising:0.0248%
15:59:11  1.329096   59.8709    49.747 Stabilising:0.0141%
15:59:23  1.328847  59.87086    49.759 Stabilising:0.0104%
```

```
15:07:23  1.327283  59.87054     49.339 Measuring
15:07:29  1.327007  59.87074     49.334
15:07:41  1.326645  59.87058      49.34
15:07:53  1.326438  59.87045     49.349 Done
15:07:59  1.326372  59.87105     49.346
15:08:11  1.326274  59.87073     49.341
15:08:23  1.326216  59.87089     49.353
15:08:29  1.326204  59.87092     49.354
15:08:41  1.326181  59.87074     49.347
15:08:53   1.32617  59.87078     49.352
15:08:59  1.326168  59.87051     49.353
15:09:11  1.326153  59.87062     49.344
15:09:23  1.326146   59.8706     49.355
15:09:29  1.326147  59.87083     49.361 Start        measurement
15:09:41  1.328674  59.87076     49.354 Loading      cell
15:09:53  1.330375  59.87048     49.341
15:09:59  1.329461   59.8708      49.34
15:10:11  1.327882  59.87062     49.334 Stabilising:0.0502%
15:10:23  1.327008  59.87058     49.322 Measuring
15:10:29  1.326686  59.87049     49.318
15:10:41   1.32634  59.87076     49.325
15:10:53   1.32614  59.87045     49.336 Done
15:10:59  1.326074  59.87076     49.333
15:11:11  1.325988  59.87044     49.329
15:11:23  1.325938  59.87042     49.341
15:11:29  1.325916   59.8706     49.343
15:11:41   1.32589  59.87132     49.335
15:11:53  1.325877  59.87115      49.34
15:11:59  1.325867  59.87119      49.34
15:12:11   1.32583   59.8708     49.331
15:12:23   1.32585  59.87057     49.339
15:12:29  1.325857  59.87074     49.345 Start        measurement
```

```
15:59:29  1.328765  59.87117     49.763 Stabilising:0.0062%
15:59:41  1.328669   59.8708     49.758 Stabilising:0.0035%
15:59:53  1.328599  59.87057     49.765 Stabilising:0.0029%
15:59:59  1.328582  59.87058     49.771 Stabilising:0.0013%
16:00:11  1.328552  59.87049     49.769 Stabilising:0.0011%
16:00:23  1.328539  59.87069      49.77 Stabilising:0.0005%
16:00:29   1.32853  59.87085     49.773 Measuring
16:00:41  1.328524  59.87092     49.772
16:00:53  1.328519  59.87246     49.772
16:00:59  1.328521  59.87194     49.779 Start        measurement
16:01:11  1.329321  59.87083     49.783 Loading      cell
16:01:23  1.332782  59.87022      49.77
16:01:29  1.332796  59.87062     49.765
16:01:41  1.330977  59.87086     49.763
16:01:53  1.329903  59.87103     49.753 Stabilising:0.0464%
16:01:59  1.329569  59.87074     49.747 Stabilising:0.0251%
16:02:11  1.329122  59.87051     49.747 Stabilising:0.0145%
16:02:23  1.328851  59.87051      49.76 Stabilising:0.0111%
16:02:29  1.328778  59.87063     49.762 Stabilising:0.0055%
16:02:41  1.328666  59.87065     49.755 Stabilising:0.0040%
16:02:53  1.328607  59.87105     49.761 Stabilising:0.0022%
16:02:59  1.328581  59.87081     49.769 Stabilising:0.0020%
16:03:11  1.328559  59.87086     49.766 Stabilising:0.0007%
16:03:23  1.328534  59.87067     49.769 Measuring
16:03:29  1.328531  59.87071     49.772
16:03:41  1.328519  59.87101     49.771
16:03:53  1.328514   59.8708     49.771 Done
16:03:59  1.328517  59.87101     49.779 Start        measurement
16:04:11  1.329009  59.87083     49.783 Loading      cell
16:04:23  1.332714  59.87053     49.771
16:04:29  1.332813  59.87039     49.768
16:04:41  1.330931  59.87146     49.765
16:04:53  1.329889  59.87074     49.756 Stabilising:0.0452%
16:04:59  1.329557    59.871     49.752 Stabilising:0.0250%
```

Appendix 6.3
Experiment 3

Distribution: Volume Range: 0.755-754.7æm Classes: 20 Resolution: 34.5%

Record	Obsc[%]	Record	Time	Obsc	Chi-sqr	Mean	Median	x10	x90	1.066	1.506	2.127	3.005	4.244	5.995	8.468	11.96	16.89	23.86	33.71	47.61	67.26	95.01	134.2	189.5	267.7	378.2	534.2	754.7
1	0.34	1	0	0.34	35.09	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
2	0.23	2	0.02	0.23	38.73	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
3	0.28	3	0.03	0.28	34.61	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
4	0.08	4	0.03	0.08	35.71	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
5	0.1	5	0.05	0.1	41.38	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
6	0.07	6	0.05	0.07	40.99	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
7	0.06	7	0.07	0.06	48.11	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
8	-0.03	8	0.07	-0.03	43.8	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
9	0.03	9	0.08	0.03	50.57	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
10	0.03	10	0.1	0.03	52.66	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
11	0.41	11	0.1	0.41	46.91	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
12	-0.07	12	0.12	-0.07	56.3	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
13	0.01	13	0.12	0.01	54.4	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
14	0.01	14	0.13	0.01	62.89	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
15	-0.07	15	0.15	-0.07	65.33	656.9	644.5	556.3	732.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
16	4.12	16	0.15	4.12	301.72	125	104.5	52.6	177.8	0	0	0	0	0	0	0	0	0.255	3.214	0	3.163	13.339	20.555	39.274	12.95	3.944	0	0	3.308
17	5.92	17	0.17	5.92	1004.73	102.2	97.8	48.3	157.1	0	0	0	0	0	0	0	0	1.621	2.083	0	5.823	12.854	24.931	37.327	12.941	2.333	0	0	0.087
18	5.42	18	0.17	5.42	819.05	107.7	96.1	48.3	153.1	0	0	0	0	0	0	0	0	1.592	2.098	0	5.821	13.369	26.071	36.804	12.443	0.023	0	0	1.778
19	5.41	19	0.18	5.41	801.42	111.9	97.9	49.1	154.1	0	0	0	0	0	0	0	0	1.592	1.937	0	5.508	12.875	25.254	38.597	11.81	0	0	0	2.426
20	5.3	20	0.2	5.3	775.09	111.9	98.2	49.4	157.3	0	0	0	0	0	0	0	0	1.604	1.847	0	5.371	12.782	25.294	37.583	13.258	0	0	0	2.261
21	4.71	21	0.2	4.71	614.64	111.8	97.4	49.8	155.6	0	0	0	0	0	0	0	0	1.604	1.787	0	5.171	13.004	26.181	37.524	12.24	0.149	0	0	2.34
22	4.51	22	0.22	4.51	554.18	110.7	97.2	50.1	153.2	0	0	0	0	0	0	0	0	1.501	1.784	0	5.119	12.759	26.692	38.067	11.902	0	0	0	2.177
23	4.19	23	0.22	4.19	472.06	115	97.2	50.3	158.6	0	0	0	0	0	0	0	0	1.494	1.786	0	4.952	12.882	26.839	37.075	11.299	0.812	0	0	2.861
24	4.39	24	0.23	4.39	518.64	108.8	98.2	51	154.7	0	0	0	0	0	0	0	0	1.507	1.598	0	4.693	12.645	26.382	38.585	12.426	0.631	0	0	1.532
25	4.77	25	0.23	4.77	604.19	108	102.6	53.5	158.4	0	0	0	0	0	0	0	0	1.453	1.362	0	3.832	11.235	24.232	40.832	16.163	0.221	0	0	0.67
26	5.24	26	0.25	5.24	639.31	122.1	106.8	55.9	169.8	0	0	0	0	0	0	0	0	1.327	1.224	0	3.204	10.121	21.896	40.555	18.154	0.978	0	0	2.541
27	5.62	27	0.27	5.62	716.2	122	111.4	59.2	174.1	0	0	0	0	0	0	0	0	1.251	1.117	0	2.411	8.84	19.448	40.622	22.663	2.244	0	0	1.404
28	6.41	28	0.27	6.41	795.03	129.6	116	63.2	179.7	0	0	0	0	0	0	0	0	1.137	1.059	0	1.806	7.551	17.386	39.372	26.38	3.472	0	0	1.837
29	6.83	29	0.28	6.83	888.69	132.2	121.5	68.2	183.8	0	0	0	0	0	0	0	0	1.068	0.947	0	1.343	6.157	14.788	38.024	30.92	5.741	0	0	1.012
30	7.48	30	0.28	7.48	971.86	133.6	127.4	72	186.6	0	0	0	0	0	0	0	0	0.971	0.899	0	1.226	4.771	12.596	35.799	35.628	8.11	0	0	0
31	7.85	31	0.3	7.85	1066.88	140.1	132	75	194.7	0	0	0	0	0	0	0	0	0.945	0.853	0	1.108	4.12	10.72	34.207	37.368	10.328	0	0	0.351
32	8.22	32	0.32	8.22	1066.75	142.8	137.2	77.9	206	0	0	0	0	0	0	0	0	0.868	0.842	0	1.03	3.618	9.472	32.001	39.51	12.647	0	0	0.013
33	8.35	33	0.32	8.35	1102.38	146.7	140.6	80.6	213.6	0	0	0	0	0	0	0	0	0.859	0.798	0	1.003	3.435	8.154	31.075	40.352	14.096	0	0	0.228
34	8.77	34	0.33	8.77	1142.52	152.9	144.5	84.3	221.4	0	0	0	0	0	0	0	0	0.821	0.808	0	0.881	3.162	7.051	29.613	41.422	15.344	0	0	0.898
35	9.06	35	0.33	9.06	1166.97	156.9	149.5	89.8	227.8	0	0	0	0	0	0	0	0	0.812	0.736	0	0.861	2.764	5.933	27.031	43.042	18.051	0	0	0.769
36	9.48	36	0.35	9.48	1244.62	162.5	153.6	95.2	234.1	0	0	0	0	0	0	0	0	0.754	0.728	0	0.8	2.671	4.911	24.924	43.515	20.559	0	0	1.139
37	9.4	37	0.37	9.4	1221.59	161.2	154	95.4	233.1	0	0	0	0	0	0	0	0	0.757	0.724	0	0.817	2.674	4.806	24.474	44.16	20.81	0	0	0.778
38	9.71	38	0.37	9.71	1310.7	163.1	156.1	96.3	235.6	0	0	0	0	0	0	0	0	0.754	0.742	0	0.806	2.615	4.319	23.341	44.118	22.603	0	0	0.702
39	9.9	39	0.38	9.9	1342.33	164.9	157.6	97	237.4	0	0	0	0	0	0	0	0	0.745	0.744	0	0.766	2.488	4.09	22.543	44.111	23.752	0	0	0.761
40	10.11	40	0.38	10.11	1351.04	168.6	160.8	98.8	240.2	0	0	0	0	0	0	0	0	0.721	0.719	0	0.705	2.432	3.437	20.52	44.719	25.874	0	0	0.873
41	10.63	41	0.4	10.63	1432.27	176	162.9	99.6	244.5	0	0	0	0	0	0	0	0	0.688	0.718	0	0.739	2.327	3.261	19.246	44.375	26.538	0	0	2.109
42	10.37	42	0.4	10.37	1399.3	171.4	162.6	99.7	242	0	0	0	0	0	0	0	0	0.695	0.734	0	0.714	2.38	3.197	19.196	44.993	26.985	0	0	1.106
43	10.61	43	0.42	10.61	1425.23	170.2	163.6	100.4	241.7	0	0	0	0	0	0	0	0	0.652	0.751	0	0.664	2.379	2.985	18.658	45.085	28.244	0	0	0.582
44	10.52	44	0.43	10.52	1423.05	167.7	163.5	100.7	240.3	0	0	0	0	0	0	0	0	0.664	0.758	0	0.659	2.357	2.86	18.571	45.664	28.465	0	0	0
45	10.67	45	0.43	10.67	1424.88	174.9	165.9	101.7	244.3	0	0	0	0	0	0	0	0	0.681	0.722	0	0.706	2.206	2.747	17.197	45.009	29.605	0	0	1.127
46	11.02	46	0.45	11.02	1521.25	172.2	167.3	102.3	243.7	0	0	0	0	0	0	0	0	0.676	0.747	0	0.684	2.24	2.593	16.448	44.464	31.986	0	0	0.162
47	10.73	47	0.45	10.73	1502.83	172.1	166.4	102.3	243.2	0	0	0	0	0	0	0	0	0.683	0.755	0	0.693	2.185	2.59	16.696	45.416	30.628	0	0	0.354
48	10.97	48	0.47	10.97	1526.49	171.4	166.9	102.6	243	0	0	0	0	0	0	0	0	0.669	0.759	0	0.65	2.253	2.506	16.311	45.409	31.402	0	0	0.041
49	10.56	49	0.48	10.56	1408.12	170	165.8	102.1	242	0	0	0	0	0	0	0	0	0.677	0.759	0	0.671	2.236	2.603	16.899	45.852	30.302	0	0	0
50	10.95	50	0.48	10.95	1455.35	172	167.7	103.3	243.4	0	0	0	0	0	0	0	0	0.655	0.759	0	0.609	2.259	2.326	15.982	45.348	32.063	0	0	0
51	11.12	51	0.5	11.12	1495.79	174.1	168.7	103.7	244.5	0	0	0	0	0	0	0	0	0.654	0.753	0	0.638	2.217	2.363	15.219	45.181	32.709	0	0	0.265
52	11.13	52	0.5	11.13	1494.22	172.9	168.7	103.6	244	0	0	0	0	0	0	0	0	0.682	0.72	0	0.709	2.153	2.402	15.163	45.233	32.938	0	0	0
53	11.25	53	0.52	11.25	1500.15	174	169.5	104	244.8	0	0	0	0	0	0	0	0	0.647	0.768	0	0.657	2.136	2.34	15.026	44.617	33.727	0	0	0.082
54	11.04	54	0.53	11.04	1511.71	172.7	168.3	103.8	243.7	0	0	0	0	0	0	0	0	0.697	0.712	0	0.58	2.225	2.348	15.334	45.577	32.527	0	0	0
55	11.37	55	0.53	11.37	1501.32	173.3	169.1	103.9	244.4	0	0	0	0	0	0	0	0	0.639	0.776	0	0.659	2.177	2.294	15.285	44.683	33.486	0	0	0
56	11.46	56	0.55	11.46	1507.77	174	169.7	104.8	244.5	0	0	0	0	0	0	0	0	0.658	0.728	0	0.641	2.128	2.251	14.369	45.589	33.637	0	0	0
57	11.62	57	0.55	11.62	1544.94	175.5	171.3	105.1	245.8	0	0	0	0	0	0	0	0	0.612	0.798	0	0.654	2.114	2.218	14.058	44.056	35.467	0	0	0.022
58	11.33	58	0.57	11.33	1482.99	173	168.7	104.1	243.9	0	0	0	0	0	0	0	0	0.687	0.737	0	0.599	2.174	2.321	14.937	45.838	32.707	0	0	0
59	11.63	59	0.57	11.63	1481.78	175.1	169.7	104.3	245.1	0	0	0	0	0	0	0	0	0.68	0.714	0	0.586	2.181	2.362	14.603	45.025	33.592	0	0	0.257
60	11.48	60	0.58	11.48	1445.33	174	169.7	104.7	244.6	0	0	0	0	0	0	0	0	0.702	0.698	0	0.573	2.223	2.2	14.655	45.195	33.754	0	0	0
61	11.76	61	0.6	11.76	1484.14	175.2	171	105.2	245.5	0	0	0	0	0	0	0	0	0.643	0.741	0	0.609	2.119	2.25	14.039	44.538	35.061	0	0	0
62	11.95	62	0.6	11.95	1518.3	175.4	171.2	105.3	245.6	0	0	0	0	0	0	0	0	0.634	0.747	0	0.614	2.143	2.246	13.78	44.646	35.189	0	0	0
63	11.62	63	0.62	11.62	1478.67	174.6	170.3	105.2	244.9	0	0	0	0	0	0	0	0	0.697	0.682	0	0.615	2.045	2.305	14.085	45.413	34.157	0	0	0
64	11.59	64	0.62	11.59	1442.41	174.6	170.3	105.1	245	0	0	0	0	0	0	0	0	0.679	0.686	0	0.552	2.093	2.288	14.332	45.115	34.255	0	0	0
65	11.49	65	0.63	11.49	1425.96	175.1	170	105	245.1	0	0	0	0	0	0	0	0	0.689	0.694	0	0.54	2.086	2.305	14.504	45.164	33.843	0	0	0.175
66	11.69	66	0.65	11.69	1427.3	176	171.6	106.2	245.8	0	0	0	0	0	0	0	0	0.674	0.69	0	0.596	2.036	2.086	13.767	44.614	35.518	0	0	0.02
67	11.83	67	0.65	11.83	1482.27	176.2	172.1	106	246.1	0	0	0	0	0	0	0	0	0.665	0.751	0	0.647	2.132	2.059	13.376	44.366	36.004	0	0	0
68	11.56	68	0.67	11.56	1392.99	175.5	171.2	105.6	245.5	0	0	0	0	0	0	0	0	0.655	0.708	0	0.606	2.088	2.175	13.922	44.715	35.119	0	0	0.011
69	11.54	69	0.67	11.54	1450.48	175.9	171.7	105.9	245.9	0	0	0	0	0	0	0	0	0.705	0.663	0	0.636	2.062	2.106	13.828	44.33	35.671	0	0	0
70	11.54	70	0.68	11.54	1407.24	175.5	171.2	105.4	245.5	0	0	0	0	0	0	0	0	0.672	0.691	0	0.559	2.038	2.371	13.833	44.694	35.142	0	0	0
71	11.62	71	0.7	11.62	1354.04	177.5	173.4	106.9	246.8	0	0	0	0	0	0	0	0	0.621	0.765	0	0.585	2.073	2.005	13.018	43.714	37.22	0	0	0
