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Viscosity Of Aqueous Sodium Chloride Solutions From 0 - 150° C

H. Ozbek, J.A. Fair, S.L. Phillips

December 1977

Lawrence Berkeley Laboratory University of California/Berkeley

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VISCOSITY OF AQUEOUS SODIUM CHLORIDE SOLUTIONS FROM 0 - 150° C

by

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Berkeley, CA 94720

Sponsored by the U.S. Department of Energy

Abstract

A critical evaluation of data on the viscosity of aqueous sodium chloride solutions is presented. The literature was screened through October 1977, and a databank of evaluated data was established. Viscosity values were converted when necessary to units of °C, centipoise and molal concentration. The data were correlated with the aid of an empirical equation to facilitate interpolation and computer calculations. The result of the evaluation includes a table containing smoothed values for the viscosity of NaCl solutions to 150°C.

MPa = 10^6 N/m^2 = 10 bar = 145.04 psi

μPa s = 10^{-6} kg/s m = 10^{-5}p = 10^3 cp

1 Pa s = 1N s/m^2 = 1 Kg/s M = 10 Poise

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Appendix I - Dynamic Viscosity of Water Substance

A. Introduction

The need for critically evaluated basic scientific data in geothermal and other energy research and development is obvious. Only a brief reflection is needed to realize the great frequency with which scientists and engineers look up tabulated data in handbooks, reports and computer print-outs. Before the advent of computer manipulation of data, only elementary methods could be used for statistical calculations of data evaluation. Now it is possible for specialized information analysis centers to use modern computer methods for storage, retrieval and statistical calculations involving large quantitiies of numerical data. The saving in time and cost to provide the scientific community with critically evaluated recommended values, correlations and in non-duplication of research effort is substantial.

The National Geothermal Information Resource (GRID) of the Lawrence Berkeley Laboratory is sponsored by the Department of Energy to compile and evaluate data on geothermal energy for electrical and non-electrical uses. Included in this compilation are both site-dependent and site-independent material related to geothermal exploration, reservoir engineering, reservoir utilization, physical chemistry, as well as environmental, legal, and economic aspects of geothermal energy. While the larger work covers the areas listed, this report is limited to a critical evaluation

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of data on the viscosity of sodium chloride solutions to elevated temperatures, pressures, and saturation concentrations.

The development of geothermal resources requires scientific and engineering calculations based on the basic energy properties of aqueous sodium chloride and other electrolyte solutions. In this context, GRID has developed a computer file to store, retrieve and index worldwide publications relevant to the thermodynamic and transport properties of aqueous sodium chloride and other solutions. Data from this file are extracted for status of data reviews and critical evaluations. The objective is establishing a databank of published data on basic energy properties of aqueous NaCl solutions covering the ranges of geothermal interest: temperatures to 350°C, pressures to 50 mPa (500 bars), and concentrations to saturation (Ref. 1). The present work gives the results of a survey and evaluation of a subset of this databank: that dealing with the viscosity of sodium chloride solutions.

The literature screened in compiling the viscosity data covers the time span from 1929 to 1977; data prior to 1929 are contained in the International Critical Tables (Ref. 2) for NaCl solutions at atmospheric pressure over the temperature range 0°C to 100°C, and concentrations from 0 molal to 5 molal. Published viscosity data from 1929 to July 1977 are largely at atmospheric or saturation vapor pressure with the highest temperature being 150°C (Ref. 3,4). See Table 1. Recently,

Kestin has provided extensive experimental data to pressures of 30 MPa in Table 1 (Ref. 5-7).

Besides laboratory data on viscosity, this report includes a summary of selected analytical expressions and correlations which describe the change in viscosity of NaCl solutions as a function of concentration, temperature, and pressure. Density data needed, for example, to convert NaCl molar concentrations to molal units can be obtained from Rowe and Chou (Ref. 8) or from Potter and Brown (Ref. 9). To provide for calculating relative viscosity, we have included as an Appendix, data on the temperature dependence of the viscosity of water and the corresponding correlation equation from the Eighth International Conference on the Properties of Steam. See References 10 and 11 for more detailed information on the viscosity of water to elevated temperatures and pressures.

While it is our intent that this compilation on the viscosity of NaCl solutions be comprehensive, it is recognized that there may be important omissions. The reader is urged to communicate such omissions to the National Geothermal Information Resource for inclusion in this databank.

Listings containing information on the basic energy properties of NaCl and other electrolyte solutions (e.g., KCl, $CaCl_2$) can be obtained

from the computer files of the National Geothermal Information Resource. For additional and critical evaluation of data on the viscosity of both water and NaCl solutions, the reader is referred to the following references:

Dynamic Viscosity of Water Substance (Ref. 10,11),
Thermophysical Properties of Matter, Vol. II, Viscosity (Ref. 12),
"The Volumetric Properties of Aqueous NaCl Solutions from 0° to 500°C at Pressures up to 2000 Bars Based on a Regression of Available Data in the Literature" (Ref. 9), and "Viscosity of NaCl Solutions" (Ref. 2,5).

B. Analytical Expressions and Correlations

This section covers a survey of analytical expressions and correlations which have been used to describe changes in viscosity for aqueous NaCl solutions as a function of temperature, concentration, and pressure. It is not exhaustive, and the interested reader is referred for additional information to references cited.

For NaCl solutions up to few tenths molal concentrations, the variation in viscosity with concentration is commonly described using the Jones and Dole equation (Ref. 13):

$$\eta_r = 1 + A\sqrt{M} + BM \qquad (1)$$

η_r = relative viscosity (η/η_{H_2O})

M = molarity

A,B = constants

The constant A has a theoretical basis as shown by Falkenhagen and Vernon who derived the following equation based on theoretical considerations (Ref. 14):

$$\eta_r = 1 + A\sqrt{M} \qquad (2)$$

where

$$A = \frac{\beta}{320}\,\frac{\Lambda^\circ}{\lambda_1^\circ\lambda_2^\circ}\left[1 - 0.6863\left(\frac{\lambda_1^\circ-\lambda_2^\circ}{\Lambda^\circ}\right)^2\right]$$

Λ° = limiting conductivity of electrolyte

$\lambda_1^\circ,\lambda_2^\circ$ = limiting conductivities of the ions

$$\beta = \frac{29.16 \times 2\sqrt{2}}{\eta_o (DT)^{1/2}}$$

η_o = viscosity of water

D = dielectric constant of H_2O

T = temperature, °K

Suryanrayana and Venkateson (Ref. 15) measured the viscosity of aqueous NaCl solutions over the temperature range 30°C to 55°C and the concentration range 1 molal to saturation. In developing an expression for the concentration dependence of NaCl, they found that at each temperature a plot of log $(\eta/\eta_{sat.})$ is linear; consequently, they suggested the following exponential relation between viscosity and NaCl concentration:

$$\eta/\eta_{sat.} = A \exp. (Bm/m_{sat.}) \qquad (3)$$

where

$A = \eta_{water}/\eta_{sat.}$

$B = \ln [\eta_{sat.}/\eta_{water}]$

$\eta_{sat.}$ = viscosity of saturated NaCl solution,

η_{water} = viscosity of water

m = molality of NaCl solution

$m_{sat.}$ = molality of saturated NaCl solution

Korosi and Fabuss (Ref. 3) used an extended form of the Jones-Dole Equation to develop an empirical correlation for their measurements of

the viscosity of NaCl solutions covering temperatures from 0°C to 150°C:

$$\eta_r = 1 + A\sqrt{M} + BM + DM^2 \qquad (4)$$

where

η_r = relative viscosity (η/η_{H_2O})

M = molarity

A,B,D = temperature dependent coefficients

The coefficients A, B, and D were evaluated as discussed in their publication:

" Unfortunately, limiting conductances for NaCl and KCl and limiting ionic conductances are available only in the 5 to 55°C temperature range. Using these available data, with the viscosity and dielectric constant data given by Harned and Owen, the A values were calculated.

This means that the limited slope values used in this evaluation in the 55 to 150° temperature range were determined by extrapolation of the limiting ionic conductances, and using correct data for the viscosity of water and its dielectric constant. For this reason the limiting slope values can be considered only as empirical constants over this temperature range.