72	11.64	72	0.7	11.64	1363.59	177.3	173.2	106.9	246.7	0	0	0	0	0	0	0	0	0.625	0.75	0	0.557	2.139	1.94	13.194	43.709	37.087	0	0	0

73	11.66	73	0.72	11.66	1401.83	178.8	173.4	107.4	247.1	0	0	0	0	0	0	0	0	0.63	0.69	0	0.559	2.005	2.103	12.72	44.263	36.741	0	0	0.288
74	11.74	74	0.72	11.74	1395.37	178.4	173.4	106.9	247.1	0	0	0	0	0	0	0	0	0.643	0.728	0	0.57	2.05	2.098	12.857	43.83	37.027	0	0	0.197
75	11.6	75	0.73	11.6	1420.27	176.3	172	106.5	245.9	0	0	0	0	0	0	0	0	0.674	0.693	0	0.569	2.076	2.067	13.339	44.767	35.814	0	0	0
76	11.33	76	0.73	11.33	1330.18	176.9	172.7	106.8	246.4	0	0	0	0	0	0	0	0	0.619	0.764	0	0.563	2.12	1.986	13.18	44.254	36.514	0	0	0
77	11.64	77	0.75	11.64	1388.33	179.1	174.7	107.9	247.5	0	0	0	0	0	0	0	0	0.596	0.779	0	0.55	2.104	1.912	12.358	43.393	38.192	0	0	0.117
78	11.64	78	0.77	11.64	1415.99	178.4	174.5	107.7	247.3	0	0	0	0	0	0	0	0	0.614	0.731	0	0.616	2.074	1.96	12.403	43.467	38.135	0	0	0
79	11.28	79	0.77	11.28	1362.72	177.8	173.5	107.5	246.8	0	0	0	0	0	0	0	0	0.622	0.714	0	0.489	2.04	2.015	12.896	43.955	37.27	0	0	0
80	11.08	80	0.78	11.08	1376.16	177.4	173.1	107.5	246.6	0	0	0	0	0	0	0	0	0.648	0.699	0	0.461	2.118	1.882	13.196	44.099	36.898	0	0	0
81	11.19	81	0.78	11.19	1368.14	177.8	173.6	107.7	246.8	0	0	0	0	0	0	0	0	0.621	0.693	0	0.551	1.992	2.026	12.755	44.09	37.272	0	0	0
82	11.05	82	0.8	11.05	1390.03	179	175	108.2	247.6	0	0	0	0	0	0	0	0	0.625	0.737	0	0.535	2.04	1.926	12.289	43.183	38.666	0	0	0
83	11.22	83	0.82	11.22	1396.43	179.9	176.1	109	248	0	0	0	0	0	0	0	0	0.6	0.767	0	0.581	1.979	1.883	11.705	42.922	39.563	0	0	0
84	10.94	84	0.82	10.94	1356.88	178.7	174.7	108.2	247.4	0	0	0	0	0	0	0	0	0.626	0.714	0	0.474	2.059	1.95	12.423	43.462	38.293	0	0	0
85	10.94	85	0.83	10.94	1365.35	178.9	174.8	108.5	247.4	0	0	0	0	0	0	0	0	0.643	0.678	0	0.502	1.993	1.894	12.487	43.347	38.457	0	0	0
86	10.56	86	0.83	10.56	1259.53	178.6	174.5	108.1	247.3	0	0	0	0	0	0	0	0	0.641	0.679	0	0.507	1.983	2.021	12.521	43.453	38.195	0	0	0
87	10.81	87	0.85	10.81	1337.53	180.1	176.3	109	248.1	0	0	0	0	0	0	0	0	0.625	0.709	0	0.493	2.056	1.927	11.735	42.656	39.8	0	0	0
88	11.03	88	0.87	11.03	1394.07	180.9	177.2	109.9	248.5	0	0	0	0	0	0	0	0	0.595	0.747	0	0.549	2.038	1.707	11.501	42.317	40.545	0	0	0
89	10.58	89	0.87	10.58	1293.03	179.7	175.8	108.9	247.9	0	0	0	0	0	0	0	0	0.631	0.687	0	0.504	1.989	1.949	11.963	42.967	39.309	0	0	0
90	10.6	90	0.88	10.6	1285.08	179.9	176	109.1	248	0	0	0	0	0	0	0	0	0.618	0.696	0	0.47	2.004	1.951	11.875	42.933	39.453	0	0	0
91	10.45	91	0.88	10.45	1307.93	178.8	174.7	108.4	247.3	0	0	0	0	0	0	0	0	0.657	0.691	0	0.508	1.985	1.973	12.284	43.641	38.261	0	0	0
92	10.49	92	0.9	10.49	1304.45	180.2	176.3	109.4	248.1	0	0	0	0	0	0	0	0	0.613	0.734	0	0.53	2.023	1.788	11.755	42.806	39.751	0	0	0
93	10.56	93	0.9	10.56	1297.69	180.8	177.2	109.7	248.5	0	0	0	0	0	0	0	0	0.587	0.728	0	0.554	1.984	1.918	11.269	42.46	40.5	0	0	0
94	10.46	94	0.92	10.46	1288.31	180.6	176.9	109.5	248.4	0	0	0	0	0	0	0	0	0.59	0.736	0	0.54	2.001	1.878	11.489	42.512	40.255	0	0	0
95	10.3	95	0.93	10.3	1286.85	180.8	177	109.8	248.4	0	0	0	0	0	0	0	0	0.606	0.715	0	0.545	2.013	1.839	11.319	42.6	40.362	0	0	0
96	10.24	96	0.93	10.24	1261.2	179.7	175.6	109.1	247.8	0	0	0	0	0	0	0	0	0.639	0.668	0	0.497	1.967	1.916	11.996	43.193	39.124	0	0	0
97	10.19	97	0.95	10.19	1266.72	180.5	176.8	109.6	248.3	0	0	0	0	0	0	0	0	0.607	0.728	0	0.542	1.969	1.882	11.5	42.596	40.176	0	0	0
98	10.13	98	0.95	10.13	1235.31	181.2	177.5	110.2	248.6	0	0	0	0	0	0	0	0	0.6	0.705	0	0.528	1.952	1.878	11.197	42.41	40.731	0	0	0
99	10.54	99	0.97	10.54	1302.52	181.9	178.3	111.2	248.9	0	0	0	0	0	0	0	0	0.591	0.678	0	0.553	1.858	1.732	11.109	42.034	41.446	0	0	0
100	10.21	100	0.98	10.21	1236.69	180.8	177	110.1	248.4	0	0	0	0	0	0	0	0	0.623	0.65	0	0.468	1.938	1.832	11.669	42.491	40.329	0	0	0
101	10.32	101	0.98	10.32	1306.4	180.4	176.6	109.7	248.2	0	0	0	0	0	0	0	0	0.65	0.648	0	0.464	2.009	1.844	11.687	42.734	39.964	0	0	0
102	10.14	102	1	10.14	1225.4	181.1	177.3	110.4	248.5	0	0	0	0	0	0	0	0	0.622	0.665	0	0.487	1.968	1.76	11.43	42.532	40.536	0	0	0
103	10.25	103	1	10.25	1227.86	182.3	178.8	111.3	249.1	0	0	0	0	0	0	0	0	0.589	0.719	0	0.529	1.838	1.744	11.056	41.602	41.923	0	0	0
104	10.38	104	1.02	10.38	1275.49	184.1	179.3	111.7	249.8	0	0	0	0	0	0	0	0	0.583	0.702	0	0.526	1.908	1.64	10.878	41.489	41.928	0	0	0.346
105	10.06	105	1.03	10.06	1160.21	183.5	178.2	110.7	249.5	0	0	0	0	0	0	0	0	0.603	0.671	0	0.502	2.001	1.726	11.262	41.873	40.937	0	0	0.427
106	10.15	106	1.03	10.15	1195.94	183.1	178	110.2	249.4	0	0	0	0	0	0	0	0	0.584	0.71	0	0.497	1.936	1.888	11.324	41.795	40.903	0	0	0.364
107	9.9	107	1.05	9.9	1134.86	181.2	177.5	110.3	248.6	0	0	0	0	0	0	0	0	0.569	0.691	0	0.505	1.925	1.837	11.434	42.242	40.777	0	0	0
108	10.19	108	1.05	10.19	1165.94	182.4	178.8	111.7	249.1	0	0	0	0	0	0	0	0	0.58	0.703	0	0.522	1.913	1.76	10.612	42.062	41.848	0	0	0
109	10.52	109	1.07	10.52	1226.98	182.6	179.3	111.5	249.3	0	0	0	0	0	0	0	0	0.574	0.695	0	0.566	1.895	1.76	10.696	41.534	42.28	0	0	0
110	10.29	110	1.07	10.29	1179.06	182.7	179.3	111.7	249.3	0	0	0	0	0	0	0	0	0.605	0.683	0	0.463	1.882	1.772	10.782	41.478	42.335	0	0	0
111	10.59	111	1.08	10.59	1207.75	182.8	179.4	111.9	249.3	0	0	0	0	0	0	0	0	0.566	0.716	0	0.481	1.95	1.699	10.664	41.574	42.349	0	0	0
112	10.12	112	1.1	10.12	1109	182.4	178	111	249	0	0	0	0	0	0	0	0	0.578	0.718	0	0.418	1.967	1.8	11.101	42.262	40.998	0	0	0.158
113	10.21	113	1.1	10.21	1122.8	182.6	179	112.3	249.1	0	0	0	0	0	0	0	0	0.582	0.717	0	0.496	1.926	1.634	10.504	42.185	41.956	0	0	0
114	10.59	114	1.12	10.59	1160.9	183.4	180.2	112.5	249.6	0	0	0	0	0	0	0	0	0.543	0.735	0	0.463	1.861	1.809	10.285	41.303	43	0	0	0
115	10.54	115	1.12	10.54	1131.09	182.5	178.9	111.9	249.1	0	0	0	0	0	0	0	0	0.567	0.682	0	0.455	1.893	1.632	11.1	41.712	41.959	0	0	0
116	10.57	116	1.13	10.57	1160.45	182.3	178.7	111.6	249.1	0	0	0	0	0	0	0	0	0.579	0.689	0	0.513	1.838	1.754	10.953	41.896	41.779	0	0	0
117	10.33	117	1.15	10.33	1063.47	181.4	177.6	111	248.6	0	0	0	0	0	0	0	0	0.6	0.646	0	0.442	1.86	1.758	11.491	42.396	40.806	0	0	0
118	10.38	118	1.15	10.38	1100.09	181.9	178.2	111.3	248.9	0	0	0	0	0	0	0	0	0.588	0.69	0	0.41	1.914	1.789	11.096	42.188	41.325	0	0	0
119	10.32	119	1.17	10.32	1031.24	184.2	179.6	112.1	249.8	0	0	0	0	0	0	0	0	0.616	0.628	0	0.546	1.859	1.735	10.605	41.508	42.204	0	0	0.299
120	10.67	120	1.17	10.67	1105.44	182.8	179.3	112.2	249.3	0	0	0	0	0	0	0	0	0.588	0.646	0	0.452	1.939	1.655	10.736	41.732	42.25	0	0	0
121	10.32	121	1.18	10.32	1021.11	182.4	178.7	111.9	249.1	0	0	0	0	0	0	0	0	0.573	0.668	0	0.428	1.901	1.711	10.954	41.986	41.778	0	0	0
122	10.32	122	1.2	10.32	1039.72	181.9	178.3	111.4	248.9	0	0	0	0	0	0	0	0	0.585	0.706	0	0.399	1.955	1.664	11.226	42.07	41.396	0	0	0
123	10.16	123	1.2	10.16	979.51	181.9	178.1	111.5	248.8	0	0	0	0	0	0	0	0	0.611	0.611	0	0.498	1.855	1.795	11.015	42.378	41.237	0	0	0
124	10.47	124	1.22	10.47	1046.74	183.7	180.5	113	249.7	0	0	0	0	0	0	0	0	0.57	0.667	0	0.413	1.917	1.649	10.415	41.148	43.222	0	0	0
125	10.53	125	1.22	10.53	1017.4	188.2	181.5	113.9	251.3	0	0	0	0	0	0	0	0	0.526	0.699	0	0.463	1.817	1.655	10.043	40.729	43.195	0	0	0.872
126	10.5	126	1.23	10.5	1014.46	183.9	180.8	113	249.8	0	0	0	0	0	0	0	0	0.574	0.661	0	0.468	1.848	1.738	10.255	40.916	43.537	0	0	0
127	10.48	127	1.25	10.48	1044.81	184	180.8	113.4	249.8	0	0	0	0	0	0	0	0	0.581	0.638	0	0.401	1.899	1.661	10.267	41.081	43.473	0	0	0
128	10.47	128	1.25	10.47	998.72	184.2	180.4	113.3	249.8	0	0	0	0	0	0	0	0	0.592	0.634	0	0.423	1.801	1.65	10.502	41.264	43.015	0	0	0.118
129	10.86	129	1.27	10.86	1098.48	189.1	182.4	114.6	251.6	0	0	0	0	0	0	0	0	0.549	0.68	0	0.489	1.783	1.694	9.619	40.387	43.878	0	0	0.922
130	11.05	130	1.27	11.05	1089.79	187	184.6	115.5	251.7	0	0	0	0	0	0	0	0	0.526	0.718	0	0.519	1.83	1.52	9.356	39.042	45.918	0.572	0	0
131	10.8	131	1.28	10.8	1086.42	191.3	185.5	116.3	252.5	0	0	0	0	0	0	0	0	0.54	0.687	0	0.497	1.808	1.569	9.025	38.69	46.196	0	0	0.987
132	10.97	132	1.28	10.97	1066.05	188	186.9	117.5	251.5	0	0	0	0	0	0	0	0	0.49	0.739	0	0.515	1.801	1.437	8.739	38.155	48.125	0	0	0
133	10.9	133	1.3	10.9	1076.85	195.8	187.2	118.5	253.9	0	0	0	0	0	0	0	0	0.508	0.72	0	0.48	1.773	1.45	8.468	38.222	46.641	0	0	1.738
134	11.04	134	1.32	11.04	1141.81	193.2	189.7	119.4	253.6	0	0	0	0	0	0	0	0	0.543	0.681	0	0.519	1.786	1.385	8.183	36.844	48.951	0.339	0	0.768
135	11.39	135	1.32	11.39	1218.22	194.5	192.8	120.8	255.6	0	0	0	0	0	0	0	0	0.531	0.699	0	0.494	1.829	1.296	7.826	35.295	49.8	1.876	0	0.354
136	11.42	136	1.33	11.42	1202.37	195.2	194.7	122.9	256.7	0	0	0	0	0	0	0	0	0.498	0.712	0	0.477	1.777	1.158	7.571	34.499	50.423	2.885	0	0
137	11.78	137	1.33	11.78	1232.13	198.7	196.6	125.8	257.7	0	0	0	0	0	0	0	0	0.475	0.738	0	0.491	1.701	1.132	6.96	33.889	51.181	2.932	0	0.502
138	11.55	138	1.35	11.55	1185.48	199	197.8	126.4	258.6	0	0	0	0	0	0	0	0	0.482	0.718	0	0.496	1.677	1.226	6.753	33.23	51.461	3.692	0	0.265
139	11.69	139	1.37	11.69	1233.09	203	201.1	129.9	260.3	0	0	0	0	0	0	0	0	0.49	0.713	0	0.554	1.61	1.157	6.149	31.543	52.829	4.36	0	0.594
140	12.09	140	1.37	12.09	1271.62	206.5	204.6	134.2	264.2	0	0	0	0	0	0	0	0	0.45	0.728	0	0.406	1.653	0.97	5.794	29.918	52.481	7.33	0	0.269
141	12.5	141	1.38	12.5	1311.87	209.3	208.3	135.7	266	0	0	0	0	0	0	0	0	0.459	0.674	0	0.413	1.501	0.945	5.272	27.772	54.207	8.742	0	0.014
142	12.65	142	1.38	12.65	1396.66	209.1	208.4	135.4	265.9	0	0	0	0	0	0	0	0	0.445	0.684	0	0.453	1.582	0.89	5.345	27.476	54.422	8.703	0	0
143	12.73	143	1.4	12.73	1358.5	213.1	211.5	136.5	279.5	0	0	0	0	0	0	0	0	0.436	0.693	0	0.431	1.539	0.875	4.952	26.001	53.885	11.189	0	0
144	12.72	144	1.42	12.72	1366.51	214.4	212.9	137.7	280.7	0	0	0	0	0	0	0	0	0.438	0.671	0	0.44	1.525	1.002	4.344	25.182	55.074	11.325	0	0
145	12.83	145	1.42	12.83	1375.31	219.5	216.8	138.9	302	0	0	0	0	0	0	0	0	0.414	0.668	0	0.4	1.513	0.867	4.198	22.974	54.483	14.484	0	0
146	13.34	146	1.43	13.34	1464.59	222.8	219.4	140	311.7	0	0	0	0	0	0	0	0	0.412	0.64	0	0.428	1.499	0.908	3.842	21.684	53.983	16.604	0	0
147	13.24	147	1.43	13.24	1451.46	224.9	221.2	140.5	316.8	0	0	0	0	0	0	0	0	0.394	0.688	0	0.403	1.542	0.819	3.832	20.536	53.812	17.974	0	0
148	13.41	148	1.45	13.41	1442.21	227.7	223.4	141.7	322.1	0	0	0	0	0	0	0	0	0.366	0.68	0	0.326	1.57	0.645	3.767	19.563	53.416	19.666	0	0

149	13.42	149	1.45	13.42	1433.76	229.5	224.7	142.6	325.2	0	0	0	0	0	0	0	0	0.357	0.678	0	0.344	1.462	0.727	3.522	19.094	52.997	20.819	0	0
150	13.72	150	1.47	13.72	1475.43	233.1	227.9	143.8	330.7	0	0	0	0	0	0	0	0	0.365	0.648	0	0.373	1.487	0.723	3.42	17.264	52.492	23.227	0	0
151	14.06	151	1.48	14.06	1492.08	236.6	230.8	145.8	334.7	0	0	0	0	0	0	0	0	0.338	0.66	0	0.304	1.468	0.693	3.212	15.856	52.081	25.388	0	0
152	13.43	152	1.48	13.43	1378.53	236.4	230.5	145.5	334.9	0	0	0	0	0	0	0	0	0.343	0.648	0	0.333	1.409	0.703	3.248	16.326	51.531	25.458	0	0
153	14.21	153	1.5	14.21	1562.92	238.6	232.5	146.8	337.3	0	0	0	0	0	0	0	0	0.339	0.649	0	0.359	1.413	0.715	3.017	15.443	51.12	26.946	0	0
154	13.76	154	1.5	13.76	1473.08	239.2	233.2	146.3	338.2	0	0	0	0	0	0	0	0	0.32	0.66	0	0.334	1.482	0.77	3.158	14.968	50.755	27.554	0	0
155	13.79	155	1.52	13.79	1476.82	242.4	235.9	148.9	341	0	0	0	0	0	0	0	0	0.311	0.662	0	0.36	1.403	0.707	2.815	14.096	50.003	29.644	0	0
156	14.26	156	1.53	14.26	1546.69	245.3	238.8	149.7	343.8	0	0	0	0	0	0	0	0	0.324	0.635	0	0.373	1.369	0.609	2.995	13.241	48.414	32.04	0	0
157	14.15	157	1.53	14.15	1598.11	246.7	240.2	150.8	344.7	0	0	0	0	0	0	0	0	0.321	0.639	0	0.371	1.464	0.571	2.904	12.478	48.316	32.938	0	0
158	14.73	158	1.55	14.73	1598.04	249	242.4	152	346.5	0	0	0	0	0	0	0	0	0.282	0.665	0	0.283	1.381	0.72	2.77	12.123	47.021	34.755	0	0
159	14.33	159	1.55	14.33	1506.48	248.9	242	153.7	345.8	0	0	0	0	0	0	0	0	0.273	0.65	0	0.298	1.407	0.565	2.714	11.642	48.414	34.038	0	0
160	14.64	160	1.57	14.64	1596.05	252.5	246.1	155.2	348.6	0	0	0	0	0	0	0	0	0.291	0.641	0	0.309	1.397	0.569	2.615	11.042	45.881	37.254	0	0
161	14.15	161	1.58	14.15	1493.81	254.1	247.9	156.2	349.6	0	0	0	0	0	0	0	0	0.274	0.638	0	0.334	1.298	0.649	2.631	10.511	45.149	38.514	0	0
162	14.85	162	1.58	14.85	1631.83	254.4	248.1	156.9	349.6	0	0	0	0	0	0	0	0	0.271	0.661	0	0.269	1.352	0.548	2.673	10.289	45.338	38.599	0	0
163	15.08	163	1.6	15.08	1651.03	255.1	248.8	158.1	349.9	0	0	0	0	0	0	0	0	0.255	0.645	0	0.295	1.368	0.523	2.578	10.04	45.295	39.002	0	0
164	14.4	164	1.6	14.4	1546.71	256.6	250.9	158.6	350.9	0	0	0	0	0	0	0	0	0.262	0.644	0	0.287	1.393	0.637	2.641	9.394	44.325	40.417	0	0
165	14.72	165	1.62	14.72	1648.03	256.7	250.7	159.6	350.8	0	0	0	0	0	0	0	0	0.224	0.675	0	0.337	1.35	0.584	2.435	9.568	44.546	40.281	0	0
166	15.01	166	1.62	15.01	1767.65	260	255	162.8	352.5	0	0	0	0	0	0	0	0	0.256	0.675	0	0.257	1.379	0.504	2.449	8.684	42.818	42.978	0	0
167	15.33	167	1.63	15.33	1805.61	261.8	257	165.7	353.2	0	0	0	0	0	0	0	0	0.267	0.65	0	0.237	1.331	0.487	2.241	8.417	42.196	44.175	0	0
168	15.59	168	1.65	15.59	1775.61	261.8	257.4	164.6	353.4	0	0	0	0	0	0	0	0	0.231	0.672	0	0.243	1.354	0.529	2.323	8.48	41.721	44.447	0	0
169	15.36	169	1.65	15.36	1769.12	264.8	260.9	167.6	354.7	0	0	0	0	0	0	0	0	0.251	0.648	0	0.28	1.264	0.484	2.238	8.025	40.386	46.268	0	0.156
170	15.58	170	1.67	15.58	1709.34	264.1	260.5	167.7	354.3	0	0	0	0	0	0	0	0	0.237	0.627	0	0.287	1.319	0.45	2.408	7.732	40.744	46.196	0	0
171	15.67	171	1.67	15.67	1752.72	267.4	265.6	172.1	355.7	0	0	0	0	0	0	0	0	0.222	0.667	0	0.206	1.327	0.474	2.148	7.24	38.808	48.908	0	0
172	16.29	172	1.68	16.29	1826.82	269.1	268.7	174.1	356.3	0	0	0	0	0	0	0	0	0.213	0.673	0	0.255	1.277	0.486	2.167	6.846	37.657	50.426	0	0
173	15.91	173	1.7	15.91	1766.42	268.3	267.3	173	356.1	0	0	0	0	0	0	0	0	0.222	0.664	0	0.254	1.288	0.479	2.251	6.918	38.165	49.76	0	0
174	16.73	174	1.7	16.73	1938.35	270.3	270.9	176.4	356.8	0	0	0	0	0	0	0	0	0.206	0.675	0	0.253	1.326	0.442	2.188	6.447	37.03	51.432	0	0
175	16	175	1.72	16	1794.43	269.9	270	176.3	356.6	0	0	0	0	0	0	0	0	0.219	0.667	0	0.235	1.305	0.541	2.007	6.617	37.399	51.01	0	0
176	16.31	176	1.72	16.31	1795.13	274	273.1	178.5	358.5	0	0	0	0	0	0	0	0	0.213	0.669	0	0.229	1.324	0.397	2.295	6.09	36.286	51.753	0	0.744
177	16.76	177	1.73	16.76	1833.19	274.8	275.2	181.4	358.6	0	0	0	0	0	0	0	0	0.201	0.654	0	0.26	1.264	0.448	2.218	5.818	35.569	52.945	0	0.603
178	16.64	178	1.75	16.64	1770.93	280.6	277.6	185	361.4	0	0	0	0	0	0	0	0	0.19	0.659	0	0.258	1.259	0.457	2.244	5.373	34.876	52.738	0	1.946
179	16.84	179	1.75	16.84	1799.52	290.2	280.6	186.1	366.3	0	0	0	0	0	0	0	0	0.191	0.649	0	0.199	1.289	0.533	1.929	5.554	33.694	51.512	0	4.45
180	17.12	180	1.77	17.12	1772	281.8	280.1	185.6	361.7	0	0	0	0	0	0	0	0	0.17	0.67	0	0.246	1.282	0.454	2.165	5.404	33.577	54.151	0	1.881
181	17.53	181	1.77	17.53	1925.55	286.9	281.6	190.3	363.9	0	0	0	0	0	0	0	0	0.203	0.634	0	0.243	1.16	0.452	2.061	4.956	33.558	53.699	0	3.032
182	17.35	182	1.78	17.35	1809.15	287	283.5	190.1	363.7	0	0	0	0	0	0	0	0	0.23	0.608	0	0.27	1.178	0.449	1.995	5.052	32.365	55.089	0	2.765
183	18.03	183	1.78	18.03	1843.28	286	283	190.3	363.3	0	0	0	0	0	0	0	0	0.206	0.62	0	0.248	1.135	0.513	2.029	4.951	32.727	55.035	0	2.536
184	17.62	184	1.8	17.62	1776.58	288.7	284.6	190.5	364.5	0	0	0	0	0	0	0	0	0.182	0.641	0	0.256	1.209	0.421	2.061	4.87	31.91	55.354	0	3.098
185	17.98	185	1.82	17.98	1876.49	296.8	286.8	191.3	368.4	0	0	0	0	0	0	0	0	0.184	0.639	0	0.202	1.219	0.402	1.988	4.691	31.344	54.137	0	5.193
186	18.47	186	1.82	18.47	1890.7	290.4	286.5	191.3	365.8	0	0	0	0	0	0	0	0	0.17	0.64	0	0.263	1.152	0.474	1.973	4.627	31.23	55.77	0.815	2.886
187	18.13	187	1.83	18.13	1817.9	297.7	289.2	192.4	369.4	0	0	0	0	0	0	0	0	0.164	0.669	0	0.173	1.162	0.402	1.847	4.485	30.432	55.094	1.05	4.522
188	18.97	188	1.83	18.97	2098.68	294.3	289.6	191.7	368.7	0	0	0	0	0	0	0	0	0.186	0.646	0	0.223	1.129	0.472	1.912	4.624	29.763	55.861	2.226	2.958
189	18.59	189	1.85	18.59	1908.26	299.6	290	191.7	370.9	0	0	0	0	0	0	0	0	0.153	0.656	0	0.263	1.132	0.488	1.961	4.552	29.8	54.615	1.404	4.976
190	19.05	190	1.87	19.05	2086.7	296	290.6	192.4	370.4	0	0	0	0	0	0	0	0	0.166	0.639	0	0.267	1.141	0.458	1.92	4.328	29.646	55.374	3.019	3.022
191	18.58	191	1.87	18.58	1937.15	301.9	291.7	192.5	372.3	0	0	0	0	0	0	0	0	0.168	0.632	0	0.261	1.147	0.412	1.934	4.335	29.268	54.813	1.934	5.096
192	18.73	192	1.88	18.73	1856.78	300.6	294	193.6	373.5	0	0	0	0	0	0	0	0	0.151	0.655	0	0.183	1.118	0.403	1.897	4.133	28.254	55.598	4.448	3.161
193	19.43	193	1.88	19.43	1967.41	305.4	296.1	194.2	375.8	0	0	0	0	0	0	0	0	0.14	0.657	0	0.232	1.111	0.396	1.932	3.917	27.426	55.445	4.448	4.298
194	19.42	194	1.9	19.42	2148.97	304.9	295.6	194.1	376.6	0	0	0	0	0	0	0	0	0.158	0.652	0	0.257	1.115	0.411	1.972	3.803	27.913	54.531	5.159	4.03
195	19.62	195	1.92	19.62	2119.4	300.4	294.9	193.7	374.4	0	0	0	0	0	0	0	0	0.13	0.683	0	0.214	1.197	0.357	2.039	3.897	27.816	55.628	5.468	2.57
196	19.59	196	1.92	19.59	2105.83	298.5	295.2	194.3	373.8	0	0	0	0	0	0	0	0	0.133	0.682	0	0.225	1.125	0.401	1.873	3.896	27.71	56.206	6.225	1.524
197	19.24	197	1.93	19.24	1997.41	297.4	295.6	194.4	372.2	0	0	0	0	0	0	0	0	0.138	0.648	0	0.246	1.115	0.337	2.027	3.818	27.173	57.655	5.494	1.35
198	19.89	198	1.93	19.89	2123.3	304.2	298.7	195.1	377.7	0	0	0	0	0	0	0	0	0.144	0.646	0	0.25	1.081	0.396	1.914	3.706	26.179	55.949	7.605	2.13
199	19.67	199	1.95	19.67	2171.54	306.7	299.1	195.4	384.9	0	0	0	0	0	0	0	0	0.144	0.655	0	0.21	1.111	0.329	1.915	3.667	26.278	55.38	7.334	2.977
200	19.7	200	1.95	19.7	2171.44	304	298.2	194.6	376.4	0	0	0	0	0	0	0	0	0.125	0.657	0	0.23	1.146	0.426	1.955	3.771	26.103	56.535	6.386	2.667
201	19.73	201	1.97	19.73	2154.21	302.4	297.8	195	377	0	0	0	0	0	0	0	0	0.116	0.661	0	0.202	1.113	0.4	1.889	3.753	26.729	55.769	7.644	1.721
202	19.14	202	1.98	19.14	2012.89	300.9	298.6	194.7	376.8	0	0	0	0	0	0	0	0	0.129	0.646	0	0.271	1.081	0.44	1.944	3.782	25.971	56.459	8.488	0.789
203	19.29	203	1.98	19.29	2039.12	305	299.4	195.4	390.6	0	0	0	0	0	0	0	0	0.103	0.676	0	0.23	1.125	0.455	1.889	3.578	26.18	55.062	8.893	1.809
204	19.27	204	2	19.27	2074.61	304.9	298.5	195.4	377.4	0	0	0	0	0	0	0	0	0.121	0.668	0	0.221	1.107	0.376	1.9	3.656	26.413	55.959	6.937	2.642
205	19.62	205	2	19.62	2167.69	303.2	298.6	194.8	378	0	0	0	0	0	0	0	0	0.119	0.682	0	0.213	1.09	0.353	1.944	3.844	26.24	55.632	8.239	1.644
206	19.68	206	2.02	19.68	2159.7	299.1	297.7	194.4	375.8	0	0	0	0	0	0	0	0	0.128	0.66	0	0.208	1.099	0.284	2.009	4.006	26.247	56.633	8.318	0.409
207	19.4	207	2.03	19.4	2129.4	298.8	298.1	194.7	376.4	0	0	0	0	0	0	0	0	0.131	0.663	0	0.247	1.06	0.469	1.902	3.821	26.219	56.452	9.035	0
208	19.82	208	2.03	19.82	2262.47	302.5	297.5	194.7	376.2	0	0	0	0	0	0	0	0	0.116	0.682	0	0.246	1.045	0.452	1.922	3.794	26.645	56.154	6.779	2.164
209	19.32	209	2.05	19.32	2120.14	301.7	298.4	195.1	377.1	0	0	0	0	0	0	0	0	0.133	0.659	0	0.261	1.028	0.437	1.921	3.705	26.269	56.152	8.333	1.102
210	19.46	210	2.05	19.46	2223.68	298.7	297.5	194.7	375.5	0	0	0	0	0	0	0	0	0.143	0.657	0	0.176	1.18	0.269	2.039	3.804	26.523	56.62	8.199	0.389
211	19.45	211	2.07	19.45	2197.43	301.9	297.3	194.7	375.6	0	0	0	0	0	0	0	0	0.14	0.657	0	0.206	1.09	0.373	1.952	3.853	26.641	56.461	6.566	2.061
212	19.34	212	2.08	19.34	2266.86	297.5	296.3	194.6	374.2	0	0	0	0	0	0	0	0	0.142	0.673	0	0.22	1.075	0.4	1.997	3.767	27.075	56.724	7.398	0.53
213	19.7	213	2.08	19.7	2171.45	301.6	298.4	194.9	376.9	0	0	0	0	0	0	0	0	0.109	0.68	0	0.191	1.096	0.37	1.961	3.811	26.174	56.273	8.209	1.126
214	19.86	214	2.1	19.86	2219.41	303.6	299.2	195.3	378	0	0	0	0	0	0	0	0	0.114	0.678	0	0.213	1.095	0.301	2.045	3.653	25.944	56.064	8.335	1.559
215	18.95	215	2.1	18.95	2066.59	304.2	298.5	194.8	377.8	0	0	0	0	0	0	0	0	0.129	0.667	0	0.159	1.083	0.29	1.875	4.033	26.266	55.732	7.636	2.131
216	19.92	216	2.12	19.92	2193.43	302.2	298	195.4	376.1	0	0	0	0	0	0	0	0	0.145	0.637	0	0.15	1.123	0.368	1.848	3.773	26.491	56.567	7.177	1.721
217	19.3	217	2.12	19.3	2079.96	297.6	296.1	194.3	373.9	0	0	0	0	0	0	0	0	0.12	0.664	0	0.212	1.033	0.334	1.92	4.086	27.073	56.794	7.093	0.671
218	19.04	218	2.13	19.04	2111.27	308.2	299.4	195.4	394.6	0	0	0	0	0	0	0	0	0.141	0.648	0	0.22	1.048	0.438	1.873	3.683	26.198	54.976	7.369	3.405
219	20.01	219	2.15	20.01	2190.47	307.9	299.6	195	387.5	0	0	0	0	0	0	0	0	0.133	0.653	0	0.218	1.071	0.31	1.947	3.879	25.807	55.566	7.026	3.389
220	19.46	220	2.15	19.46	2146.57	301.9	296.6	194	376.1	0	0	0	0	0	0	0	0	0.132	0.676	0	0.159	1.137	0.367	1.96	4.029	27.055	55.582	6.672	2.233
221	19.94	221	2.17	19.94	2185.42	295.7	295.5	194.3	373.5	0	0	0	0	0	0	0	0	0.114	0.693	0	0.174	1.031	0.431	1.87	4.035	27.434	56.677	7.542	0
222	18.7	222	2.17	18.7	2006.51	303.9	297.2	194.3	377.3	0	0	0	0	0	0	0	0	0.135	0.691	0	0.146	1.124	0.276	1.99	4.028	26.899	55.184	6.886	2.643
223	19.32	223	2.18	19.32	2091.76	302.9	297.7	194.9	376.3	0	0	0	0	0	0	0	0	0.146	0.668	0	0.126	1.108	0.332	1.913	3.882	26.618	56.204	6.812	2.191
224	19.14	224	2.2	19.14	2041.38	301.5	297.2	194.5	376.9	0	0	0	0	0	0	0	0	0.167	0.625	0	0.227	1.122	0.275	2.08	3.815	26.913	55.478	7.733	1.564

225	20.02	225	2.2	20.02	2273.05	300.3	296.7	193.7	376.3	0	0	0	0	0	0	0	0	0.139	0.695	0	0.155	1.154	0.385	1.973	4.097	26.886	55.495	7.634	1.386
226	19.65	226	2.22	19.65	2160.69	302.2	296.6	194.6	376.2	0	0	0	0	0	0	0	0	0.161	0.636	0	0.139	1.133	0.374	1.87	3.95	27.268	55.524	6.673	2.273
227	19.45	227	2.22	19.45	2104.44	305.9	295.9	194.5	375	0	0	0	0	0	0	0	0	0.149	0.642	0	0.134	1.132	0.224	1.913	4.071	27.535	55.827	3.729	4.645
228	19.58	228	2.23	19.58	2016.14	302.1	296.4	194.2	374.6	0	0	0	0	0	0	0	0	0.157	0.626	0	0.217	1.025	0.385	1.975	4.002	27.015	56.441	5.422	2.733
229	20.25	229	2.25	20.25	2193.88	304.2	297.4	194.5	377.3	0	0	0	0	0	0	0	0	0.174	0.645	0	0.184	1.015	0.405	1.936	3.963	26.888	55.241	6.821	2.727
230	20.48	230	2.25	20.48	2155.28	305	297.4	194.8	377.2	0	0	0	0	0	0	0	0	0.141	0.635	0	0.211	1.018	0.376	1.928	3.879	26.967	55.372	6.387	3.088
231	19.11	231	2.27	19.11	1995.76	300.7	294.8	193.7	373.2	0	0	0	0	0	0	0	0	0.164	0.648	0	0.193	1.04	0.366	2.001	4.129	27.674	56.374	4.403	3.008
232	20.28	232	2.27	20.28	2134.8	297.4	294.9	194.2	372	0	0	0	0	0	0	0	0	0.194	0.599	0	0.219	0.995	0.378	1.951	4.05	27.517	57.348	5.187	1.562
233	19.43	233	2.28	19.43	2042.94	298.8	295.2	193.7	373.4	0	0	0	0	0	0	0	0	0.158	0.652	0	0.177	1.016	0.36	1.92	4.284	27.405	56.513	5.724	1.792
234	19.9	234	2.28	19.9	2068.23	298.3	295.1	194	372.2	0	0	0	0	0	0	0	0	0.128	0.703	0	0.19	1.129	0.336	1.999	3.978	27.337	57.346	4.851	2.001
235	20	235	2.3	20	2017.07	299.5	296	193.8	374	0	0	0	0	0	0	0	0	0.135	0.649	0	0.228	1.074	0.464	1.91	4.095	26.943	56.688	5.998	1.815
236	20.06	236	2.32	20.06	2037.76	297.9	295.3	194.1	373.6	0	0	0	0	0	0	0	0	0.137	0.68	0	0.157	1.057	0.354	1.974	4.065	27.514	56.442	6.395	1.225
237	20.65	237	2.32	20.65	2165.36	303.4	295.4	194.3	374.4	0	0	0	0	0	0	0	0	0.155	0.633	0	0.19	0.999	0.376	1.801	4.164	27.659	55.995	4.315	3.711
238	19.6	238	2.33	19.6	2050.48	301.8	294.6	194.4	373.2	0	0	0	0	0	0	0	0	0.173	0.636	0	0.11	1.149	0.255	2.051	3.912	28.044	56.22	3.959	3.49
239	19.64	239	2.33	19.64	2039.74	302.4	295.6	194.4	372.7	0	0	0	0	0	0	0	0	0.153	0.666	0	0.195	1.049	0.261	2.005	3.976	27.286	57.296	3.404	3.71
240	20.05	240	2.35	20.05	2145.3	300.1	296.2	193.8	374.9	0	0	0	0	0	0	0	0	0.145	0.667	0	0.211	1.02	0.357	2.005	4.131	27.037	56.106	6.577	1.743
241	20.04	241	2.37	20.04	2111.75	299.4	295	194	373.2	0	0	0	0	0	0	0	0	0.163	0.644	0	0.195	1.059	0.287	2.005	4.07	27.681	56.453	5.248	2.195
242	20.44	242	2.37	20.44	2134.44	298.8	294.8	194.2	373	0	0	0	0	0	0	0	0	0.154	0.623	0	0.215	1.018	0.383	1.837	4.125	27.814	56.519	5.365	1.947
243	20.12	243	2.38	20.12	2185.47	301.9	294.8	193.8	374.2	0	0	0	0	0	0	0	0	0.161	0.647	0	0.126	1.06	0.261	2.019	4.217	27.891	55.644	4.747	3.227
244	19.83	244	2.38	19.83	2044.53	302.6	296.5	194.5	375.2	0	0	0	0	0	0	0	0	0.119	0.713	0	0.183	1.077	0.251	1.882	4.05	27.123	56.14	5.726	2.737
245	20.12	245	2.4	20.12	2129.24	300.6	296.8	194.4	375.6	0	0	0	0	0	0	0	0	0.132	0.67	0	0.193	1.085	0.252	1.978	4.039	26.928	56.092	7.085	1.548
246	19.48	246	2.42	19.48	2133.6	298.6	294.4	194.2	371.2	0	0	0	0	0	0	0	0	0.165	0.652	0	0.125	1.136	0.253	2.054	3.957	27.813	57.515	3.772	2.558
247	20.1	247	2.42	20.1	2155.58	293.2	293.6	193.9	370.4	0	0	0	0	0	0	0	0	0.159	0.653	0	0.159	1.054	0.321	1.903	4.202	28.099	57.513	5.677	0.259
248	21.65	248	2.43	21.65	1193.82	299.1	295	193.8	373.7	0	0	0	0	0	0	0	0	0.049	0.619	0	0.16	0.991	0.48	1.983	4.221	27.697	56.098	5.826	1.875
249	1.19	249	2.43	1.19	674.41	306	289.4	178.2	406.4	0	0	0	0	0	0	0	0	0	0	0	0	0	1.348	3.146	6.937	29.047	48.615	5.027	5.88