With these limiting slope values, the experimental viscosity data at each temperature were evaluated, and by a least square method the best values of the constants B and D were determined. The experimentally determined and derived A, B and D constants were expressed as functions of temperature by a cubic temperature relationship of the form:

$$A = A_0 + A_1t + A_2t^2 + A_3t^3$$

$$B = B_0 + B_1t + B_2t^2 + B_3t^3$$

$$D = D_0 + D_1t + D_2t^2 + D_3t^3$$

The constants of these equations as calculated by Korosi and Fabuss (Ref. 3) are:

$A_0 = 0.5649 \times 10^{-2}$	$B_0 = 0.23092 \times 10^{-1}$	$D_0 = 0.25651 \times 10^{-1}$
$A_1 = 0.2012 \times 10^{-4}$	$B_1 = 0.23206 \times 10^{-2}$	$D_1 = 0.39857 \times 10^{-3}$
$A_2 = 0.1200 \times 10^{-6}$	$B_2 = 0.22124 \times 10^{-4}$	$D_2 = 0.43024 \times 10^{-5}$
$A_3 = 0.4514 \times 10^{-9}$	$B_3 = 0.82313 \times 10^{-7}$	$D_3 = 0.15500 \times 10^{-7}$

The empirical equation reproduces their data with an estimated precision of ± 0.2%.

In a recent study, Goncalves and Kestin (Ref. 6) measured the viscosity of aqueous NaCl solutions at temperatures of 25°C, 30°C, 40°C, and 50°C over a range of molalities up to about saturation. The laboratory data at each temperature were correlated with the aid of polynomials of the form

$$\eta = \eta_0 + \eta_1 c + \eta_2 c^2 + \eta_3 c^3 \qquad (5)$$

where $\eta_0, \eta_1, \eta_2, \eta_3$ are temperature dependent coefficients. Each of these coefficients is a smooth function of temperature, and each one is correlated with the aid of a third order polynomial. The resulting correlation equation can be represented by the double sum

$$\eta = \sum_{i=0}^{3} \sum_{j=0}^{3} a_{ij} c^i T \qquad (6)$$

The correlation reproduces their data within accuracy of the measurements which is $\pm 0.1\%$ The coefficients a_{ij} are listed below:

Coefficients a_{ij} of Equation 6 (Ref. 6)

i=	0	1	2	3
j=0	1.6560	0.7221×10^{-1}	0.2460×10^{-1}	0.1448×10^{-2}
1	-0.4304×10^{-1}	$0.1275.10^{-2}$	-0.1294×10^{-2}	-0.2994×10^{-4}
2	0.5769×10^{-3}	-0.5876×10^{-4}	0.2821×10^{-4}	0.9443×10^{-8}
3	-0.3194×10^{-5}	0.5550×10^{-6}	-0.2228×10^{-6}	0.3086×10^{-8}

An additional source of data on the viscosity of aqueous NaCl solutions at elevated temperatures is contained in the publication Pressure Buildups and Flow Tests in Walls (Ref. 16). The data is presented as a family of curves covering the temperatures 4°C to 204°C, and NaCl

concentrations from 0 molal to about 6 molal. However, data from these plots are not included in our evaluation because the numerical data from which these plots were drawn are not available for critical evaluation.

Currently the experimental data on the pressure dependence of the viscosity of aqueous NaCl solutions is that provided by Kestin for temperatures to 150°C, over the concentration range of 0.47 molal to 5.4 molal, and pressures to 30.0 MPa (300 bars). See Ref. 5 and 7. The authors found that the viscosity increases with pressure by about 1%. See Table 1. The empirical correlation developed by Kestin and coworkers reproduces their NaCl data with a standard deviation of $\pm 0.5\%$ and is of the form:

$$\mu\ (P,T,c) = \mu^{o}(T,c)\ [1 + \beta\ (T,c)\ P] \qquad (7)$$

where

μ = viscosity

P = pressure

T = temperature

c = concentration

β = pressure coefficient

μ^{o} = zero-pressure viscosity

The reader is referred to Reference 5 for detailed information.

In summary, empirical correlation equations are available which reproduce the viscosity of NaCl solutions; however statistically developed empirical

equations are valid only for interpolation and machine computation in the concentration and temperature range stated. The theoretical equation developed by Falkenhagen and Vernon (Ref. 14) can be used to predict the viscosity of aqueous NaCl solutions, but is limited to dilute solutions, e.g. <0.1m. Moreover, the coefficient A in the Falkenhagen-Vernon equation requires data on limiting conductivities of both the electrolyte and the ions, as well as the dielectric constant of water. Addition of a higher order concentration term to the Falkenhagen-Vernon equation results in the Jones-Dole equation which is applicable to concentrations to about 0.1 molal. Much work has been done to theoretically evaluate the B coefficient; see, for example, the literature review by Mandal, Seal and Basu (Ref. 17). A successful prediction of the B coefficient does not appear important to geothermal applications because the viscosity of NaCl solutions to saturation concentrations is required.

C. Instrumentation for Measuring Viscosity

This section summarizes laboratory instrumentation for measuring the viscosity of aqueous NaCl and other electrolyte solutions. The discussion includes instrumentation used at 25°C, but emphasis is on those methods which have been applied to elevated temperatures and pressures. For additional information, a good discussion on viscosity measurements is given in the Encyclopedia of Chemical Technology (Ref. 18), and in the publications by Kestin (Ref. 7), and Korosi and Fabuss (Ref. 3).

The four viscometers commonly used to measure the viscosity of NaCl aqueous solutions are the following: capillary, rotational, falling sphere, and oscillating disk. For temperatures above about 50°C, the most widely used is the capillary-type, for example, the Ostwald, Cannon and Ubbelohde viscometers. These viscometers are based on Poiseuille's Law which describes laminar flow in pipes.

Goncalves and Kestin used both the Ostwald and Ubbelohde viscometers in measuring the viscosity of NaCl and KCl solutions over the range 25°C to 50°C. Calibration was performed with respect to water at 20, 25, 30, 40, and 60°C, with temperatures controlled to ±0.1°C. The solutions were prepared by weighing the desired amount of reagent grade NaCl

in double-distilled water. Measurements of NaCl viscosity were at 25, 30, 40 and 50°C, with temperature controlled to ±0.1°C. The accuracy of the viscosity measurements was taken as ±0.1% (Ref. 6).

Korosi and Fabuss measured NaCl viscosity over the temperature range 25°C to 150°C (Ref. 3), using a specially built Cannon glass capillary viscometer with 470 mm overall length secured into a metal support frame by means of two screw clamps. The ends of the 3/8 in. O.D. receiving tube and a 1/4 in. O.D. capillary side tube of the viscometer were connected to the manifold and valve system with two Cajon O ring fittings. The capillary side of the viscometer joined a stainless steel holder enclosing a palladium silver membrane, which was connected to a normally open, air pressure-operated Nupto bellows valve. The line rejoined the receiving side of the viscometer in a T fitting. From here connection was made to the source of pressurized hydrogen, through an air pressure operated, and normally closed, Whitey valve, and through the panel terminal located on top of the assembly. The whole assembly was submerged in a thermostat filled with oil for temperature control.

Ostwald-type viscometers were also used by Ezrokhi in measuring NaCl viscosity at 25, 40 and 60°C (Ref. 19), by Postnikov for temperatures to 80°C (Ref. 20), by Suryanarayana and Venkatesan for temperatures to 55°C (Ref. 15), and by Jones and Christian at 25°C (Ref. 21).

Recent viscosity measurements at pressures to 300 bars by Abe, Grimes, Kestin, Khalifa, Sookiazian and Wakeham were made using a modified oscillating disk viscometer. The instrument consisted of a high-pressure bomb of type 347, 18-8 stainless steel, sealed with the aid of bolts made from Inconel X, and provided with a synthetic sapphire, Bridgman-type window. The oscillating system was enclosed in the bomb, and carried a reflecting mirror on a stem. The bomb was mounted on a titanium-carbide ball bearing, and enclosed in an automatically controlled heater surrounded by a radiation shield. Oscillation was initiated by rotation of the bomb on its bearing, and observed by a telescope which was trained on a precision scale. For brines such as NaCl solutions, the following parameters were used: natural period of $\tau_0 \approx 16$ sec., stainless steel disk with R = 33.9725 mm radius and d = 3.2131 mm thickness between two fixed plates of widespacing b = 2.9782 mm. Pressure measurements were made using high-precision Bourdon gauges, each accurate to 0.2% of its maximum range. Temperatures were measured with calibrated thermocouples. See Reference 5.

In summary, the Ostwald, Cannon and Ubbelohde-type capillary viscometers are the instruments mainly used for measuring the viscosity of NaCl solutions for temperatures to 150°C. An oscillating-disk viscometer was used for measurements at pressures to 30 MPa (300 bars), and temperatures to 150°C (Ref. 23).

D. Evaluation and Correlation

A comprehensive search of the published literature for NaCl viscosity data was made, covering the time span from 1929 to July 1977. All available copies of the original publications were assembled using the following main sources for literature references: The Department of Energy Technical Information Center's RECON System which includes the following databases: Energy Data Base, Water Resources Abstracts, and Engineering Index (COMPENDEX); Chemical Abstracts; the International Critical Tables; and relevant journals and reports.

The data selected for correlation from a larger list (Ref. 22) are the reported experimental values, and do not include either smoothed or calculated data. Nickels' data at 25°C were consistently low and were not included here (Ref. 30). See Table 1. All data in this table have been converted where necessary to the ^{12}C scale of atomic weights, to the g/cm^3 basis for density, to centipoise for viscosity, from molar to molal concentrations, and from relative to absolute viscosity values. The needed water viscosity data were taken from the results of the Eighth International Conference on the Properties of Steam (Ref. 10,11).

The following empirical equation developed from this data was found convenient for correlation to 30 MPa and 150°C:

$$\eta = c_1 + c_2 \exp(\alpha_1 T) + c_3 \exp(\alpha_2 m) + c_4 \exp[\alpha_3 (0.01T + m)] + c_5 \exp[\alpha_4 (0.01T - m)] \quad (11)$$

where

η = viscosity, cp

T = temperature, °C

m = concentration, molality

c_1 = 0.1256735	α_1 =-0.04296718
c_2 = 1.265347	α_2 = 0.3710073
c_3 =-1.105369	α_3 = 0.4230889
c_4 = 0.2044679	α_4 =-0.3259828
c_5 = 1.308779	

Equation 11 is valid only to pressures of 30 MPa and temperatures to 150°C.

Figure 1 shows the viscosity data versus concentration for temperatures of 10, 20, 30, 40, 50, 75, 100, 125 and 150°C, and the corresponding correlation plotted using Eq. 11. Figure 2 is a plot of viscosity versus temperature, using Eq. 11. Data may be interpolated with Eq. 11 to a standard deviation of 1.5% over the entire temperature, pressure, and concentration range. See Figure 3. The standard deviation for all concentrations is shown in Figure 4; and for 10°C to 150°C in Figure 5.

Table 2 contains smoothed values calculated from Equation 11.

E. Summary and Conclusions

The currently available experimental data on the viscosity of NaCl solutions is sparse and covers mainly pressures from atmospheric to 30 MPa (300 bars), concentrations to saturation, and temperatures below 75°C. Above 75°C the available data is that of Korosi and Fabuss, and Kestin. An empirical correlation equation was developed which reproduces the experimental data by 1.5% over the temperature range 10 to 150°C. The equation is convenient for interpolation, and for machine calculations. Additional laboratory measurements on the viscosity of NaCl solutions to 350°C are needed for statistical calculation to provide the basis for recommended values to 350°C. Laboratory data are also needed for pressures to 500 bars.

G. Acknowledgment

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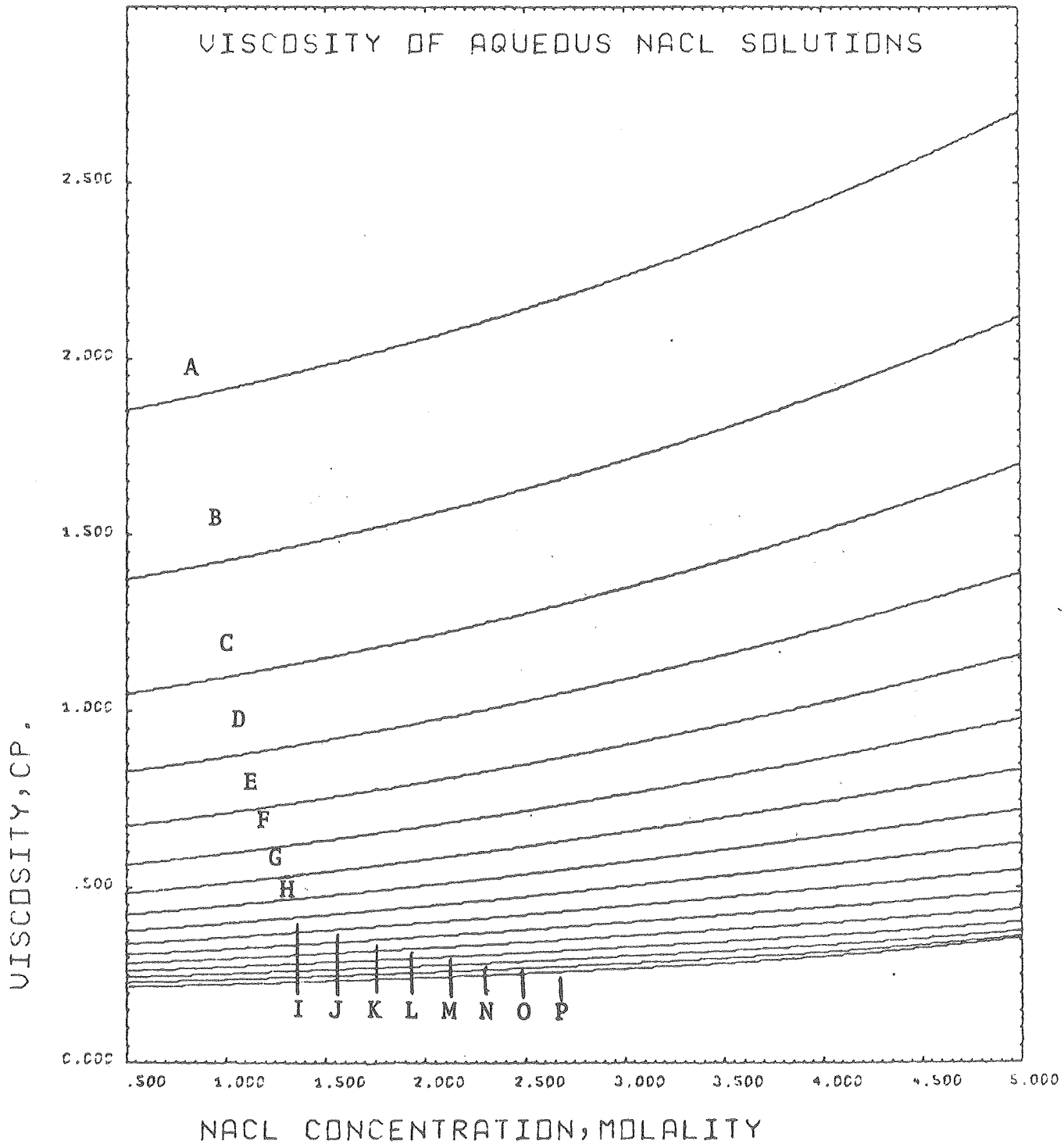
Figure 1. Viscosity of NaCl solutions versus concentration using Eq 11.