250	1.16	250	2.45	1.16	468.34	322.5	266.5	64.4	652.3	0	0	0	0	0	0	0	0	0	0	0	4.115	6.887	6.369	8.674	10.539	13.644	15.181	13.065	21.526

Time	Density	Box Temp	Cry Temp	Status
15:25:00	1.324773	59.85216	49.315	Loading cell
15:25:12	1.326655	59.8523	49.291	
15:25:24	1.32699	59.8521	49.275	
15:25:30	1.326058	59.85219	49.265	Stabilising:0.0702%
15:25:42	1.32509	59.85213	49.238	Stabilising:0.0314%
15:25:54	1.324528	59.85245	49.216	Stabilising:0.0242%
15:26:00	1.324341	59.85204	49.213	Stabilising:0.0141%
15:26:12	1.3241	59.85227	49.222	Stabilising:0.0078%
15:26:24	1.323968	59.8524	49.23	Stabilising:0.0055%
15:26:30	1.323919	59.85232	49.234	Stabilising:0.0037%
15:26:42	1.323846	59.85223	49.244	Stabilising:0.0023%
15:26:54	1.32382	59.8523	49.239	Stabilising:0.0008%
15:27:00	1.32381	59.85245	49.225	Measuring
15:27:12	1.323784	59.85219	49.208	
15:27:24	1.323783	59.85249	49.206	
15:27:30	1.323776	59.85216	49.213	Done
15:27:42	1.323761	59.85234	49.227	
15:27:54	1.323749	59.85238	49.235	Start measurement
15:28:00	1.324462	59.85311	49.227	Loading cell
15:28:12	1.327813	59.852	49.207	
15:28:24	1.327044	59.85194	49.199	
15:28:30	1.326234	59.85241	49.197	Stabilising:0.0610%
15:28:42	1.325222	59.85202	49.186	Stabilising:0.0321%
15:28:54	1.324602	59.85255	49.176	Stabilising:0.0288%
15:29:00	1.324423	59.8523	49.178	Stabilising:0.0135%
15:29:12	1.324176	59.85229	49.194	Stabilising:0.0076%
15:29:24	1.324049	59.85259	49.209	Stabilising:0.0052%
15:29:30	1.323997	59.85232	49.216	Stabilising:0.0039%
15:29:42	1.323929	59.85227	49.231	Stabilising:0.0028%
15:29:54	1.323901	59.85269	49.228	Stabilising:0.0009%
15:30:00	1.323888	59.85254	49.219	Measuring
15:30:12	1.323864	59.85254	49.214	
15:30:24	1.32386	59.85214	49.221	
15:30:30	1.323855	59.85257	49.226	Done
15:30:42	1.323845	59.85249	49.239	
15:30:54	1.323836	59.85265	49.244	Start measurement
15:31:00	1.324256	59.85245	49.235	Loading cell
15:31:12	1.327785	59.85205	49.212	
15:31:24	1.326981	59.85218	49.202	
15:31:30	1.326202	59.85222	49.198	Stabilising:0.0587%
15:31:42	1.32522	59.85213	49.17	Stabilising:0.0311%
15:31:54	1.324664	59.85222	49.144	Stabilising:0.0241%
15:32:00	1.324489	59.85238	49.139	Stabilising:0.0132%
15:32:12	1.324236	59.85218	49.14	Stabilising:0.0068%
15:32:24	1.324099	59.85205	49.141	Stabilising:0.0053%
15:32:30	1.324054	59.85216	49.142	Stabilising:0.0034%
15:32:42	1.323973	59.85218	49.145	Stabilising:0.0032%
15:32:54	1.323936	59.85227	49.131	Stabilising:0.0014%
15:33:00	1.323923	59.8525	49.118	Stabilising:0.0010%
15:33:12	1.323891	59.85205	49.103	Measuring
15:33:24	1.323886	59.85246	49.105	
15:33:30	1.323883	59.85216	49.107	
15:33:42	1.32387	59.85257	49.113	Done
15:33:54	1.323856	59.85227	49.113	Start measurement
15:34:00	1.321958	59.85209	49.103	Loading cell
15:34:12	1.328158	59.85205	49.076	
15:34:24	1.326822	59.85238	49.065	
15:34:30	1.326015	59.85186	49.06	Stabilising:0.0608%
15:34:42	1.325016	59.85209	49.045	Stabilising:0.0319%
15:34:54	1.324438	59.85178	49.032	Stabilising:0.0249%
15:35:00	1.324252	59.85234	49.033	Stabilising:0.0140%
15:35:12	1.323996	59.85225	49.047	Stabilising:0.0078%
16:35:24	1.323848	59.85238	49.059	Stabilising:0.0056%
15:35:30	1.323802	59.8525	49.065	Stabilising:0.0035%
15:35:42	1.323737	59.85214	49.077	Stabilising:0.0021%
15:35:54	1.323707	59.85243	49.072	Stabilising:0.0012%
15:36:00	1.323696	59.85246	49.063	Stabilising:0.0008%
15:36:12	1.323674	59.85316	49.056	Measuring
15:36:24	1.323668	59.85214	49.062	
15:36:30	1.323663	59.8524	49.066	
15:36:42	1.323653	59.85254	49.078	Done
15:36:54	1.323636	59.85241	49.081	Start measurement
15:37:00	1.324809	59.852	49.071	Loading cell
15:37:12	1.3278	59.8523	49.047	
15:37:24	1.326498	59.85245	49.036	
15:37:30	1.325672	59.85214	49.033	Stabilising:0.0622%
15:37:42	1.324581	59.85222	49.018	Stabilising:0.0311%
15:37:54	1.324015	59.85236	49.006	Stabilising:0.0241%
15:38:00	1.323835	59.8525	49.007	Stabilising:0.0136%
15:38:12	1.32359	59.85617	49.02	Stabilising:0.0077%
15:38:24	1.32345	59.85255	49.032	Stabilising:0.0057%
15:38:30	1.323406	59.85471	49.038	Stabilising:0.0033%
15:38:42	1.323331	59.85513	49.053	Stabilising:0.0026%
15:38:54	1.323305	59.85236	49.047	Stabilising:0.0008%
15:39:00	1.323294	59.85422	49.038	Measuring
15:39:12	1.323267	59.85524	49.029	
15:39:24	1.323264	59.85255	49.036	
15:39:30	1.323261	59.85467	49.042	Done
15:39:42	1.323252	59.85303	49.054	
15:39:54	1.323235	59.85269	49.058	Start measurement
15:40:00	1.324528	59.8525	49.048	Loading cell
15:40:12	1.326953	59.85306	49.025	
15:40:24	1.326159	59.85238	49.014	
15:40:30	1.325343	59.85236	49.011	Stabilising:0.0615%
15:40:42	1.324326	59.85251	48.997	Stabilising:0.0325%
15:40:54	1.323703	59.85202	48.985	Stabilising:0.0251%
15:41:00	1.323526	59.85251	48.987	Stabilising:0.0134%
15:41:12	1.323285	59.85408	49.001	Stabilising:0.0074%
15:41:24	1.323148	59.85227	49.013	Stabilising:0.0058%
15:41:30	1.323105	59.85274	49.02	Stabilising:0.0032%
15:41:42	1.323033	59.85301	49.033	Stabilising:0.0027%
15:41:54	1.323004	59.85259	49.029	Stabilising:0.0010%
15:42:00	1.322996	59.85408	49.02	Measuring
15:42:12	1.322969	59.85461	49.013	
15:42:24	1.322965	59.85372	49.02	
15:42:30	1.322963	59.85257	49.026	Done

Time	Density	Box Temp	Cry Temp	Status
16:33:59	1.322356	59.85219	48.977	Loading cell
16:34:11	1.326758	59.85227	48.951	
16:34:23	1.325564	59.85257	48.938	
16:34:29	1.324751	59.85205	48.933	Stabilising:0.0613%
16:34:41	1.323746	59.85359	48.917	Stabilising:0.0325%
16:34:53	1.323162	59.85223	48.905	Stabilising:0.0254%
16:34:59	1.322974	59.85274	48.906	Stabilising:0.0142%
16:35:11	1.322719	59.85349	48.919	Stabilising:0.0082%
16:35:23	1.322573	59.85277	48.928	Stabilising:0.0067%
16:35:29	1.322528	59.85241	48.933	Stabilising:0.0034%
16:35:41	1.322461	59.85257	48.944	Stabilising:0.0024%
16:35:53	1.322432	59.85257	48.936	Stabilising:0.0013%
16:35:59	1.322417	59.85261	48.927	Stabilising:0.0011%
16:36:11	1.322395	59.85406	48.918	Measuring
16:36:23	1.32239	59.85288	48.922	
16:36:29	1.322384	59.8537	48.925	
16:36:41	1.322379	59.85404	48.934	Done
16:36:53	1.322358	59.85868	48.936	Start measurement
16:36:59	1.323459	59.85621	48.925	Loading cell
16:37:11	1.326679	59.85245	48.897	
16:37:23	1.325444	59.85259	48.882	
16:37:29	1.324486	59.85395	48.877	Stabilising:0.0722%
16:37:41	1.323489	59.85236	48.857	Stabilising:0.0324%
16:37:53	1.322917	59.85255	48.842	Stabilising:0.0247%
16:37:59	1.322729	59.85284	48.841	Stabilising:0.0142%
16:38:11	1.322483	59.85408	48.853	Stabilising:0.0077%
16:38:23	1.322346	59.85903	48.861	Stabilising:0.0057%
16:38:29	1.322302	59.86319	48.865	Stabilising:0.0033%
16:38:41	1.322226	59.85512	48.877	Stabilising:0.0024%
16:38:53	1.322197	59.8595	48.871	Stabilising:0.0010%
16:38:59	1.322183	59.85601	48.861	Measuring
16:39:11	1.322164	59.85871	48.852	
16:39:23	1.32216	59.86102	48.857	
16:39:29	1.322158	59.85923	48.862	Done
16:39:41	1.322147	59.85822	48.873	
16:39:53	1.322127	59.86081	48.874	Start measurement
16:39:59	1.318125	59.86002	48.863	Loading cell
16:40:11	1.326047	59.85608	48.837	
16:40:23	1.32496	59.85265	48.824	
16:40:29	1.324151	59.85223	48.819	Stabilising:0.0610%
16:40:41	1.323085	59.85222	48.804	Stabilising:0.0369%
16:40:53	1.322553	59.85275	48.788	Stabilising:0.0227%
16:40:59	1.32237	59.85254	48.787	Stabilising:0.0138%
16:41:11	1.322118	59.85245	48.797	Stabilising:0.0081%
16:41:23	1.321975	59.85442	48.803	Stabilising:0.0057%
16:41:29	1.321929	59.85379	48.805	Stabilising:0.0035%
16:41:41	1.321854	59.85363	48.817	Stabilising:0.0029%
16:41:53	1.321817	59.85447	48.808	Stabilising:0.0018%
16:41:59	1.321803	59.85391	48.798	Stabilising:0.0011%
16:42:11	1.321781	59.85451	48.788	Measuring
16:42:23	1.321779	59.85254	48.791	
16:42:29	1.321774	59.85424	48.795	
16:42:41	1.321763	59.8554	48.805	Done
16:42:53	1.321746	59.8529	48.806	Start measurement
16:42:59	1.319986	59.85255	48.795	Loading cell
16:43:11	1.324541	59.8523	48.77	
16:43:23	1.323816	59.85223	48.757	
16:43:29	1.323302	59.85234	48.753	Stabilising:0.0388%
16:43:41	1.322565	59.85271	48.737	Stabilising:0.0249%
16:43:53	1.322044	59.8527	48.725	Stabilising:0.0221%
16:43:59	1.321845	59.8527	48.726	Stabilising:0.0150%
16:44:11	1.321616	59.85456	48.738	Stabilising:0.0073%
16:44:23	1.321493	59.85269	48.749	Stabilising:0.0050%
16:44:29	1.32145	59.85254	48.754	Stabilising:0.0033%
16:44:41	1.321384	59.85259	48.764	Stabilising:0.0027%
16:44:53	1.321357	59.85301	48.756	Stabilising:0.0008%
16:44:59	1.321343	59.8527	48.746	Measuring
16:45:11	1.321325	59.85241	48.736	
16:45:23	1.321322	59.85712	48.739	
16:45:29	1.321319	59.85456	48.742	Done
16:45:41	1.321309	59.85353	48.751	
16:45:53	1.321298	59.85803	48.75	Start measurement
16:45:59	1.321364	59.85364	48.74	Loading cell
16:46:11	1.325431	59.85223	48.713	
16:46:23	1.324125	59.85249	48.699	
16:46:29	1.323322	59.85303	48.695	Stabilising:0.0606%
16:46:41	1.322312	59.85427	48.679	Stabilising:0.0314%
16:46:53	1.321727	59.85281	48.665	Stabilising:0.0252%
16:46:59	1.321542	59.85209	48.667	Stabilising:0.0140%
16:47:11	1.321273	59.85241	48.679	Stabilising:0.0089%
16:47:23	1.321138	59.85234	48.688	Stabilising:0.0057%
16:47:29	1.321092	59.85332	48.691	Stabilising:0.0035%
16:47:41	1.321025	59.85234	48.701	Stabilising:0.0023%
16:47:53	1.320996	59.85848	48.693	Stabilising:0.0010%
16:47:59	1.320984	59.86043	48.682	Measuring
16:48:11	1.320958	59.8643	48.671	
16:48:23	1.320957	59.86285	48.674	
16:48:29	1.320953	59.86621	48.678	Done
16:48:41	1.320943	59.86931	48.689	
16:48:53	1.320931	59.86952	48.692	Start measurement
16:48:59	1.321965	59.86833	48.68	Loading cell
16:49:11	1.323362	59.86185	48.652	
16:49:23	1.3237	59.85528	48.639	
16:49:29	1.322899	59.85719	48.635	Stabilising:0.0604%
16:49:41	1.321897	59.85415	48.619	Stabilising:0.0315%
16:49:53	1.321318	59.85671	48.607	Stabilising:0.0250%
16:49:59	1.321127	59.85427	48.608	Stabilising:0.0145%
16:50:11	1.320882	59.85457	48.621	Stabilising:0.0077%
16:50:23	1.320736	59.85468	48.631	Stabilising:0.0058%
16:50:29	1.320691	59.85673	48.636	Stabilising:0.0034%
16:50:41	1.32062	59.85535	48.645	Stabilising:0.0028%
16:50:53	1.32059	59.8535	48.638	Stabilising:0.0009%
16:50:59	1.320581	59.85245	48.628	Measuring
16:51:11	1.320559	59.8527	48.619	
16:51:23	1.320555	59.85243	48.623	
16:51:29	1.320552	59.85254	48.627	Done

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15:42:42   1.32295  59.85549    49.039
15:42:54  1.322936  59.85504    49.044 Start      measurement
15:43:00  1.323944  59.85362    49.034 Loading    cell
15:43:12  1.327353  59.85255    49.011
15:43:24  1.325928  59.85234    49.001
15:43:30  1.325117  59.85236    48.998 Stabilising:0.0611%
15:43:42  1.324106  59.85259    48.985 Stabilising:0.0326%
15:43:54  1.323525   59.8525    48.974 Stabilising:0.0250%
15:44:00  1.323336  59.85354    48.976 Stabilising:0.0143%
15:44:12  1.323067  59.85227    48.991 Stabilising:0.0089%
15:44:24  1.322935  59.85232    49.004 Stabilising:0.0056%
15:44:30  1.322889   59.8525    49.011 Stabilising:0.0035%
15:44:42   1.32282  59.85281    49.026 Stabilising:0.0028%
15:44:54  1.322792  59.85249    49.022 Stabilising:0.0009%
15:45:00  1.322777  59.85261    49.014 Measuring
15:45:12  1.322754   59.8525    49.007
15:45:24  1.322755  59.85536    49.014
15:45:30  1.322746  59.85457     49.02 Done
15:45:42  1.322734  59.85307    49.033
15:45:54  1.322721  59.85297    49.037 Start      measurement
15:46:00  1.323836  59.85229    49.027 Loading    cell
15:46:12   1.32584   59.8523    49.005
15:46:24    1.3256  59.85246    48.995
15:46:30  1.324869   59.8525    48.992 Stabilising:0.0551%
15:46:42  1.323944  59.85245    48.978 Stabilising:0.0295%
15:46:54  1.323398  59.85447    48.968 Stabilising:0.0233%
15:47:00  1.323216  59.85202    48.969 Stabilising:0.0137%
15:47:12  1.322975  59.85535    48.984 Stabilising:0.0076%
15:47:24  1.322842  59.85262    48.997 Stabilising:0.0054%
15:47:30   1.32279  59.85451    49.003 Stabilising:0.0039%
15:47:42  1.322725  59.85259    49.018 Stabilising:0.0022%
15:47:54  1.322694   59.8521    49.015 Stabilising:0.0012%
15:48:00  1.322684  59.85391    49.006 Stabilising:0.0008%
15:48:12  1.322659  59.85197        49 Measuring