Curve	^{o}C
A	0
B	10
C	20
D	30
E	40
F	50
G	60
H	70
I	80
J	90
K	100
L	110
M	120
N	130
O	140
P	150


VISCOSITY OF AQUEOUS NACL SOLUTIONS
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VISCOSITY, CP.
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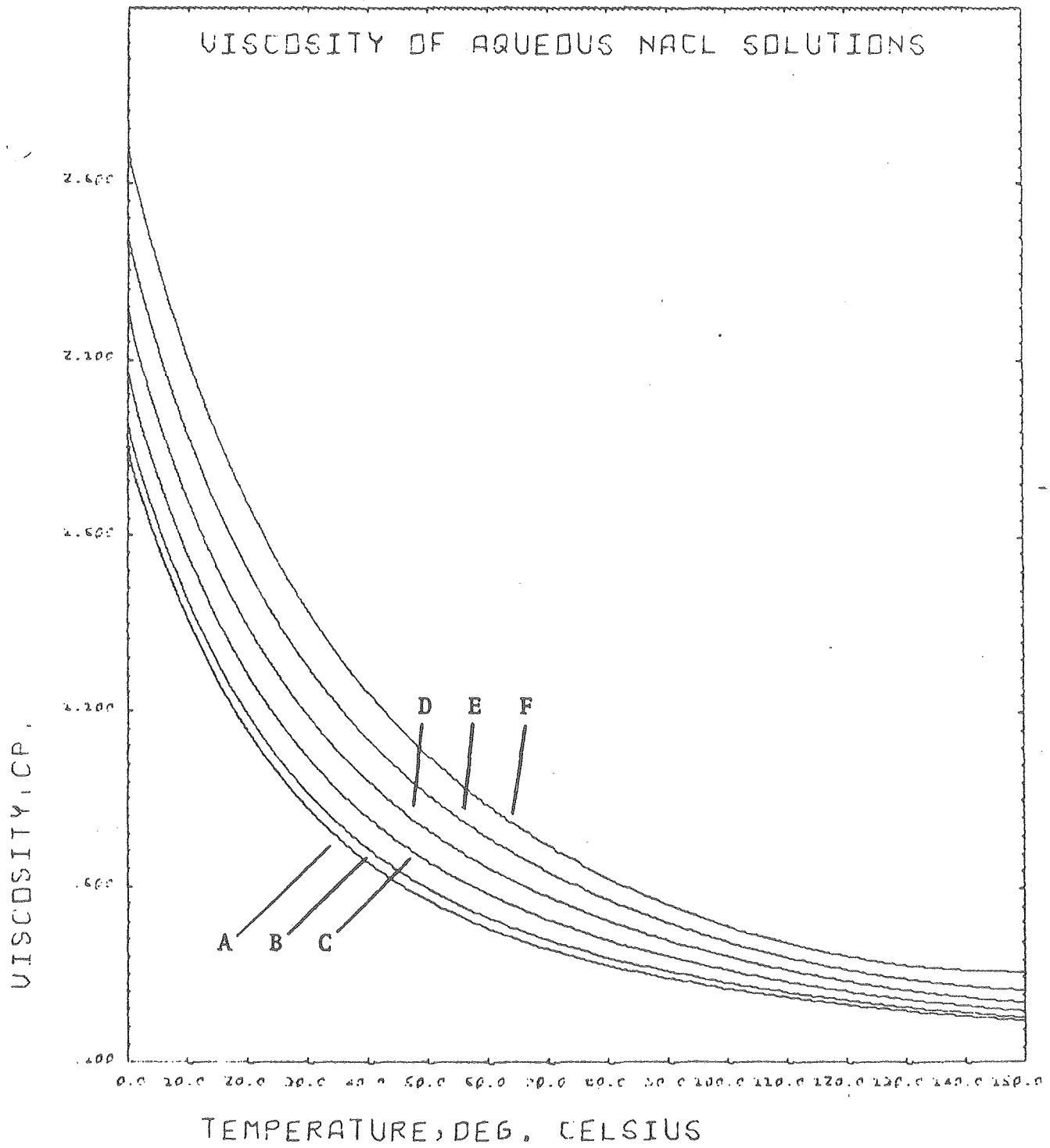
NACL CONCENTRATION, MOLALITY

Figure 2. Viscosity of NaCl solutions versus temperature using Eq 11.

Curve	Molality
A	0.5
B	1
C	2
D	3
E	4
F	5


VISCOSITY OF AQUEOUS NACL SOLUTIONS
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VISCOSITY, CP.
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0
TEMPERATURE, DEG. CELSIUS
A
B
C
D
E
F

Figure 3. Comparison of calculated NaCl viscosity using Eq 11 with measured values. Deviation for all values is 1.5%.

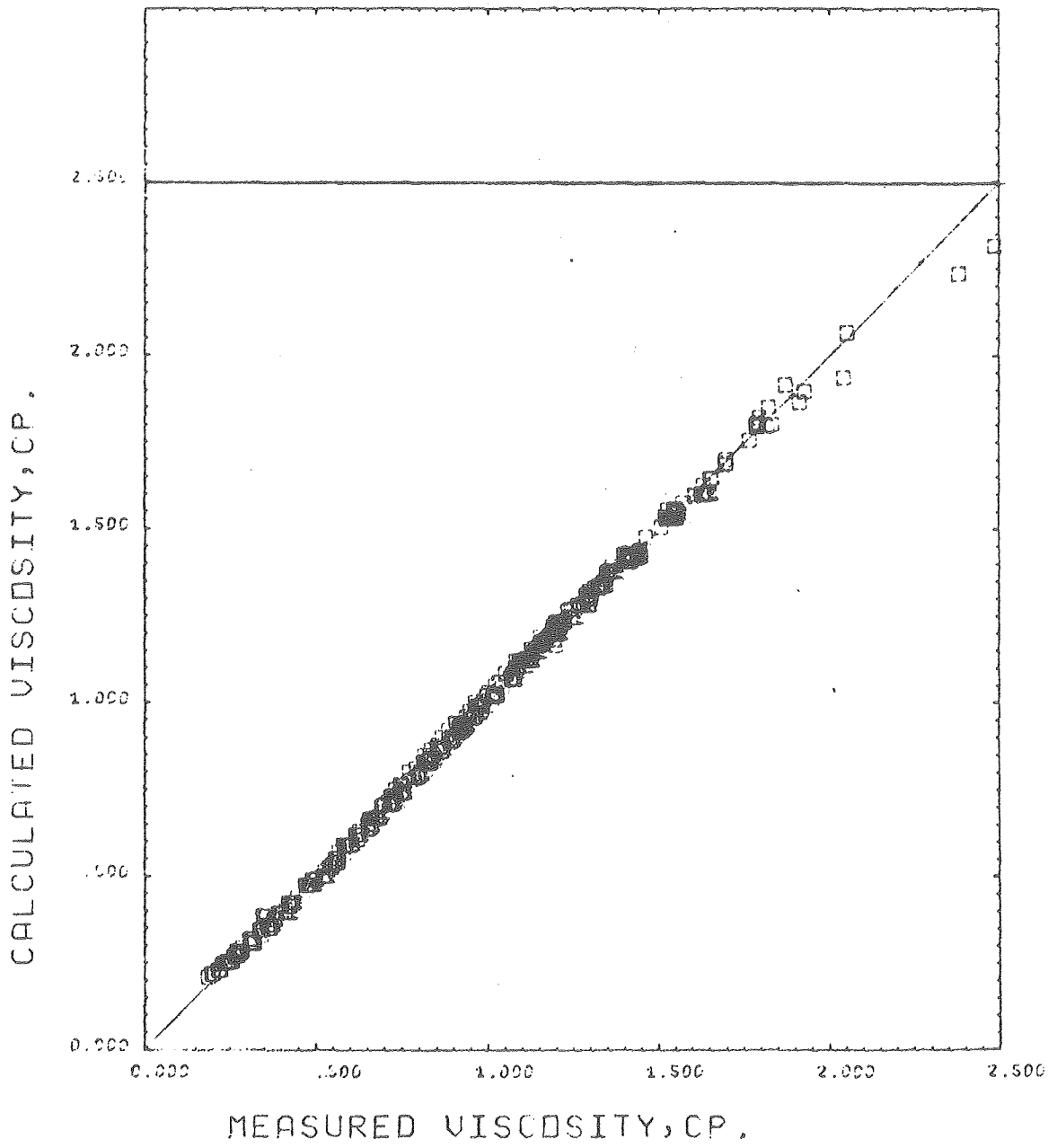
2.500
2.000
1.500
1.000
.500
0.000
CALCULATED VISCOSITY,CP.
0.000
.500
1.000
1.500
2.000
2.500
MEASURED VISCOSITY,CP.