15:48:24  1.322655  59.85402    49.007
15:48:30  1.322651  59.85229    49.013
15:48:42  1.322638  59.85261    49.025 Done
15:48:54  1.322622  59.85209    49.031 Start      measurement
15:49:00  1.322309  59.85238    49.023 Loading    cell
15:49:12  1.326884  59.85238        49
15:49:24  1.325787   59.8523     48.99
15:49:30  1.324964  59.85216    48.987 Stabilising:0.0620%
15:49:42  1.323878  59.85301    48.974 Stabilising:0.0374%
15:49:54  1.323314  59.85259    48.964 Stabilising:0.0247%
15:50:00  1.323129  59.85222    48.966 Stabilising:0.0140%
15:50:12  1.322878  59.85254    48.982 Stabilising:0.0082%
15:50:24   1.32275  59.85229    48.995 Stabilising:0.0052%
15:50:30  1.322703  59.85232    49.001 Stabilising:0.0036%
15:50:42  1.322633  59.85823    49.015 Stabilising:0.0029%
15:50:54  1.322604  59.85216    49.012 Stabilising:0.0011%
15:51:00  1.322593  59.85245    49.008 Stabilising:0.0008%
15:51:12  1.322568  59.85254    48.999 Measuring
15:51:24  1.322568  59.85347    49.007
15:51:30  1.322561  59.85377    49.013
15:51:42  1.322546   59.8523    49.026 Done
15:51:54  1.322534  59.85204    49.032 Start      measurement
15:52:00  1.323676  59.85245    49.023 Loading    cell
15:52:12  1.327016  59.85225    49.002
15:52:24  1.325707  59.85284    48.994
15:52:30  1.324899  59.85402    48.992 Stabilising:0.0609%
15:52:42  1.323888  59.85236     48.98 Stabilising:0.0322%
15:52:54  1.323271  59.85312     48.97 Stabilising:0.0254%
15:53:00  1.323091  59.85592    48.971 Stabilising:0.0136%
15:53:12  1.322843  59.85261    48.987 Stabilising:0.0076%
15:53:24  1.322712  59.85484    48.999 Stabilising:0.0053%
15:53:30  1.322671   59.8585    49.006 Stabilising:0.0031%
15:53:42  1.322603  59.85619     49.02 Stabilising:0.0025%
15:53:54  1.322569  59.85637    49.018 Stabilising:0.0011%
15:54:00  1.322558  59.85373     49.01 Stabilising:0.0008%
15:54:12  1.322534   59.8559    49.005 Measuring
15:54:24  1.322533   59.8568    49.012
15:54:30  1.322529  59.85787    49.017
15:54:42  1.322518  59.85592     49.03 Done
15:54:54  1.322504   59.8573    49.035 Start      measurement
15:55:00  1.323507  59.85513    49.026 Loading    cell
15:55:12  1.327032  59.85255    49.003
15:55:24  1.325698  59.85214    48.994
15:55:30  1.324888   59.8524    48.991 Stabilising:0.0610%
15:55:41  1.323884  59.85257    48.977 Stabilising:0.0314%
15:55:54  1.323299  59.85255    48.967 Stabilising:0.0254%
15:56:00  1.323111  59.85386    48.968 Stabilising:0.0142%
15:56:11  1.322846  59.85497    48.983 Stabilising:0.0091%
15:56:24  1.322716  59.85761    48.997 Stabilising:0.0057%
15:56:30  1.322669  59.85526    49.004 Stabilising:0.0036%
15:56:42  1.322601  59.85503    49.016 Stabilising:0.0023%
15:56:54  1.322571  59.85626    49.014 Stabilising:0.0009%
15:56:59  1.322559  59.85301    49.006 Measuring
15:57:12  1.322534  59.85617        49
15:57:23  1.322531  59.85309    49.008
15:57:29  1.322528  59.85254    49.013 Done
15:57:42  1.322515  59.85249    49.025
15:57:53  1.322501  59.85507    49.031 Start      measurement
15:57:59  1.323608  59.85249    49.022 Loading    cell
15:58:11  1.326413  59.85245        49
15:58:23  1.325655   59.8524    48.991
15:58:30  1.324851   59.8525    48.988 Stabilising:0.0606%
15:58:41  1.323855  59.85236    48.976 Stabilising:0.0321%
15:58:53   1.32328  59.85238    48.965 Stabilising:0.0248%
15:59:00  1.323092  59.85234    48.966 Stabilising:0.0142%
15:59:11  1.322843  59.85302     48.98 Stabilising:0.0077%
15:59:24  1.322698  59.85251    48.993 Stabilising:0.0056%
15:59:29  1.322654  59.85342    48.999 Stabilising:0.0033%
15:59:41  1.322578  59.85592    49.013 Stabilising:0.0030%
15:59:53  1.322555  59.85803    49.011 Stabilising:0.0007%
15:59:59  1.322542  59.86072    49.002 Measuring
16:00:11   1.32252  59.86404    48.995
16:00:23  1.322517  59.86716    49.003
```

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16:51:41  1.320542  59.85265    48.637
16:51:53  1.320526  59.85225    48.638 Start      measurement
16:51:59  1.321637  59.85307    48.626 Loading    cell
16:52:11  1.324491  59.85377    48.599
16:52:23  1.323487  59.85249    48.585
16:52:29  1.322524  59.85225    48.581 Stabilising:0.0727%
16:52:41  1.321526   59.8527    48.563 Stabilising:0.0327%
16:52:53  1.321195  59.85286     48.55 Stabilising:0.0250%
16:52:59  1.320759  59.85249    48.548 Stabilising:0.0140%
16:53:11  1.320507  59.85222    48.559 Stabilising:0.0082%
16:53:23  1.320367   59.8527    48.568 Stabilising:0.0055%
16:53:29  1.320316   59.8521    48.572 Stabilising:0.0039%
16:53:41  1.320248   59.8527    48.582 Stabilising:0.0023%
16:53:53   1.32022  59.85291    48.573 Stabilising:0.0011%
16:53:59  1.320206  59.85318    48.562
16:54:11  1.320186  59.85395    48.552 Measuring
16:54:23  1.320184  59.85359    48.553
16:54:29   1.32018  59.85448    48.556
16:54:41  1.320166  59.85479    48.566 Done
16:54:53  1.320151  59.85293    48.568 Start      measurement
16:54:59  1.321316  59.85483    48.557 Loading    cell
16:55:11  1.324103  59.85241     48.53
16:55:23  1.323049  59.85238    48.516
16:55:29  1.322209  59.85219     48.51 Stabilising:0.0634%
16:55:41  1.321103   59.8525    48.492 Stabilising:0.0374%
16:55:53  1.320529  59.85254    48.484 Stabilising:0.0250%
16:55:59  1.320345  59.85245    48.482 Stabilising:0.0139%
16:56:11  1.320091  59.85246    48.492 Stabilising:0.0079%
16:56:23  1.320018   59.8527    48.495 Stabilising:0.0055%
16:56:29   1.31991  59.85223    48.499 Stabilising:0.0029%
16:56:41  1.319833  59.85318    48.511 Stabilising:0.0031%
16:56:53  1.319804  59.85245    48.501 Stabilising:0.0010%
16:56:59   1.31979   59.8529    48.491 Measuring
16:57:11   1.31977  59.85592    48.486
16:57:23  1.319763  59.85326    48.491
16:57:29  1.319761  59.85373    48.489 Done
16:57:41  1.319746   59.8546    48.499
16:57:53   1.31973  59.85404    48.502 Start      measurement
16:57:59  1.320943  59.85243    48.496 Loading    cell
16:58:11  1.323913  59.85232     48.47
16:58:23  1.322593  59.85202    48.455
16:58:29  1.321752  59.85223    48.451 Stabilising:0.0635%
16:58:41  1.320639  59.85291    48.434 Stabilising:0.0386%
16:58:53  1.320063  59.85241    48.417 Stabilising:0.0185%
16:58:59  1.319876  59.85216    48.417 Stabilising:0.0142%
16:59:11  1.319625  59.85249    48.424 Stabilising:0.0080%
16:59:23  1.319487  59.85245    48.437 Stabilising:0.0047%
16:59:29  1.319441  59.85499    48.441 Stabilising:0.0035%
16:59:41  1.319369  59.85271    48.449 Stabilising:0.0027%
16:59:53  1.319339  59.85504    48.443 Stabilising:0.0010%
16:59:59  1.319323  59.85535    48.431 Measuring
17:00:11  1.319301  59.85282    48.419
17:00:23  1.319295  59.85262     48.42
17:00:29  1.319294  59.85259    48.423 Done
17:00:41  1.319281  59.85229    48.434
17:00:53  1.319267  59.85208    48.437 Start      measurement
17:00:59  1.320529  59.85213    48.426 Loading    cell
17:01:11   1.32345  59.85222    48.399
17:01:23   1.32213   59.8523    48.385
17:01:29  1.321293  59.85265     48.38 Stabilising:0.0632%
17:01:41   1.32025  59.85229    48.364 Stabilising:0.0343%
17:01:53   1.31961  59.85236    48.349 Stabilising:0.0260%
17:01:59  1.319426  59.85279    48.349 Stabilising:0.0139%
17:02:11  1.319174  59.85204     48.36 Stabilising:0.0079%
17:02:23  1.319038  59.85216     48.37 Stabilising:0.0058%
17:02:29   1.31899  59.85236    48.375 Stabilising:0.0036%
17:02:41  1.318922  59.85245    48.386 Stabilising:0.0024%
17:02:53   1.31889  59.85307     48.38 Stabilising:0.0012%
17:02:59  1.318874  59.85234    48.368
17:03:11  1.318852  59.85279    48.355 Measuring
17:03:23  1.318849  59.85261     48.36
17:03:29  1.318844  59.85271    48.361
17:03:41  1.318832   59.8525    48.371 Done
17:03:53  1.318819  59.85234    48.371 Start      measurement
17:03:59  1.320079  59.85315    48.361 Loading    cell
17:04:11  1.323094  59.85222    48.332
17:04:23  1.321712   59.8523    48.318
17:04:29  1.320869  59.85234    48.313 Stabilising:0.0637%
17:04:41  1.319816   59.8523    48.295 Stabilising:0.0343%
17:04:53  1.319213  59.85238    48.281 Stabilising:0.0261%
17:04:59   1.31899  59.85254    48.279 Stabilising:0.0169%
17:05:11   1.31874   59.8523    48.292 Stabilising:0.0080%
17:05:23  1.318602  59.85249    48.301 Stabilising:0.0058%
17:05:29  1.318553  59.85261    48.305 Stabilising:0.0037%
17:05:41  1.318482  59.85236    48.315 Stabilising:0.0027%
17:05:53  1.318454  59.85307    48.308 Stabilising:0.0013%
17:05:59  1.318438   59.8524    48.297 Stabilising:0.0012%
17:06:11  1.318414  59.85279    48.286 Measuring
17:06:23   1.31841   59.8532     48.29
17:06:29  1.318404  59.85241    48.293
17:06:41  1.318398  59.85218    48.303 Done
17:06:53  1.318384  59.85269    48.305 Start      measurement
17:06:59  1.318918  59.85281    48.293 Loading    cell
17:07:11  1.322648  59.85245    48.265
17:07:23  1.321245  59.85194    48.249
17:07:29  1.320415  59.85251    48.247 Stabilising:0.0628%
17:07:41   1.31937  59.85227    48.229 Stabilising:0.0337%
17:07:53  1.318766  59.85205    48.214 Stabilising:0.0261%
17:07:59  1.318573  59.85234    48.213 Stabilising:0.0146%
17:08:11  1.318296  59.85202    48.225 Stabilising:0.0077%
17:08:23  1.318159  59.85238    48.235 Stabilising:0.0060%
17:08:29  1.318113  59.85229    48.239 Stabilising:0.0035%
17:08:41  1.318041   59.8527     48.25 Stabilising:0.0027%
17:08:53  1.318011   59.8523    48.244 Stabilising:0.0011%
17:08:59  1.317996  59.85377    48.231
17:09:11  1.317972   59.8523     48.22 Measuring
17:09:23   1.31797   59.8523    48.221
```

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16:00:29  1.322513  59.86594   49.008 Done
16:00:41  1.322501  59.86671   49.021
16:00:53  1.322486  59.87016   49.026 Start       measurement
16:00:59  1.323696  59.86985   49.017 Loading     cell
16:01:11  1.327067  59.86629   48.995
16:01:23  1.325755  59.85674   48.986
16:01:29  1.324917  59.85232   48.983 Stabilising:0.0631%
16:01:41  1.323817  59.85262   48.971 Stabilising:0.0316%
16:01:53  1.323242  59.85209   48.961 Stabilising:0.0247%
16:01:59   1.32306  59.85232   48.962 Stabilising:0.0138%
16:02:11  1.322811  59.85213   48.979 Stabilising:0.0079%
16:02:23  1.322673  59.85274   48.992 Stabilising:0.0056%
16:02:29  1.322628  59.85234   48.998 Stabilising:0.0034%
16:02:41  1.322555   59.8529   49.013 Stabilising:0.0030%
16:02:53  1.322523  59.85223    49.01 Stabilising:0.0010%
16:02:59  1.322512  59.85255   49.002 Measuring
16:03:11  1.322488  59.85277   48.997
16:03:23  1.322487  59.85255   49.004
16:03:29  1.322481  59.85275    49.01 Done
16:03:41  1.322472   59.8532   49.022
16:03:53  1.322453  59.85282   49.028 Start       measurement
16:03:59  1.320796  59.85277   49.019 Loading     cell
16:04:11  1.325688  59.85214   48.998
16:04:23  1.325675  59.85257   48.988
16:04:29  1.324861  59.85257   48.986 Stabilising:0.0613%
16:04:41  1.323846  59.85269   48.972 Stabilising:0.0330%
16:04:53  1.323226  59.85246   48.962 Stabilising:0.0250%
16:04:59  1.323046  59.85342   48.964 Stabilising:0.0136%
16:05:11  1.322806   59.8527   48.978 Stabilising:0.0075%
16:05:23  1.322672  59.85384   48.993 Stabilising:0.0057%
16:05:29  1.322626  59.85245   48.999 Stabilising:0.0035%
16:05:41  1.322558  59.85277   49.013 Stabilising:0.0023%
16:05:53  1.322527  59.85255   49.009 Stabilising:0.0011%
16:05:59  1.322514  59.85425   49.001 Stabilising:0.0010%
16:06:11  1.322488  59.85642   48.996 Measuring
16:06:23  1.322483   59.8525   49.003
16:06:29  1.322479  59.85447   49.009
16:06:41  1.322471  59.85261   49.022 Done
16:06:53   1.32246  59.85383   49.028 Start       measurement
16:06:59  1.323714  59.85214    49.02 Loading     cell
16:07:11  1.326827  59.85246   48.998
16:07:23  1.325635  59.85219   48.988
16:07:29  1.324832  59.85269   48.986 Stabilising:0.0605%
16:07:41  1.323831  59.85245   48.973 Stabilising:0.0322%
16:07:53  1.323253  59.85232   48.963 Stabilising:0.0248%
16:07:59  1.323065   59.8524   48.966 Stabilising:0.0142%
16:08:11  1.322799  59.85368   48.982 Stabilising:0.0073%
16:08:23  1.322668  59.85639   48.996 Stabilising:0.0057%