Figure 4. Deviation of Eq. 11 from data for NaCl concentration range 0.01m to saturation.

$$\% \text{ Deviation} = \frac{(\text{measured}) - (\text{calculated})}{(\text{measured})} \times 100$$

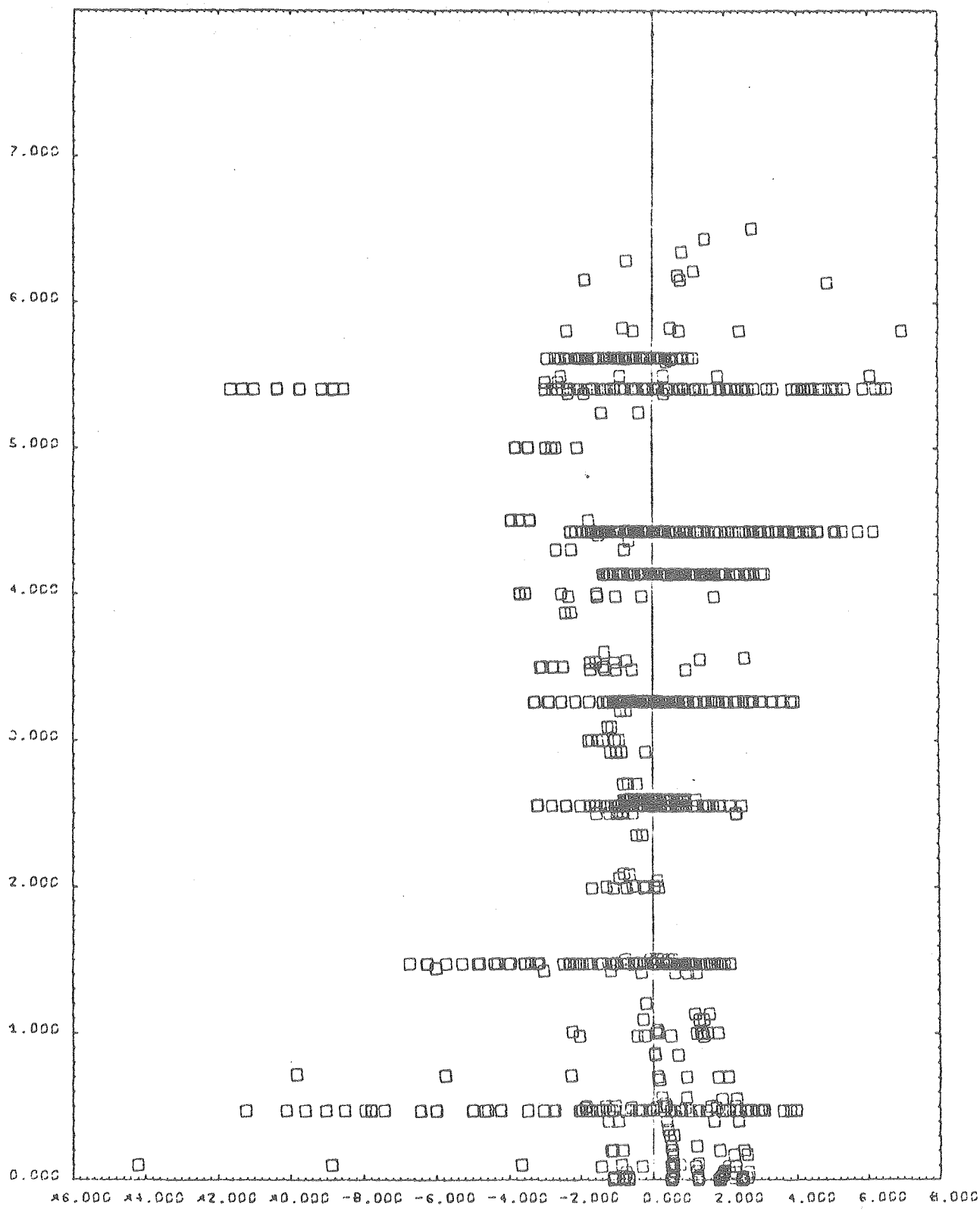
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
-6.000 -4.000 -2.000 0.000 2.000 4.000 6.000 8.000

Figure 5. Deviation of Eq. 11 from data for temperature range $10^{o}C$ to $150^{o}C$.

$$\% \text{ Deviation} = \frac{(\text{measured}) - (\text{calculated})}{(\text{measured})} \times 100$$

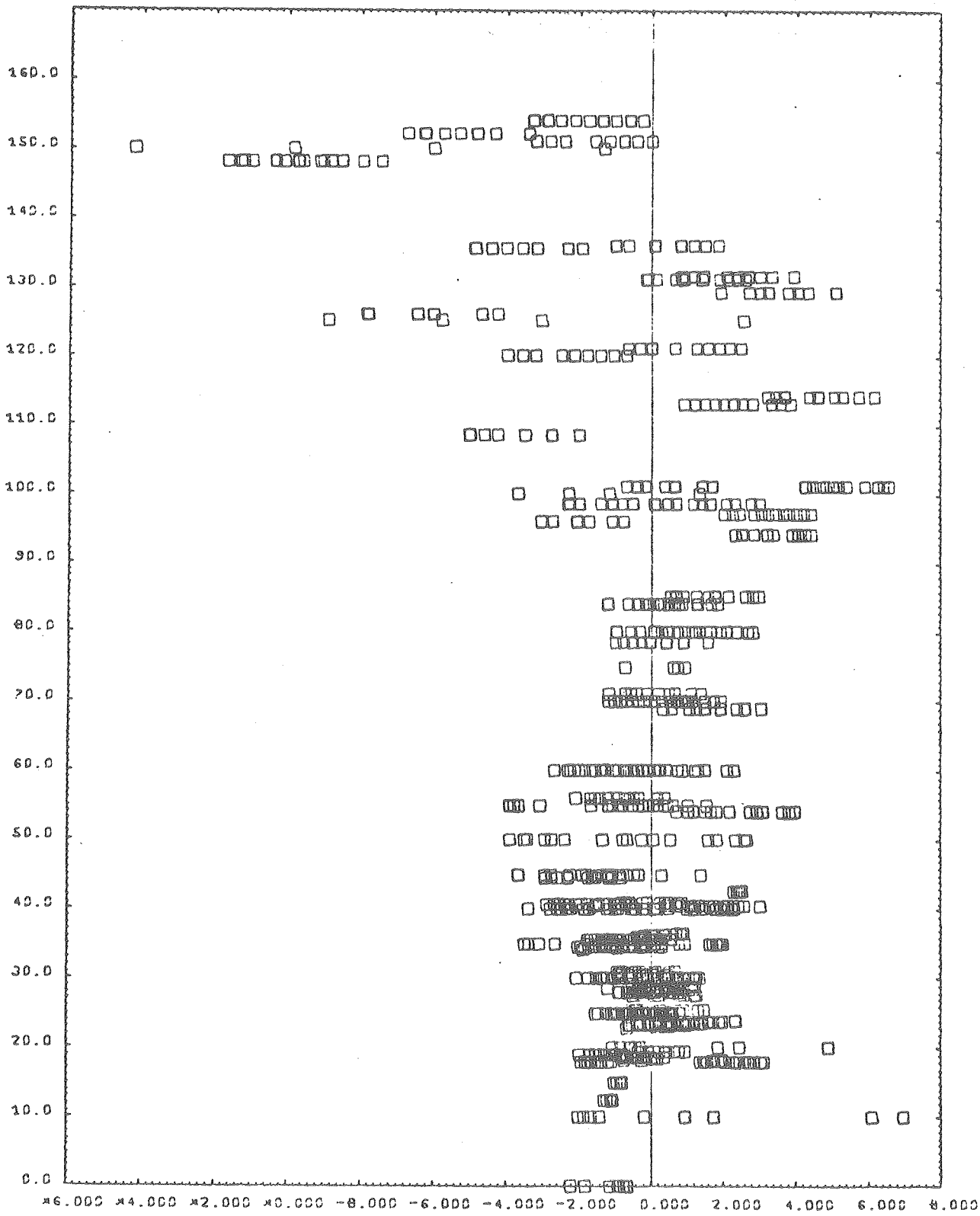
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
*6.000 *4.000 *2.000 *0.000 -8.000 -6.000 -4.000 -2.000 0.000 2.000 4.000 6.000 8.000

Table 1. Experimental data on the viscosity of NaCl solutions used in this evaluation and for developing the correlation Eq 11. References to the literature are given as Short Code, which contains the last name of the first named author of each publication and the last two digits of the year of publication.