16:08:29  1.322622  59.85255   49.002 Stabilising:0.0035%
16:08:41  1.322551  59.85261   49.017 Stabilising:0.0025%
16:08:53  1.322521  59.85291   49.014 Stabilising:0.0008%
16:08:59  1.322511  59.85327   49.005 Measuring
16:09:11  1.322488  59.85265       49
16:09:23  1.322485  59.85234   49.007
16:09:29  1.322479   59.8525   49.014 Done
16:09:41  1.322468  59.85213   49.025
16:09:53  1.322455  59.85737   49.031 Start       measurement
16:09:59  1.323091  59.85689   49.023 Loading     cell
16:10:11  1.325388  59.85682       49
16:10:23  1.325637  59.85225    48.99
16:10:29  1.324836   59.8523   48.987 Stabilising:0.0604%
16:10:41  1.323832  59.85243   48.974 Stabilising:0.0314%
16:10:53  1.323256  59.85364   48.962 Stabilising:0.0249%
16:10:59  1.323069  59.85509   48.965 Stabilising:0.0141%
16:11:11  1.322816  59.85269    48.98 Stabilising:0.0076%
16:11:23  1.322671  59.85395   48.992 Stabilising:0.0055%
16:11:29  1.322626   59.8539   48.998 Stabilising:0.0034%
16:11:41  1.322557   59.8523   49.012 Stabilising:0.0024%
16:11:53  1.322526  59.85639    49.01 Stabilising:0.0008%
16:11:59  1.322514  59.85526   49.001 Measuring
16:12:11  1.322492  59.85302   48.996
16:12:23  1.322487  59.85266   49.004
16:12:29  1.322489  59.85427   49.009 Done
16:12:41  1.322475   59.8524    49.02
16:12:53  1.322456  59.85311   49.027 Start       measurement
16:12:59  1.316378  59.85218   49.018 Loading     cell
16:13:11  1.326537  59.85262   48.997
16:13:23   1.32572   59.8525   48.988
16:13:29  1.324891  59.85254   48.984 Stabilising:0.0625%
16:13:41  1.323801  59.85259   48.972 Stabilising:0.0309%
16:13:53  1.323256  59.85213   48.963 Stabilising:0.0234%
16:13:59  1.323072  59.85232   48.964 Stabilising:0.0139%
16:14:11   1.32281  59.85197    48.98 Stabilising:0.0084%
16:14:23  1.322667  59.85257   48.993 Stabilising:0.0057%
16:14:29  1.322619  59.85315   48.999 Stabilising:0.0036%
16:14:41  1.322535  59.85362   49.014 Stabilising:0.0034%
16:14:53  1.322508  59.85227   49.011 Stabilising:0.0009%
16:14:59  1.322496   59.8527   49.003 Measuring
16:15:11  1.322469  59.85229   48.999
16:15:23   1.32247  59.85298   49.006
16:15:29  1.322467  59.85227   49.012 Done
16:15:41  1.322453  59.85436   49.025
16:15:53  1.322437  59.85293   49.031 Start       measurement
16:15:59  1.320879  59.85279   49.022 Loading     cell
16:16:11   1.32698  59.85255   49.001
16:16:23  1.325667  59.85295   48.991
16:16:29  1.324853  59.85209   48.989 Stabilising:0.0613%
16:16:41  1.323839  59.85245   48.976 Stabilising:0.0316%
16:16:53  1.323221   59.8525   48.965 Stabilising:0.0236%
16:16:59  1.323044  59.85265   48.967 Stabilising:0.0134%
16:17:11  1.322797  59.85234   48.983 Stabilising:0.0077%
16:17:23  1.322663  59.85232   48.996 Stabilising:0.0054%
16:17:29  1.322622  59.85209   49.001 Stabilising:0.0031%
16:17:41  1.322552   59.8525   49.016 Stabilising:0.0027%
16:17:53  1.322523  59.85232   49.013 Stabilising:0.0010%
16:17:59  1.322512  59.85279   49.005 Measuring
16:18:11  1.322487  59.85216   48.999
```

```
17:09:29  1.317968  59.85241   48.224
17:09:41  1.317959  59.85243   48.232 Done
17:09:53  1.317942  59.85274   48.234 Start       measurement
17:09:59  1.318924  59.85232    48.23 Loading     cell
17:10:11  1.321341  59.85234   48.196
17:10:23  1.320386  59.85257   48.179
17:10:29  1.319742  59.85209   48.177 Stabilising:0.0487%
17:10:41  1.318828   59.8521   48.161 Stabilising:0.0300%
17:10:53  1.318262  59.85257   48.147 Stabilising:0.0243%
17:10:59  1.318078  59.85254   48.147 Stabilising:0.0140%
17:11:11  1.317813  59.85334    48.16 Stabilising:0.0088%
17:11:23  1.317682  59.85249   48.173 Stabilising:0.0054%
17:11:29  1.317638   59.8527   48.178 Stabilising:0.0033%
17:11:41   1.31757  59.85222   48.189 Stabilising:0.0022%
17:11:53  1.317539  59.85245   48.183 Stabilising:0.0013%
17:11:59  1.317525  59.85222   48.174 Stabilising:0.0011%
17:12:11  1.317504  59.85234   48.163 Measuring
17:12:23  1.317504  59.85262   48.167
17:12:29  1.317499  59.85218   48.171
17:12:41  1.317492   59.8532   48.182 Done
17:12:53  1.317475  59.85255   48.189 Start       measurement
17:12:59  1.317251  59.85265    48.18 Loading     cell
17:13:11  1.321472  59.85184   48.154
17:13:23  1.320413  59.85236   48.141
17:13:29  1.319583  59.85238   48.138 Stabilising:0.0628%
17:13:41  1.318546  59.85238   48.124 Stabilising:0.0325%
17:13:53  1.317949  59.85388   48.111 Stabilising:0.0256%
17:13:59  1.317755   59.8523   48.112 Stabilising:0.0147%
17:14:11  1.317494  59.85243   48.126 Stabilising:0.0083%
17:14:23  1.317346  59.85255   48.141 Stabilising:0.0068%
17:14:29  1.317302  59.85246   48.147 Stabilising:0.0033%
17:14:41  1.317225  59.85208   48.159 Stabilising:0.0025%
17:14:53  1.317194  59.85298   48.159 Stabilising:0.0008%
17:14:59  1.317184  59.85255   48.151 Measuring
17:15:11  1.317161  59.85277   48.139
17:15:23  1.317158   59.8525   48.146
17:15:29  1.317158  59.85274    48.15 Done
17:15:41  1.317139  59.85216   48.162
17:15:53  1.317124  59.85262   48.168 Start       measurement
17:15:59  1.317393  59.85236   48.158 Loading     cell
17:16:11   1.32118  59.85209   48.135
17:16:23  1.320125  59.85245   48.124
17:16:29  1.319347  59.85173   48.122 Stabilising:0.0589%
17:16:41  1.318342   59.8527   48.107 Stabilising:0.0318%
17:16:53  1.317757  59.85255   48.097 Stabilising:0.0195%
17:16:59  1.317568  59.85249   48.097 Stabilising:0.0143%
17:17:11  1.317303  59.85225   48.111 Stabilising:0.0085%
17:17:23  1.317153  59.85218   48.124 Stabilising:0.0047%
17:17:29  1.317105   59.8525    48.13 Stabilising:0.0036%
17:17:41  1.317033  59.85259   48.145 Stabilising:0.0027%
17:17:53     1.317  59.85238   48.146 Stabilising:0.0010%
17:17:59  1.316985  59.85214   48.136 Measuring
17:18:11  1.316959  59.85249   48.128
17:18:23  1.316958  59.85232   48.134
17:18:29  1.316955  59.85271   48.139 Done
17:18:41  1.316942   59.8521   48.149
17:18:53  1.316928  59.85249    48.16 Start       measurement
17:18:59  1.315243  59.85259   48.151 Loading     cell
17:19:11  1.321231  59.85218   48.126
17:19:23  1.320213  59.85257   48.115
17:19:29  1.319359   59.8523   48.113 Stabilising:0.0646%
17:19:41  1.318294  59.85322   48.101 Stabilising:0.0342%
17:19:53  1.317677  59.85214   48.091 Stabilising:0.0267%
17:19:59   1.31748  59.85222   48.091 Stabilising:0.0149%
17:20:11  1.317212  59.85279   48.107 Stabilising:0.0083%
17:20:23  1.317058  59.85251   48.121 Stabilising:0.0058%
17:20:29  1.317011   59.8523   48.127 Stabilising:0.0036%
17:20:41   1.31694  59.85281   48.142 Stabilising:0.0027%
17:20:53  1.316906  59.85234    48.14 Stabilising:0.0016%
17:20:59  1.316894  59.85234    48.13 Stabilising:0.0009%
17:21:11  1.316872  59.85254   48.124 Measuring
17:21:23  1.316867  59.85269   48.129
17:21:29  1.316864  59.85234   48.135
17:21:41  1.316851  59.85293   48.148 Done
17:21:53  1.316835  59.85286   48.155 Start       measurement
17:21:59  1.315338  59.85236   48.146 Loading     cell
17:22:11  1.320468  59.85257   48.122
17:22:23  1.319651  59.85209   48.113
17:22:29  1.319007   59.8523   48.111 Stabilising:0.0488%
17:22:41  1.318103  59.85246   48.099 Stabilising:0.0299%
17:22:53  1.317542    59.852   48.088 Stabilising:0.0243%
17:22:59  1.317361  59.85262   48.089 Stabilising:0.0137%
17:23:11  1.317106  59.85214   48.105 Stabilising:0.0081%
17:23:23  1.316963   59.8525   48.118 Stabilising:0.0054%
17:23:29  1.316921  59.85249   48.125 Stabilising:0.0032%
17:23:41   1.31685  59.85277   48.141 Stabilising:0.0024%
17:23:53  1.316822  59.85245   48.138 Stabilising:0.0011%
17:23:59  1.316809  59.85245   48.129 Stabilising:0.0010%
17:24:11   1.31679  59.85295   48.124 Measuring
17:24:23  1.316788  59.85208   48.132
17:24:29  1.316785   59.8525   48.136
17:24:41  1.316774  59.85254   48.145 Done
17:24:53  1.316769  59.85216   48.159 Start       measurement
17:24:59  1.316739  59.85261   48.153 Loading     cell
17:25:11  1.321521  59.85257   48.125
17:25:23  1.320267  59.85218   48.116
17:25:29   1.31927  59.85246   48.113 Stabilising:0.0754%
17:25:41  1.318223  59.85238   48.101 Stabilising:0.0324%
17:25:53  1.317622  59.85336   48.091 Stabilising:0.0261%
17:25:59  1.317427  59.85208   48.092 Stabilising:0.0148%
17:26:11  1.317166  59.85205   48.108 Stabilising:0.0088%
17:26:23  1.317027  59.85275   48.121 Stabilising:0.0060%
17:26:29  1.316971   59.8524   48.129 Stabilising:0.0043%
17:26:41  1.316899   59.8523   48.142 Stabilising:0.0022%
17:26:53  1.316867  59.85225    48.14 Stabilising:0.0013%
17:26:59   1.31685  59.85251    48.13
17:27:11   1.31683   59.8525   48.125 Measuring
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16:18:23  1.322482  59.85794     49.007
16:18:29  1.322479  59.85416     49.012 Done
16:18:41  1.322463  59.85465     49.024
16:18:53  1.322455   59.8549     49.029 Start        measurement
16:18:59  1.323583  59.85674     49.021 Loading      cell
16:19:11  1.326387  59.85508     48.999
16:19:23  1.325554  59.85213     48.988
16:19:29  1.324785   59.8525     48.985 Stabilising:0.0580%
16:19:41  1.323811   59.8524     48.972 Stabilising:0.0303%
16:19:53  1.323265  59.85279     48.962 Stabilising:0.0237%
16:19:59  1.323083  59.85261     48.963 Stabilising:0.0138%
16:20:11  1.322818   59.8523     48.979 Stabilising:0.0074%
16:20:23   1.32268  59.85271     48.992 Stabilising:0.0060%
16:20:29   1.32263  59.85277     48.997 Stabilising:0.0038%
16:20:41  1.322557  59.85315     49.011 Stabilising:0.0027%
16:20:53  1.322524  59.85241     49.009 Stabilising:0.0010%
16:20:59  1.322515  59.85301     49.001 Measuring
16:21:11  1.322483   59.8527     48.996
16:21:23   1.32248  59.85326     49.003
16:21:29  1.322479  59.85399     49.009 Done
16:21:41  1.322467  59.85298     49.022
16:21:53  1.322455  59.85402     49.029 Start        measurement
16:21:59  1.320789  59.85746      49.02 Loading      cell
16:22:11   1.32668  59.85227     48.999
16:22:23  1.325557  59.85249     48.991
16:22:29  1.324768  59.85291      48.99 Stabilising:0.0595%
16:22:41  1.323789  59.85266     48.978 Stabilising:0.0319%
16:22:53  1.323222  59.85535     48.969 Stabilising:0.0245%
16:22:59  1.323044   59.8569     48.972 Stabilising:0.0134%
16:23:11  1.322791  59.85739     48.988 Stabilising:0.0080%
16:23:23  1.322655  59.86136     49.002 Stabilising:0.0052%
16:23:29  1.322612  59.86521     49.007 Stabilising:0.0033%
16:23:41  1.322546   59.8667     49.021 Stabilising:0.0022%
16:23:53  1.322515  59.87001     49.019 Stabilising:0.0011%
16:23:59  1.322504  59.86632     49.011 Stabilising:0.0008%
16:24:11  1.322484  59.86983     49.004 Measuring
16:24:23   1.32248  59.86482     49.012
16:24:29  1.322478  59.86365     49.017
16:24:41  1.322467  59.86231      49.03 Done
16:24:53   1.32245  59.86582     49.037 Start        measurement
16:24:59  1.323643  59.87048     49.028 Loading      cell
16:25:11  1.326934  59.86444     49.007
16:25:23   1.32574  59.85734     48.997
16:25:29  1.324793  59.85281     48.995 Stabilising:0.0714%
16:25:41  1.323813  59.85213     48.983 Stabilising:0.0306%
16:25:53  1.323246  59.85204     48.972 Stabilising:0.0242%
16:25:59  1.323064  59.85322     48.974 Stabilising:0.0138%
16:26:11  1.322817  59.85307      48.99 Stabilising:0.0078%
16:26:23  1.322685  59.85261     49.003 Stabilising:0.0056%
16:26:29  1.322638  59.85241     49.009 Stabilising:0.0036%
16:26:41  1.322565  59.85255     49.019 Stabilising:0.0025%
16:26:53  1.322541  59.85315     49.018 Stabilising:0.0007%
16:26:59  1.322527  59.85245      49.01 Measuring
16:27:11  1.322501  59.85531     49.004
16:27:23    1.3225  59.85855     49.012
16:27:29  1.322495  59.85682     49.018 Done
16:27:41   1.32248  59.85896     49.028
16:27:53  1.322473  59.86445     49.033 Start        measurement
16:27:59  1.323325  59.86496     49.024 Loading      cell
16:28:11  1.326961  59.86356     49.003
16:28:23  1.325687  59.85329     48.993
16:28:29  1.324898  59.85208      48.99 Stabilising:0.0595%
16:28:41  1.323879  59.85288     48.977 Stabilising:0.0331%
16:28:53   1.32326  59.85254     48.966 Stabilising:0.0288%