NATIONAL GEOTHERMAL
INFORMATION RESOURCE

DECEMBER 1977

VISCOSITY OF NACL SOLUTIONS

UNITS

TEMPERATURE=DEGREES CELSIUS
CONCENTRATION=MOLALITY
PRESSURE=BAR
VISCOSITY=CENTIPOISE

TEMP.	CONC.	PRESS.	VISC.	SHORT CODE
0	.002000	1.0	1.787660	JONES 37
0	.005000	1.0	1.787660	JONES 37
0	.010000	1.0	1.788290	JONES 37
0	.020010	1.0	1.789260	JONES 37
0	.050040	1.0	1.790770	JONES 37
0	.100150	1.0	1.793830	JONES 37
0	.200590	1.0	1.799350	JONES 37
0	.503670	1.0	1.821060	JONES 37
0	1.015600	1.0	1.874560	JONES 37
0	2.068820	1.0	2.050580	JONES 37
10.00	.098600	1.0	1.314500	LENGYEL 64
10.00	.497100	1.0	1.347900	LENGYEL 64
10.00	.986500	1.0	1.398100	LENGYEL 64
10.00	1.993000	1.0	1.529900	LENGYEL 64
10.00	2.929600	1.0	1.697300	LENGYEL 64
10.00	3.486500	1.0	1.816200	LENGYEL 64
10.00	3.987300	1.0	1.930000	LENGYEL 64
10.00	5.495200	1.0	2.383300	LENGYEL 64
10.00	5.802300	1.0	2.489200	LENGYEL 64
12.50	.001000	1.0	1.218810	KAMINSKY 56
12.50	.002000	1.0	1.218960	KAMINSKY 56
12.50	.005000	1.0	1.219380	KAMINSKY 56
12.50	.010010	1.0	1.219950	KAMINSKY 56
12.50	.020020	1.0	1.221010	KAMINSKY 56
12.50	.200790	1.0	1.237110	KAMINSKY 56
12.50	.403040	1.0	1.254730	KAMINSKY 56
12.50	.504730	1.0	1.263720	KAMINSKY 56
15.00	.001000	1.0	1.139280	KAMINSKY 56
15.00	.002000	1.0	1.139440	KAMINSKY 56
15.00	.005000	1.0	1.139840	KAMINSKY 56
15.00	.010010	1.0	1.140400	KAMINSKY 56
15.00	.020020	1.0	1.141440	KAMINSKY 56
15.00	.200860	1.0	1.157380	KAMINSKY 56
15.00	.403170	1.0	1.174830	KAMINSKY 56

15.00	.54910	1.0	1.183710	KAMINSKY 56
17.99	4.132000	1.0	1.631900	KESTIN 77
18.00	.475500	1.0	1.089000	KESTIN 77B
18.00	.475500	36.2	1.087000	KESTIN 77B
18.00	.475500	70.7	1.086000	KESTIN 77B
18.00	.475500	104.8	1.087000	KESTIN 77B
18.00	.475500	139.9	1.084000	KESTIN 77B
18.00	.475500	157.9	1.084000	KESTIN 77B
18.00	.475500	175.1	1.083000	KESTIN 77B
18.00	.475500	206.1	1.081000	KESTIN 77B
18.00	.475500	239.9	1.084000	KESTIN 77B
18.00	.475500	264.4	1.085000	KESTIN 77B
18.00	.475500	302.7	1.082000	KESTIN 77B
18.00	.475500	1.0	1.090000	KESTIN 77B
18.00	4.132000	1.0	1.628300	KESTIN 77
18.01	4.132000	1.0	1.625300	KESTIN 77
18.01	4.132000	1.0	1.628500	KESTIN 77
18.02	4.132000	1.0	1.626200	KESTIN 77
18.05	4.132000	34.5	1.625700	KESTIN 77
18.05	4.132000	205.0	1.641700	KESTIN 77
18.05	4.132000	205.0	1.644400	KESTIN 77
18.05	4.132000	243.0	1.645700	KESTIN 77
18.06	4.132000	34.5	1.625400	KESTIN 77
18.06	4.132000	137.9	1.634500	KESTIN 77
18.06	4.132000	137.9	1.636800	KESTIN 77
18.06	4.132000	172.8	1.638900	KESTIN 77
18.06	4.132000	172.8	1.640200	KESTIN 77
18.06	4.132000	243.0	1.646000	KESTIN 77
18.06	4.132000	274.7	1.648000	KESTIN 77
18.06	4.132000	274.7	1.648100	KESTIN 77
18.06	4.132000	307.8	1.651600	KESTIN 77
18.06	4.132000	307.8	1.652900	KESTIN 77
18.07	4.132000	69.3	1.628400	KESTIN 77
18.07	4.132000	69.3	1.628800	KESTIN 77
18.08	4.132000	104.2	1.632000	KESTIN 77
18.08	4.132000	104.2	1.632500	KESTIN 77
18.14	2.600000	1.0	1.338400	KESTIN 77
18.26	2.600000	173.4	1.341100	KESTIN 77
18.46	2.600000	274.0	1.338700	KESTIN 77
18.46	2.600000	274.0	1.339800	KESTIN 77
18.48	2.600000	309.9	1.339800	KESTIN 77
18.49	2.600000	309.9	1.342500	KESTIN 77
18.50	2.600000	172.7	1.332600	KESTIN 77
18.51	2.600000	206.5	1.334300	KESTIN 77
18.51	2.600000	242.3	1.334800	KESTIN 77
18.52	2.600000	172.7	1.331800	KESTIN 77
18.52	2.600000	242.3	1.336600	KESTIN 77
18.53	2.600000	138.9	1.329300	KESTIN 77
18.53	2.600000	138.9	1.331000	KESTIN 77
18.54	2.600000	103.4	1.330400	KESTIN 77
18.54	2.600000	206.5	1.332300	KESTIN 77
18.55	2.600000	103.4	1.326100	KESTIN 77
18.56	2.600000	68.9	1.324600	KESTIN 77
18.56	2.600000	68.9	1.327000	KESTIN 77
18.67	2.600000	34.8	1.323200	KESTIN 77
18.69	2.600000	34.8	1.322100	KESTIN 77
18.72	2.600000	1.0	1.320600	KESTIN 77
18.73	2.600000	1.0	1.320600	KESTIN 77
19.00	1.471300	35.5	1.164000	KESTIN 77B
19.00	1.471300	66.5	1.167000	KESTIN 77B
19.00	1.471300	104.4	1.168000	KESTIN 77B
19.00	1.471300	138.9	1.166000	KESTIN 77B