16:28:59  1.323078  59.85394     48.968 Stabilising:0.0138%
16:29:11  1.322832  59.85262     48.983 Stabilising:0.0076%
16:29:23  1.322699  59.85429     48.996 Stabilising:0.0054%
16:29:29  1.322657  59.85238     49.001 Stabilising:0.0032%
16:29:41  1.322584  59.85214     49.016 Stabilising:0.0029%
16:29:53  1.322551  59.85259     49.013 Stabilising:0.0012%
16:29:59  1.322539  59.85223     49.004 Stabilising:0.0009%
16:30:11  1.322516  59.85683     48.999 Measuring
16:30:23  1.322513  59.85719     49.006
16:30:29   1.32251   59.8569     49.011
16:30:41  1.322499  59.85658     49.024 Done
16:30:53  1.322488  59.86004     49.029 Start        measurement
16:30:59  1.320452  59.85789     49.019 Loading      cell
16:31:11  1.325932  59.85205     48.996
16:31:23  1.325223  59.85322     48.985
16:31:29    1.3246  59.85227     48.981 Stabilising:0.0470%
16:31:41  1.323736  59.85257     48.966 Stabilising:0.0290%
16:31:53  1.323199  59.85265     48.955 Stabilising:0.0227%
16:31:59  1.323021  59.85246     48.954 Stabilising:0.0134%
16:32:11  1.322766  59.85257     48.967 Stabilising:0.0071%
16:32:23  1.322642   59.8568     48.977 Stabilising:0.0053%
16:32:29  1.322601  59.85327     48.982 Stabilising:0.0031%
16:32:41  1.322532    59.856     48.994 Stabilising:0.0023%
16:32:53  1.322507  59.85364     48.987 Stabilising:0.0009%
16:32:59  1.322492  59.85316     48.977 Measuring
16:33:11  1.322473  59.85451     48.968
16:33:23  1.322472  59.85214     48.969
16:33:29  1.322467  59.85246     48.973 Done
16:33:41  1.322461  59.85592     48.984
16:33:53  1.322444  59.85227     48.987 Start        measurement
```

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17:27:23  1.316825  59.85257      48.13
17:27:29  1.316823   59.8524     48.137
17:27:41  1.316809  59.85257      48.15 Done
17:27:53  1.316794  59.85241     48.158 Start        measurement
17:27:59  1.317074  59.85262     48.148 Loading      cell
17:28:11  1.321516  59.85257     48.126
17:28:23   1.32028  59.85219     48.116
17:28:29  1.319276  59.85257     48.115 Stabilising:0.0760%
17:28:41  1.318224  59.85227       48.1 Stabilising:0.0341%
17:28:53  1.317619  59.85229     48.092 Stabilising:0.0264%
17:28:59  1.317426  59.85259     48.093 Stabilising:0.0146%
17:29:11  1.317162  59.85227     48.108 Stabilising:0.0087%
17:29:23  1.317027  59.85238     48.122 Stabilising:0.0058%
17:29:29  1.316965  59.85218     48.129 Stabilising:0.0047%
17:29:41  1.316893    59.852     48.143 Stabilising:0.0023%
17:29:53  1.316862  59.85402     48.139 Stabilising:0.0014%
17:29:59  1.316848  59.85234     48.131 Stabilising:0.0011%
17:30:11  1.316825  59.85227     48.124 Measuring
17:30:23   1.31682  59.85334     48.131
17:30:29  1.316814   59.8521     48.136
17:30:41  1.316806  59.85438     48.151 Done
17:30:53   1.31679  59.85265     48.155 Start        measurement
17:30:59  1.318018  59.85295     48.147 Loading      cell
17:31:11  1.320507   59.8523     48.126
17:31:23  1.320248  59.85254     48.114
17:31:29  1.319379  59.85251     48.113 Stabilising:0.0658%
17:31:41  1.318216  59.85316       48.1 Stabilising:0.0330%
17:31:53  1.317617  59.85234      48.09 Stabilising:0.0260%
17:31:59  1.317427  59.85241      48.09 Stabilising:0.0144%
17:32:11  1.317168  59.85218     48.106 Stabilising:0.0081%
17:32:23  1.317024  59.85265     48.121 Stabilising:0.0060%
17:32:29  1.316982  59.85291     48.128 Stabilising:0.0032%
17:32:41  1.316898   59.8525     48.141 Stabilising:0.0027%
17:32:53  1.316864  59.85219     48.138 Stabilising:0.0013%
17:32:59  1.316852  59.85295     48.128 Stabilising:0.0009%
17:33:11  1.316831  59.85227     48.121 Measuring
17:33:23  1.316826  59.85517     48.128
17:33:29  1.316822  59.85367     48.134
17:33:41  1.316812  59.85909     48.144 Done
17:33:53  1.316799  59.85545     48.154 Start        measurement
17:33:59  1.318024  59.85719     48.145 Loading      cell
17:34:11  1.319771  59.85334     48.123
17:34:23  1.320182  59.85234     48.114
17:34:29  1.319328   59.8523     48.112 Stabilising:0.0646%
17:34:41  1.318185  59.85236       48.1 Stabilising:0.0336%
17:34:53    1.3176  59.85269     48.091 Stabilising:0.0252%
17:34:59  1.317412  59.85241     48.091 Stabilising:0.0143%
17:35:11  1.317157  59.85339     48.106 Stabilising:0.0080%
17:35:23  1.317014  59.85232     48.119 Stabilising:0.0061%
17:35:29  1.316967  59.85255     48.125 Stabilising:0.0036%
17:35:41  1.316889  59.85219     48.138 Stabilising:0.0025%
17:35:53   1.31686  59.85288     48.135 Stabilising:0.0011%
17:35:59  1.316846   59.8524     48.129
17:36:11  1.316826  59.85471     48.121 Measuring
17:36:23  1.316824  59.85332     48.128
17:36:29  1.316819   59.8523     48.132
17:36:41  1.316802  59.85243     48.147 Done
17:36:53   1.31679   59.8527     48.152 Start        measurement
17:36:59  1.317469  59.85301     48.148 Loading      cell
17:37:11  1.321396  59.85232     48.121
17:37:23  1.320195   59.8523     48.111
17:37:29  1.319332  59.85262      48.11 Stabilising:0.0653%
17:37:41  1.318183  59.85234     48.096 Stabilising:0.0334%
17:37:53   1.31759  59.85288     48.086 Stabilising:0.0260%
17:37:59  1.317398  59.85225     48.089 Stabilising:0.0146%

17:38:11   1.31714  59.85213     48.104 Stabilising:0.0082%
17:38:23  1.316998  59.85238     48.117 Stabilising:0.0058%
17:38:29   1.31695   59.8529     48.124 Stabilising:0.0036%
17:38:41  1.316875  59.85269     48.139 Stabilising:0.0030%
17:38:53  1.316841  59.85528     48.136 Stabilising:0.0013%
17:38:59  1.316827  59.85488     48.127 Stabilising:0.0011%
17:39:11  1.316807   59.8524     48.121 Measuring
17:39:23  1.316779  59.85284     48.128
17:39:29  1.316769  59.85355      48.13
17:39:41  1.314151   59.8556     48.111 Loading      cell
17:39:53  1.317849  59.86852     48.087
17:39:59  1.317989  59.87074     48.075
17:40:11  1.317451  59.86707     48.023 Stabilising:0.0175%
17:40:23  1.317262  59.86897     44.464 Stabilising:0.0143%
17:40:29  1.317004  59.86536     42.349 Stabilising:0.0081%
17:40:41   1.31686   59.8607     40.119 Stabilising:0.0047%
17:40:53  1.316783  59.85848     38.566 Stabilising:0.0039%
17:40:59  1.316754  59.85724      38.11 Stabilising:0.0022%
17:41:11  1.316718  59.85223     37.231 Stabilising:0.0013%
17:41:23  1.316698  59.85238     36.511 Stabilising:0.0015%
17:41:29  1.316684  59.85241     36.234 Stabilising:0.0007%
17:41:41  1.316677  59.85559     35.562 Measuring
17:41:53  1.316668  59.85216      35.03
17:41:59  1.316671  59.85297     34.766
17:42:11  1.316665  59.85249     34.299 Done
17:42:23  1.316658   59.8527     33.863
17:42:29  1.316663  59.85262     33.645 Start        measurement
```

Appendix 6.4
Experiment 4

Source: M090699B.SAM

Recordno	Runno	Time/Date	d10	d50	d90	Span	Resid	Obscur	SSA	1.32	1.6	1.95	2.38	2.9	3.53	4.3	5.24	6.39	7.78	9.48
1	1	6/9/99 3:30	505.7	554.9	591	0.2	34.32	-0.1		0	0	0	0	0	0	0	0	0	0	0
2	2	6/9/99 3:30	501.7	553.4	590.8	0.2	32.49	-0.1		0	0	0	0	0	0	0	0	0	0	0
3	3	6/9/99 3:31	506.7	555.2	591.1	0.2	62.91	-0.1		0	0	0	0	0	0	0	0	0	0	0
4	4	6/9/99 3:32	493.8	551.5	590.4	0.2	53.54	0		0	0	0	0	0	0	0	0	0	0	0
5	5	6/9/99 3:32	501.2	553.2	590.7	0.2	74.16	0		0	0	0	0	0	0	0	0	0	0	0
6	6	6/9/99 3:33	501.2	553.2	590.7	0.2	74.32	0.1		0	0	0	0	0	0	0	0	0	0	0
7	7	6/9/99 3:33	355	454.1	566.2	0.5	30.25	0.1		0	0	0	0	0	0	0	0	0	0	0
8	8	6/9/99 3:34	475.8	548	589.8	0.2	61.13	0.2		0	0	0	0	0	0	0	0	0	0	0
9	9	6/9/99 3:34	449.4	539.9	588.2	0.3	62.6	0.3		0	0	0	0	0	0	0	0	0	0	0
10	10	6/9/99 3:35	463.6	545.1	589.2	0.2	65.1	0.4		0	0	0	0	0	0	0	0	0	0	0
11	11	6/9/99 3:35	443.5	536	587.4	0.3	70.97	0.5		0	0	0	0	0	0	0	0	0	0	0
12	12	6/9/99 3:36	501.4	553.3	590.8	0.2	76.94	0.6		0	0	0	0	0	0	0	0	0	0	0
13	13	6/9/99 3:36	501.5	553.3	590.8	0.2	77.63	0.7		0	0	0	0	0	0	0	0	0	0	0
14	14	6/9/99 3:37	328.3	407.4	519.2	0.5	47.67	0.8		0	0	0	0	0	0	0	0	0	0	0
15	15	6/9/99 3:37	448.8	527.2	585.4	0.3	60.46	0.8		0	0	0	0	0	0	0	0	0	0	0
16	16	6/9/99 3:38	366	469.6	571.1	0.4	36.8	0.8		0	0	0	0	0	0	0	0	0	0	0
17	17	6/9/99 3:38	457.6	543.3	588.9	0.2	68.22	0.7		0	0	0	0	0	0	0	0	0	0	0
18	18	6/9/99 3:39	469	546.6	589.5	0.2	45.56	0.7		0	0	0	0	0	0	0	0	0	0	0
19	19	6/9/99 3:39	312.2	400.2	540.8	0.6	24.49	0.5		0	0	0	0	0	0	0	0	0	0	0
20	20	6/9/99 3:40	435.5	513.4	582.2	0.3	67.99	0.4		0	0	0	0	0	0	0	0	0	0	0
21	21	6/9/99 3:40	450.8	540.7	588.4	0.3	49.92	0.4		0	0	0	0	0	0	0	0	0	0	0
22	22	6/9/99 3:41	501.6	553.4	590.8	0.2	77.86	0.4		0	0	0	0	0	0	0	0	0	0	0
23	23	6/9/99 3:41	488.6	550.5	590.2	0.2	65.97	0.4		0	0	0	0	0	0	0	0	0	0	0
24	24	6/9/99 3:42	496.9	552	590.5	0.2	65.06	0.3		0	0	0	0	0	0	0	0	0	0	0
25	25	6/9/99 3:42	464.9	545.5	589.3	0.2	35.7	0.3		0	0	0	0	0	0	0	0	0	0	0
26	26	6/9/99 3:43	348.5	440.7	558.9	0.5	24.61	0.3		0	0	0	0	0	0	0	0	0	0	0
27	27	6/9/99 3:43	492.1	551.2	590.4	0.2	64.56	0.5		0	0	0	0	0	0	0	0	0	0	0
28	28	6/9/99 3:44	427.3	500.9	578.5	0.3	66.97	0.5		0	0	0	0	0	0	0	0	0	0	0
29	29	6/9/99 3:45	501.7	553.4	590.8	0.2	81.85	0.4		0	0	0	0	0	0	0	0	0	0	0
30	30	6/9/99 3:45	452	541.1	588.4	0.3	56.79	0.3		0	0	0	0	0	0	0	0	0	0	0
31	31	6/9/99 3:46	466.1	545.8	589.4	0.2	46.42	0.1		0	0	0	0	0	0	0	0	0	0	0
32	32	6/9/99 3:46	463.9	545.3	589.3	0.2	33.52	0		0	0	0	0	0	0	0	0	0	0	0
33	33	6/9/99 3:47	374.2	492.1	578.3	0.4	29.07	-0.1		0	0	0	0	0	0	0	0	0	0	0
34	34	6/9/99 3:47	425.8	495.7	576.4	0.3	55.63	-0.2		0	0	0	0	0	0	0	0	0	0	0
35	35	6/9/99 3:48	305.3	373.7	477.2	0.5	30.1	-0.3		0	0	0	0	0	0	0	0	0	0	0
36	36	6/9/99 3:48	454.7	542.3	588.7	0.2	54.88	-0.3		0	0	0	0	0	0	0	0	0	0	0
37	37	6/9/99 3:49	447.2	538.6	587.9	0.3	46.47	-0.4		0	0	0	0	0	0	0	0	0	0	0
38	38	6/9/99 3:49	376.3	479.7	572.6	0.4	30.45	-0.4		0	0	0	0	0	0	0	0	0	0	0
39	39	6/9/99 3:50	74.1	125.3	296.3	1.8	1.97	4		0.21	0.58	0.02	0	0.01	0.36	0.22	0.09	0.02	0	0
40	40	6/9/99 3:50	58.7	132	219.8	1.2	1.29	11.9		0.08	0.33	0.5	0.01	0	0	0.33	0.24	0.19	0.17	0.16
41	41	6/9/99 3:51	68.5	150	256.4	1.3	1.52	15.7		0.07	0.29	0.43	0.01	0	0	0.27	0.21	0.18	0.17	0.17
42	42	6/9/99 3:51	77.2	162.8	272.5	1.2	1.63	17.6		0.02	0.09	0.14	0.17	0.18	0.17	0.15	0.15	0.17	0.22	0.29
43	43	6/9/99 3:52	83.6	169.5	282.4	1.2	1.72	18.6		0	0.09	0.45	0.01	0	0	0.32	0.2	0.15	0.13	0.12
44	44	6/9/99 3:52	91.1	174.8	288.2	1.1	1.79	19.2		0	0.08	0.4	0.01	0	0	0.32	0.2	0.15	0.13	0.13
45	45	6/9/99 3:53	90.3	178.1	298.8	1.2	1.84	19.5		0	0.07	0.39	0.01	0	0	0.32	0.2	0.14	0.12	0.11
46	46	6/9/99 3:53	97.8	183.6	300	1.1	1.91	21		0	0.02	0.09	0.16	0.2	0.19	0.16	0.13	0.12	0.12	0.13
47	47	6/9/99 3:54	100.7	187.7	307.3	1.1	2.04	21.2		0	0.01	0.09	0.16	0.2	0.2	0.17	0.14	0.11	0.11	0.11
48	48	6/9/99 3:54	102.5	190.6	310.8	1.1	2.01	21.1		0	0.03	0.1	0.15	0.18	0.18	0.16	0.13	0.12	0.11	0.12
49	49	6/9/99 3:55	100.8	192	322.4	1.2	2.11	22		0	0.01	0.08	0.15	0.2	0.2	0.17	0.14	0.11	0.1	0.11
50	50	6/9/99 3:55	101.7	192.5	319.6	1.1	2.17	21.9		0	0.03	0.09	0.15	0.19	0.19	0.17	0.14	0.12	0.1	0.11
51	51	6/9/99 3:56	106.3	195.5	315.9	1.1	2.09	22.8		0	0.03	0.09	0.14	0.18	0.18	0.16	0.14	0.12	0.1	0.11
52	52	6/9/99 3:56	104.7	197.1	326	1.1	2.26	23.1		0	0.03	0.09	0.15	0.18	0.19	0.17	0.14	0.11	0.09	0.1
53	53	6/9/99 3:57	106.8	200.4	327.7	1.1	2.25	23.6		0	0.07	0.22	0.34	0.01	0	0.01	0.23	0.16	0.1	0.08
54	54	6/9/99 3:58	107.8	201.9	332.4	1.1	2.28	23.1		0	0.01	0.19	0.39	0.01	0	0.01	0.24	0.16	0.1	0.08
55	55	6/9/99 3:58	108.8	203.2	334.2	1.1	2.29	24.5		0	0.01	0.19	0.39	0.01	0	0.01	0.24	0.16	0.1	0.07
56	56	6/9/99 3:59	108.8	202.4	332.3	1.1	2.29	23.1		0	0.01	0.19	0.39	0.01	0	0.01	0.24	0.16	0.09	0.07
57	57	6/9/99 3:59	110.1	204.8	334	1.1	2.36	23.5		0	0.06	0.21	0.33	0.01	0	0.01	0.24	0.16	0.09	0.07
58	58	6/9/99 4:00	112.2	208.1	341.6	1.1	2.39	24.8		0	0	0.17	0.38	0.01	0	0.01	0.25	0.16	0.09	0.06
59	59	6/9/99 4:00	112.7	209.6	344	1.1	2.35	25.2		0	0	0.17	0.38	0.01	0	0.01	0.25	0.16	0.09	0.06
60	60	6/9/99 4:01	112.9	209.3	341.1	1.1	2.43	24.5		0	0	0.16	0.38	0.01	0	0.01	0.25	0.17	0.09	0.06
61	61	6/9/99 4:01	113.8	211.3	345.5	1.1	2.42	25.8		0	0	0.16	0.38	0.01	0	0.01	0.25	0.17	0.09	0.06
62	62	6/9/99 4:02	113.7	211.8	345.7	1.1	2.44	24.9		0	0	0.16	0.38	0.01	0	0.01	0.25	0.17	0.1	0.06
63	63	6/9/99 4:02	116.2	214.9	348.9	1.1	2.46	26.4		0	0	0.15	0.37	0.01	0	0.01	0.26	0.17	0.09	0.05
64	64	6/9/99 4:03	117.5	216.2	350.5	1.1	2.59	26.3		0	0	0.15	0.37	0.01	0	0.01	0.26	0.17	0.08	0.04