19.00	1.471300	174.8	1.166000	KESTIN 77B
19.00	1.471300	207.9	1.165000	KESTIN 77B
19.00	1.471300	241.4	1.166000	KESTIN 77B
19.00	1.471300	272.3	1.165000	KESTIN 77B
19.00	1.471300	309.6	1.166000	KESTIN 77B
19.00	1.471300	156.8	1.166000	KESTIN 77B
19.00	1.471300	1.0	1.166000	KESTIN 77B
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19.00	1.471300	35.5	1.160000	KESTIN 77B
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19.00	2.551400	36.5	1.293000	KESTIN 77B
19.00	2.551400	74.1	1.293000	KESTIN 77B
19.00	2.551400	107.2	1.293000	KESTIN 77B
19.00	2.551400	143.4	1.293000	KESTIN 77B
19.00	2.551400	175.4	1.295000	KESTIN 77B
19.00	2.551400	206.5	1.302000	KESTIN 77B
19.00	2.551400	233.4	1.298000	KESTIN 77B
19.00	2.551400	270.6	1.299000	KESTIN 77B
19.00	2.551400	302.8	1.304000	KESTIN 77B
19.50	3.267200	1.0	1.401000	KESTIN 77B
19.50	3.267200	35.5	1.401000	KESTIN 77B
19.50	3.267200	70.7	1.405000	KESTIN 77B
19.50	3.267200	104.8	1.405000	KESTIN 77B
19.50	3.267200	139.1	1.407000	KESTIN 77B
19.50	3.267200	173.4	1.411000	KESTIN 77B
19.50	3.267200	203.6	1.412000	KESTIN 77B
19.50	3.267200	243.0	1.415000	KESTIN 77B
19.50	3.267200	278.0	1.417000	KESTIN 77B
19.50	3.267200	312.5	1.419000	KESTIN 77B
19.50	3.267200	154.8	1.409000	KESTIN 77B
19.50	3.267200	1.0	1.403000	KESTIN 77B
20.00	.098600	1.0	1.010100	LENGYEL 64
20.00	.497100	1.0	1.042600	LENGYEL 64
20.00	.986500	1.0	1.092000	LENGYEL 64
20.00	1.993000	1.0	1.198700	LENGYEL 64
20.00	2.929600	1.0	1.328100	LENGYEL 64
20.00	3.486500	1.0	1.417400	LENGYEL 64
20.00	3.987300	1.0	1.505700	LENGYEL 64
20.00	5.495200	1.0	1.834500	LENGYEL 64
20.00	5.802300	1.0	1.912800	LENGYEL 64
20.00	6.140000	1.0	2.040000	POSTNIKOV 70
22.80	2.600000	1.0	1.204700	KESTIN 77
23.00	2.600000	173.4	1.208900	KESTIN 77
23.02	4.132000	1.0	1.447500	KESTIN 77
23.09	4.132000	1.0	1.444100	KESTIN 77
23.11	4.132000	1.0	1.443900	KESTIN 77
23.18	4.132000	35.4	1.443700	KESTIN 77
23.20	4.132000	35.4	1.444000	KESTIN 77
23.24	2.600000	245.8	1.206600	KESTIN 77
23.24	2.600000	280.2	1.207500	KESTIN 77
23.24	2.600000	314.7	1.207700	KESTIN 77
23.26	2.600000	209.9	1.204400	KESTIN 77
23.26	2.600000	314.7	1.211500	KESTIN 77
23.26	4.132000	70.9	1.443600	KESTIN 77
23.27	2.600000	139.6	1.200200	KESTIN 77
23.27	2.600000	174.1	1.201800	KESTIN 77
23.27	4.132000	70.9	1.443600	KESTIN 77
23.28	2.600000	103.7	1.196900	KESTIN 77
23.28	2.600000	245.8	1.208400	KESTIN 77
23.28	2.600000	280.2	1.211600	KESTIN 77
23.29	2.600000	174.1	1.202600	KESTIN 77
23.29	2.600000	209.9	1.206100	KESTIN 77

23.30	2.600000	69.3	1.195800	KESTIN 77
23.30	2.600000	139.6	1.200600	KESTIN 77
23.31	2.600000	34.8	1.193300	KESTIN 77
23.31	2.600000	103.7	1.198500	KESTIN 77
23.32	2.600000	69.3	1.195400	KESTIN 77
23.34	2.600000	34.8	1.191400	KESTIN 77
23.35	2.600000	1.0	1.191500	KESTIN 77
23.35	4.132000	104.1	1.442300	KESTIN 77
23.35	4.132000	104.1	1.444200	KESTIN 77
23.36	2.600000	1.0	1.190700	KESTIN 77
23.41	4.132000	138.9	1.442700	KESTIN 77
23.42	4.132000	138.9	1.443800	KESTIN 77
23.48	4.132000	173.4	1.443300	KESTIN 77
23.48	4.132000	173.4	1.444200	KESTIN 77
23.50	.475500	1.0	.958000	KESTIN 77B
23.50	.475500	34.6	.957000	KESTIN 77B
23.50	.475500	70.3	.959000	KESTIN 77B
23.50	.475500	103.4	.959000	KESTIN 77B
23.50	.475500	139.8	.957000	KESTIN 77B
23.50	.475500	174.2	.957000	KESTIN 77B
23.50	.475500	204.6	.956000	KESTIN 77B
23.50	.475500	240.3	.956000	KESTIN 77B
23.50	.475500	274.4	.956000	KESTIN 77B
23.50	.475500	307.5	.956000	KESTIN 77B
23.50	.475500	157.2	.957000	KESTIN 77B
23.50	.475500	1.0	.960000	KESTIN 77B
23.53	4.132000	207.1	1.445100	KESTIN 77
23.53	4.132000	207.1	1.445500	KESTIN 77
23.59	4.132000	138.8	1.438500	KESTIN 77
23.59	4.132000	242.3	1.445900	KESTIN 77
23.59	4.132000	242.3	1.446500	KESTIN 77
23.62	4.132000	1.0	1.426600	KESTIN 77
23.63	4.132000	275.4	1.447100	KESTIN 77
23.63	4.132000	275.4	1.445600	KESTIN 77
23.67	4.132000	309.8	1.449500	KESTIN 77
23.68	4.132000	309.8	1.447800	KESTIN 77
23.80	.300000	1.0	.943000	GAETA 66
23.80	.300000	1.0	.943000	GAETA 66
23.80	.300000	1.0	.942000	GAETA 66
24.00	2.500000	1.0	1.196000	GAETA 66
24.00	2.500000	1.0	1.196000	GAETA 66
24.00	2.500000	1.0	1.196000	GAETA 66
25.00	.001000	1.0	.890640	KAMINSKY 56
25.00	.002000	1.0	.890783	JONES 37
25.00	.002010	1.0	.890783	KAMINSKY 56
25.00	.005000	1.0	.891121	JONES 37
25.00	.005020	1.0	.891130	KAMINSKY 56
25.00	.007840	1.0	.891320	GONCALVES 77
25.00	.010000	1.0	.891700	JONES 37
25.00	.010030	1.0	.891655	KAMINSKY 56
25.00	.012850	1.0	.891920	GONCALVES 77
25.00	.015980	1.0	.892130	GONCALVES 77
25.00	.020000	1.0	.892706	JONES 37
25.00	.020070	1.0	.892599	KAMINSKY 56
25.00	.020270	1.0	.892470	GONCALVES 77
25.00	.050000	1.0	.895244	JONES 37
25.00	.061770	1.0	.896250	GONCALVES 77
25.00	.088800	1.0	.898410	DRUCKER 46B
25.00	.098600	1.0	.898700	LENGYEL 64
25.00	.099900	1.0	.899000	KOROSI 68
25.00	.100000	1.0	.899300	JANZ 70
25.00	.100000	1.0	.899259	JONES 37