65	65	6/9/99 4:03	117.5	217.2	353.7	1.1	2.53	26.3		0	0	0.14	0.37	0.01	0	0.01	0.26	0.18	0.09	0.05
66	66	6/9/99 4:04	116.8	217.1	357.1	1.1	2.58	26.4		0	0.04	0.19	0.33	0.01	0	0.01	0.24	0.17	0.09	0.05
67	67	6/9/99 4:04	118.7	218.9	358.1	1.1	2.59	26.6		0	0.04	0.19	0.32	0.01	0	0.01	0.25	0.17	0.09	0.05
68	68	6/9/99 4:05	118.8	219.1	357.6	1.1	2.5	26.2		0	0.03	0.18	0.32	0.01	0	0.01	0.25	0.17	0.09	0.05
69	69	6/9/99 4:05	120.4	220	356.3	1.1	2.69	27.1		0	0	0.14	0.37	0.01	0	0.01	0.27	0.18	0.08	0.03
70	70	6/9/99 4:06	122.1	223.1	359.8	1.1	2.67	27.7		0	0	0.13	0.37	0.01	0	0.01	0.27	0.18	0.08	0.03
71	71	6/9/99 4:07	122.3	223.7	360.2	1.1	2.68	27.2		0	0	0.12	0.36	0.01	0	0.01	0.27	0.18	0.09	0.03
72	72	6/9/99 4:07	122.7	225.5	365.5	1.1	2.72	28.3		0	0.02	0.17	0.32	0.01	0	0.01	0.25	0.17	0.08	0.03
73	73	6/9/99 4:08	122.5	224.4	363.7	1.1	2.75	27.6		0	0	0.13	0.36	0.01	0	0.01	0.27	0.18	0.08	0.03
74	74	6/9/99 4:08	123.3	224.8	360.9	1.1	2.68	28.1		0	0.02	0.17	0.32	0.01	0	0.01	0.26	0.18	0.08	0.03
75	75	6/9/99 4:09	125.2	227.9	366.8	1.1	2.84	28.5		0	0.02	0.17	0.32	0.01	0	0.01	0.26	0.18	0.08	0.03
76	76	6/9/99 4:10	125.5	229	368.1	1.1	2.82	27.8		0	0	0.11	0.36	0.01	0	0.01	0.27	0.19	0.09	0.02
77	77	6/9/99 4:10	126	230.3	372.2	1.1	2.76	28.7		0	0.01	0.17	0.32	0.01	0	0.01	0.26	0.18	0.09	0.03
78	78	6/9/99 4:11	126.2	230.3	374.6	1.1	2.88	28.9		0	0.01	0.14	0.28	0.01	0	0.01	0.24	0.17	0.08	0.03
79	79	6/9/99 4:11	128.3	233.2	376	1.1	2.87	29.2		0	0	0.09	0.36	0.01	0	0.01	0.27	0.19	0.09	0.02
80	80	6/9/99 4:12	128.3	233.5	379.4	1.1	2.87	29.8		0	0	0.39	0.36	0.01	0	0.01	0.27	0.19	0.09	0.02
81	81	6/9/99 4:12	128.9	233.2	373.6	1	2.87	28.7		0	0	0.16	0.31	0.01	0	0.01	0.26	0.19	0.09	0.02
82	82	6/9/99 4:13	129.9	235.2	381.2	1.1	2.96	29.9		0	0	0.09	0.36	0.01	0	0.01	0.28	0.19	0.08	0.01
83	83	6/9/99 4:14	129.6	235.6	381.2	1.1	2.94	29.2		0	0	0.16	0.31	0.01	0	0.01	0.25	0.19	0.09	0.02
84	84	6/9/99 4:14	129.6	234.3	377.2	1.1	2.94	29		0	0	0.16	0.31	0.01	0	0.01	0.26	0.19	0.08	0.01
85	85	6/9/99 4:15	131.4	237.7	385.1	1.1	3.03	30.2		0	0	0.07	0.36	0.01	0	0.01	0.28	0.2	0.09	0.01
86	86	6/9/99 4:15	132.1	239.3	386.9	1.1	2.94	31.3		0	0	0.15	0.31	0.01	0	0.01	0.26	0.19	0.09	0.01
87	87	6/9/99 4:16	131.8	237.3	381.9	1.1	2.99	29.6		0	0	0.15	0.31	0.01	0	0.01	0.26	0.19	0.09	0.01
88	88	6/9/99 4:17	135	240.8	384.2	1	3.07	30.6		0	0	0	0	0	0	0	0	0	0	0
89	89	6/9/99 4:17	134.6	239.2	380.4	1	3.04	28.6		0	0	0	0	0	0	0	0	0	0	0
90	90	6/9/99 4:17	135.9	242.5	389.3	1	3.16	31.5		0	0	0	0	0	0	0	0	0	0	0
91	91	6/9/99 4:18	137.4	245	392.5	1	3.17	31.9		0	0	0	0	0	0	0	0	0	0	0
92	92	6/9/99 4:18	137.4	245	392.5	1	3.17	31.9		0	0	0	0	0	0	0	0	0	0	0

11.55	14.08	17.15	20.9	25.46	31.01	37.79	46.03	56.09	68.33	83.26	101.44	123.59	150.57	183.44	223.51	272.31	331.77	404.21	492.47	600
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	5.05	94.91
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.1	7.05	92.84
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	4.54	95.43
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.16	9.52	90.29
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	7.31	92.59
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	7.29	92.62
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	4.56	23.96	36.45	34.78
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.35	13.64	86
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.85	21.59	77.56
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	16.66	82.84
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.03	24.68	74.29
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09	7.18	92.73
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09	7.16	92.75
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.77	9.91	37.52	35.97	15.82
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	1.35	27.58	71.06
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2.87	19.37	37.43	40.23
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	18.45	80.95
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.46	15.15	84.39
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	1.3	13.88	36.67	28.38	19.75
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	2.23	35.76	61.99
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	20.79	78.31
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.09	7.11	92.8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.2	10.7	89.08
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.14	8.85	90.99
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.53	16.22	83.25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.31	5.62	27.54	36.88	29.66
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.17	9.89	89.91
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.05	3.63	41.52	54.8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	7.05	92.87
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	20.51	78.74
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	15.91	83.59
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.56	16.48	82.97
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	2.37	15.47	32.26	49.83
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.04	3.61	44.43	51.91
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	2.09	20.5	45.14	24.24	7.96
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.69	19.43	79.88
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.95	22.64	76.41
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	1.56	15.08	39.63	43.71
0	0	0	0	0	0	0	0.09	1.06	4.33	9.51	15.08	17.3	14.7	10.92	7.71	5.74	4.49	3.65	2.56	1.34
0.16	0.15	0.13	0.1	0.03	0.14	1.11	2.45	2.99	3.46	5.12	9.28	16.18	20.06	16.74	10.54	5.84	2.75	0.78	0	0
0.17	0.16	0.14	0.07	0	0	0.24	1.21	2.52	3.66	4.88	7.25	11.69	16.55	18.02	14.54	9.62	5.36	2.13	0.01	0
0.01	0	0.01	0.3	0.05	0	0	0.52	1.81	3.07	4.26	6.19	9.9	14.96	18.44	16.76	11.94	6.97	2.96	0.1	0
0.15	0.17	0.19	0.16	0	0	0	0.02	1.16	2.63	3.94	5.81	9.28	14.26	18.26	17.5	13.15	8.03	3.58	0.23	0
0.15	0.17	0.19	0.18	0	0	0	0.01	0.58	1.91	3.32	5.29	8.83	14.04	18.63	18.41	14.06	8.6	3.82	0.4	0
0.13	0.15	0.18	0.18	0.04	0	0	0.01	0.53	2.02	3.48	5.35	8.54	13.25	17.57	17.85	14.33	9.4	4.74	0.89	0
0.19	0.25	0.01	0	0	0	0	0	0.12	1.55	2.94	4.7	7.83	12.85	18.15	19.19	15.42	9.82	4.75	0.94	0
0.16	0.2	0.01	0	0	0	0	0	0.01	1.24	2.72	4.56	7.62	12.41	17.55	19.03	15.99	10.67	5.36	1.16	0
0.17	0.24	0.01	0	0	0	0	0	0.01	1.19	2.58	4.23	7.1	11.89	17.51	19.47	16.4	10.9	5.59	1.42	0.01
0.15	0.2	0.01	0	0	0	0	0	0.01	1.2	2.77	4.58	7.42	11.73	16.45	18.23	15.95	11.38	6.52	2.12	0.02
0.14	0.19	0.01	0	0	0	0	0	0.01	1.09	2.69	4.5	7.32	11.65	16.58	18.58	16.26	11.44	6.33	1.89	0.01
0.17	0.24	0.01	0	0	0	0	0	0.01	0.85	2.28	3.92	6.63	11.24	17.07	19.78	17.23	11.67	6.03	1.6	0.01
0.14	0.2	0.01	0	0	0	0	0	0.01	0.83	2.43	4.22	6.92	11.12	16.15	18.67	16.84	12.09	6.86	2.24	0.02
0.1	0.12	0.16	0.22	0.25	0.01	0	0	0	0.62	2.17	3.82	6.35	10.52	15.96	19.14	17.49	12.52	7.03	2.29	0.03
0.09	0.12	0.15	0.21	0.23	0.01	0	0	0	0.59	2.13	3.75	6.25	10.38	15.79	18.95	17.43	12.65	7.38	2.69	0.02
0.09	0.12	0.16	0.22	0.25	0.02	0	0	0	0.49	2.04	3.66	6.13	10.25	15.65	18.97	17.62	12.84	7.5	2.8	0.02
0.09	0.12	0.15	0.21	0.23	0.01	0	0	0	0.51	2.06	3.68	6.19	10.36	15.83	19.06	17.55	12.73	7.39	2.67	0.02
0.09	0.11	0.15	0.21	0.25	0.06	0	0	0	0.39	1.96	3.57	5.99	10.04	15.51	19.08	17.94	13.14	7.6	2.72	0.03
0.08	0.11	0.14	0.21	0.26	0.08	0	0	0.01	0.24	1.82	3.41	5.77	9.7	15.1	18.89	18.1	13.55	8.14	3.22	0.02
0.08	0.11	0.14	0.21	0.27	0.1	0	0	0.01	0.19	1.8	3.36	5.65	9.49	14.89	18.82	18.22	13.78	8.36	3.38	0.03
0.07	0.1	0.14	0.2	0.26	0.11	0	0	0.01	0.15	1.79	3.36	5.66	9.53	14.97	18.98	18.42	13.77	8.18	3.13	0.02
0.07	0.1	0.14	0.2	0.27	0.13	0	0	0.02	0.09	1.73	3.3	5.54	9.29	14.67	18.81	18.48	14.02	8.51	3.46	0.03
0.07	0.1	0.13	0.2	0.26	0.12	0	0	0.02	0.1	1.73	3.28	5.52	9.28	14.61	18.71	18.43	14.06	8.6	3.56	0.05
0.07	0.1	0.13	0.2	0.28	0.17	0	0	0	0.02	1.52	3.09	5.24	8.86	14.28	18.83	18.88	14.47	8.85	3.72	0.19
0.06	0.1	0.13	0.19	0.28	0.2	0	0	0	0.02	1.43	2.99	5.12	8.72	14.14	18.82	19.1	14.75	9	3.69	0.14
0.06	0.09	0.13	0.19	0.27	0.19	0	0	0	0.02	1.44	3	5.11	8.63	13.95	18.65	19.03	14.77	9.12	3.91	0.32
0.07	0.09	0.13	0.19	0.27	0.18	0	0	0	0.02	1.5	3.04	5.15	8.68	13.95	18.47	18.74	14.57	9.16	4.12	0.56
0.06	0.09	0.13	0.19	0.27	0.2	0	0	0	0.02	1.34	2.88	4.97	8.48	13.78	18.55	19.04	14.86	9.31	4.17	0.56
0.06	0.09	0.12	0.18	0.26	0.19	0	0	0	0.02	1.33	2.87	4.95	8.46	13.78	18.52	19.06	14.97	9.36	4.13	0.51
0.05	0.09	0.13	0.19	0.27	0.21	0	0	0	0.02	1.22	2.76	4.82	8.32	13.73	18.71	19.26	14.99	9.34	4.2	0.61
0.05	0.09	0.12	0.18	0.27	0.23	0	0	0	0.01	1.09	2.62	4.64	8.03	13.34	18.46	19.45	15.47	9.77	4.4	0.71
0.05	0.08	0.12	0.18	0.26	0.23	0	0	0	0.01	1.08	2.62	4.62	7.95	13.21	18.4	19.52	15.6	9.84	4.4	0.73
0.05	0.08	0.12	0.18	0.27	0.24	0	0	0	0.01	1.07	2.59	4.54	7.8	12.94	18.13	19.43	15.67	10.05	4.72	1.04
0.05	0.08	0.12	0.18	0.26	0.23	0	0	0	0.01	1.08	2.6	4.59	7.92	13.12	18.27	19.42	15.52	9.91	4.62	0.95
0.05	0.09	0.12	0.18	0.27	0.25	0	0	0	0.01	0.99	2.53	4.52	7.83	13.07	18.42	19.77	15.75	9.84	4.43	0.8
0.04	0.08	0.12	0.18	0.27	0.26	0.01	0	0	0.01	0.87	2.39	4.32	7.53	12.71	18.2	19.82	16.02	10.23	4.79	1.09
0.04	0.08	0.11	0.17	0.26	0.26	0.01	0	0	0.01	0.86	2.39	4.3	7.45	12.55	18.03	19.85	16.2	10.38	4.87	1.14
0.04	0.08	0.12	0.18	0.27	0.27	0.01	0	0	0.01	0.83	2.34	4.22	7.33	12.39	17.87	19.72	16.22	10.54	5.12	1.4
0.04	0.08	0.12	0.19	0.27	0.25	0.01	0	0	0.01	0.79	2.33	4.31	7.5	12.47	17.7	19.43	16.12	10.68	5.31	1.43
0.03	0.07	0.11	0.17	0.27	0.29	0.01	0	0	0.01	0.71	2.22	4.05	7.06	12.01	17.65	19.94	16.6	10.87	5.34	1.55
0.03	0.07	0.11	0.17	0.26	0.27	0.01	0	0	0.01	0.73	2.22	4.05	7.05	11.98	17.55	19.77	16.47	10.91	5.54	1.76
0.03	0.07	0.11	0.17	0.26	0.27	0.01	0	0	0.01	0.64	2.16	4	7.03	12.08	17.8	20.09	16.74	10.89	5.21	1.38
0.02	0.07	0.11	0.17	0.27	0.29	0.01	0	0	0.01	0.64	2.14	3.91	6.86	11.82	17.5	19.86	16.69	11.14	5.66	1.82
0.03	0.07	0.11	0.16	0.25	0.27	0.01	0	0	0.01	0.66	2.16	3.95	6.88	11.73	17.35	19.85	16.8	11.22	5.66	1.81
0.02	0.07	0.11	0.16	0.26	0.28	0.01	0	0	0.01	0.64	2.15	3.96	6.94	11.89	17.64	20.09	16.75	10.98	5.41	1.6
0.01	0.06	0.1	0.16	0.26	0.29	0.01	0	0	0	0.57	2.07	3.81	6.67	11.49	17.25	19.95	16.94	11.4	5.9	2.03
0.02	0.06	0.1	0.17	0.27	0.31	0.01	0	0	0	0.52	2.02	3.74	6.53	11.25	17.02	19.99	17.21	11.62	6.01	2.1
0.02	0.06	0.1	0.16	0.25	0.29	0.01	0	0	0	0.53	2.04	3.79	6.68	11.56	17.38	20.11	17.1	11.38	5.71	1.83
0.15	0.39	0.39	0.4	0.46	0.41	0.01	0	0	0	0.32	1.65	3.36	6.23	11.19	17.35	20.56	17.62	11.71	5.86	1.93
0.13	0.39	0.39	0.39	0.45	0.39	0.01	0	0	0	0.34	1.68	3.42	6.35	11.4	17.6	20.66	17.56	11.51	5.61	1.71
0.12	0.39	0.39	0.4	0.47	0.43	0.01	0	0	0	0.3	1.61	3.29	6.09	10.95	17.13	20.52	17.66	11.89	6.16	2.19
0.05	0.39	0.4	0.41	0.48	0.45	0.04	0	0	0	0.23	1.53	3.19	5.91	10.67	16.83	20.47	17.99	12.28	6.38	2.31
0.05	0.39	0.4	0.41	0.48	0.45	0.04	0	0	0	0.23	1.53	3.19	5.91	10.67	16.83	20.47	17.99	12.28	6.38	2.31

Time	Time sinc	Density	Box Temp	Crystalliser Temp
14:53:29	-48.6	1.332961	59.85331	53.67333
14:56:29	-45.6	1.333012	59.8527	53.84667
14:59:29	-42.6	1.333036	59.85318	53.91
15:02:29	-39.6	1.333066	59.85443	53.94
15:05:29	-36.6	1.333071	59.85286	53.97
15:08:29	-33.6	1.33309	59.85242	53.99
15:11:29	-30.6	1.333107	59.85257	53.85333
15:14:29	-27.6	1.333121	59.8524	52.46
15:17:29	-24.6	1.333139	59.85242	51.15333
15:20:29	-21.6	1.333144	59.85259	50.63
15:23:29	-18.6	1.333149	59.85266	50.44333
15:26:29	-15.6	1.333158	59.85835	50.37667
15:29:29	-12.6	1.333162	59.85248	50.35
15:32:29	-9.6	1.333171	59.85244	50.3
15:35:29	-6.6	1.333177	59.8524	50.18667
15:38:29	-3.6	1.333176	59.85244	50.08333
15:41:29	-0.6	1.332892	59.85229	50.09333
15:44:29	2.4	1.331324	59.85243	50.11333
15:47:28	5.383333	1.330557	59.85265	50.02333
15:50:28	8.383333	1.329917	59.85236	49.93333
15:53:28	11.38333	1.329381	59.85259	49.85333
15:56:28	14.38333	1.328931	59.85332	49.77667
15:59:28	17.38333	1.328407	59.85235	49.71333
16:02:28	20.38333	1.327932	59.85253	49.64
16:05:28	23.38333	1.327514	59.85403	49.57333
16:08:28	26.38333	1.327079	59.85246	49.51
16:11:28	29.38333	1.326655	59.85294	49.44
16:14:28	32.38333	1.326184	59.85363	49.37
16:17:28	35.38333	1.325734	59.85291	49.30333
16:20:28	38.38333	1.325287	59.85234	49.23333