25.00	.110940	1.0	.900020	GONCALVES 77
25.00	.176400	1.0	.905270	DRUCKER 46B
25.00	.200000	1.0	.907086	JONES 37
25.00	.201280	1.0	.907264	KAMINSKY 56
25.00	.236310	1.0	.909790	GONCALVES 77
25.00	.349900	1.0	.918890	DRUCKER 46B
25.00	.4[illegible]4030	1.0	.923265	KAMINSKY 56
25.00	.497100	1.0	.928800	LENGYEL 64
25.00	.500000	1.0	.931400	JANZ 70
25.00	.500000	1.0	.931385	JONES 37
25.00	.505980	1.0	.931385	KAMINSKY 56
25.00	.521500	1.0	.932870	DRUCKER 46B
25.00	.568740	1.0	.936290	GONCALVES 77
25.00	.683900	1.0	.946320	DRUCKER 46B
25.00	.716900	1.0	.947700	KOROSI 68
25.00	.853820	1.0	.960720	GONCALVES 77
25.00	.869300	1.0	.962430	DRUCKER 46B
25.00	.986500	1.0	.970900	LENGYEL 64
25.00	1.000000	1.0	.975900	JANZ 70
25.00	1.000000	1.0	.975718	JONES 37
25.00	1.023000	1.0	.977700	OSTROFF 69
25.00	1.094000	1.0	.981000	EZROKHI 52
25.00	1.202600	1.0	.992530	DRUCKER 46B
25.00	1.413800	1.0	1.013100	KOROSI 68
25.00	1.471300	1.0	1.020000	KESTIN 77B
25.00	1.471300	35.0	1.019000	KESTIN 77B
25.00	1.471300	69.8	1.019000	KESTIN 77B
25.00	1.471300	104.4	1.021000	KESTIN 77B
25.00	1.471300	138.9	1.019000	KESTIN 77B
25.00	1.471300	173.4	1.022000	KESTIN 77B
25.00	1.471300	207.9	1.021000	KESTIN 77B
25.00	1.471300	241.6	1.023000	KESTIN 77B
25.00	1.471300	276.8	1.023000	KESTIN 77B
25.00	1.471300	311.6	1.026000	KESTIN 77B
25.00	1.471300	156.8	1.021000	KESTIN 77B
25.00	1.471300	1.0	1.020000	KESTIN 77B
25.00	1.474580	1.0	1.018450	GONCALVES 77
25.00	1.993000	1.0	1.073300	LENGYEL 64
25.00	2.043000	1.0	1.088000	OSTROFF 69
25.00	2.089300	1.0	1.085270	JONES 37
25.00	2.100000	1.0	1.085000	JANZ 70
25.00	2.513930	1.0	1.134200	GONCALVES 77
25.00	2.551400	1.0	1.132000	KESTIN 77B
25.00	2.551400	36.5	1.136000	KESTIN 77B
25.00	2.551400	71.3	1.138000	KESTIN 77B
25.00	2.551400	107.2	1.137000	KESTIN 77B
25.00	2.551400	141.7	1.142000	KESTIN 77B
25.00	2.551400	175.1	1.143000	KESTIN 77B
25.00	2.551400	208.5	1.147000	KESTIN 77B
25.00	2.551400	242.3	1.149000	KESTIN 77B
25.00	2.551400	276.8	1.151000	KESTIN 77B
25.00	2.551400	310.6	1.147000	KESTIN 77B
25.00	2.700000	1.0	1.160000	EZROKHI 52
25.00	2.929600	1.0	1.188600	LENGYEL 64
25.00	3.093920	1.0	1.210030	GONCALVES 77
25.00	3.200000	1.0	1.228000	JANZ 70
25.00	3.200000	1.0	1.230000	OSTROFF 69
25.00	3.267200	1.0	1.241000	KESTIN 77B
25.00	3.267200	36.2	1.241000	KESTIN 77B
25.00	3.267200	70.1	1.243000	KESTIN 77B
25.00	3.267200	105.1	1.242000	KESTIN 77B
25.00	3.267200	139.6	1.241000	KESTIN 77B

25.00	3.267200	173.7	1.242000	KESTIN 77B
25.00	3.267200	206.6	1.247000	KESTIN 77B
25.00	3.267200	244.4	1.248000	KESTIN 77B
25.00	3.267200	277.2	1.252000	KESTIN 77B
25.00	3.267200	312.0	1.256000	KESTIN 77B
25.00	3.267200	175.1	1.248000	KESTIN 77B
25.00	3.267200	1.0	1.241000	KESTIN 77B
25.00	3.486500	1.0	1.268300	LENGYEL 64
25.00	3.534500	1.0	1.275100	KOROSI 68
25.00	3.987300	1.0	1.345500	LENGYEL 64
25.00	4.300000	1.0	1.400000	EZROKHI 52
25.00	4.365000	1.0	1.413000	OSTROFF 69
25.00	4.400000	1.0	1.407000	JANZ 70
25.00	5.243240	1.0	1.573680	GONCALVES 77
25.00	5.380000	1.0	1.610000	EZROKHI 52
25.00	5.495200	1.0	1.632600	LENGYEL 64
25.00	5.600000	1.0	1.654000	JANZ 70
25.00	5.614000	1.0	1.657000	OSTROFF 69
25.00	5.802300	1.0	1.700000	LENGYEL 64
25.00	5.822670	1.0	1.699390	GONCALVES 77
25.00	6.150000	1.0	1.770000	EZROKHI 52
25.50	4.428900	1.0	1.412000	KESTIN 77B
25.50	4.428900	35.5	1.413000	KESTIN 77B
25.50	4.428900	70.3	1.415000	KESTIN 77B
25.50	4.428900	106.3	1.419000	KESTIN 77B
25.50	4.428900	141.2	1.422000	KESTIN 77B
25.50	4.428900	175.5	1.423000	KESTIN 77B
25.50	4.428900	208.2	1.428000	KESTIN 77B
25.50	4.428900	243.7	1.431000	KESTIN 77B
25.50	4.428900	277.5	1.439000	KESTIN 77B
25.50	4.428900	311.5	1.437000	KESTIN 77B
25.50	4.428900	156.2	1.422000	KESTIN 77B
25.50	4.428900	1.0	1.413000	KESTIN 77B
25.50	4.428900	1.0	1.410800	KESTIN 77B
27.50	5.405400	9.3	1.525000	KESTIN 77B
27.50	5.405400	34.8	1.526000	KESTIN 77B
27.50	5.405400	69.5	1.529000	KESTIN 77B
27.50	5.405400	106.5	1.534000	KESTIN 77B
27.50	5.405400	141.1	1.535000	KESTIN 77B
27.50	5.405400	176.0	1.540000	KESTIN 77B
27.50	5.405400	209.6	1.545000	KESTIN 77B
27.50	5.405400	246.1	1.546000	KESTIN 77B
27.50	5.405400	278.2	1.551000	KESTIN 77B
27.50	5.405400	310.9	1.552000	KESTIN 77B
27.50	5.405400	156.2	1.536000	KESTIN 77B
27.50	5.405400	1.0	1.525000	KESTIN 77B
27.86	5.614000	1.0	1.546200	KESTIN 77
27.86	5.614000	33.4	1.549200	KESTIN 77
27.86	5.614000	33.4	1.549700	KESTIN 77
27.87	5.614000	1.0	1.545200	KESTIN 77
27.91	5.614000	70.3	1.551300	KESTIN 77
27.92	5.614000	70.3	1.552000	KESTIN 77
27.93	4.132000	33.6	1.300600	KESTIN 77
27.93	4.132000	33.6	1.301000	KESTIN 77
27.94	4.132000	1.0	1.299400	KESTIN 77
27.97	4.132000	1.0	1.298100	KESTIN 77
27.99	4.132000	69.8	1.300800	KESTIN 77
28.00	4.132000	69.8	1.302100	KESTIN 77
28.00	.479500	1.0	.868000	KESTIN 77B
28.00	.479500	35.8	.871000	KESTIN 77B
28.00	.479500	71.0	.870000	KESTIN 77B
28.00	.479500	105.5	.868000	KESTIN 77B

28.00	.479500	140.6	.868000	KESTIN 77B
28.00	.479500	175.1	.868000	KESTIN 77B
28.00	.479500	209.9	.869000	KESTIN 77B
28.00	.479500	244.1	.868000	KESTIN 77B
28.00	.479500	275.4	.870000	KESTIN 77B
28.00	.479500	311.6	.868000	KESTIN 77B
28.00	.479500	157.2	.869000	KESTIN 77B
28.00	.479500	1.0	.868000	KESTIN 77B
28.05	4.132000	104.0	1.302000	KESTIN 77
28.05	4.132000	104.0	1.302300	KESTIN 77
28.05	5.614000	104.9	1.549700	KESTIN 77
28.07	5.614000	104.9	1.549700	KESTIN 77
28.12	4.132000	139.6	1.303300	KESTIN 77
28.13	5.614000	139.6	1.548900	KESTIN 77
28.14	4.132000	139.6	1.302400	KESTIN 77
28.15	5.614000	139.6	1.550400	KESTIN 77
28.16	5.614000	173.4	1.555100	KESTIN 77
28.21	5.614000	173.4	1.552100	KESTIN 77
28.22	5.614000	173.4	1.551400	KESTIN 77
28.26	5.614000	204.4	1.553500	KESTIN 77
28.27	5.614000	204.4	1.554000	KESTIN 77
28.30	5.614000	238.5	1.555600	KESTIN 77
28.31	5.614000	238.5	1.557500	KESTIN 77
28.33	5.614000	273.4	1.559200	KESTIN 77
28.34	5.614000	273.4	1.559000	KESTIN 77
28.35	5.614000	308.5	1.563200	KESTIN 77
28.36	5.614000	308.5	1.561200	KESTIN 77
28.44	2.600000	1.0	1.071500	KESTIN 77
28.45	4.132000	175.7	1.295500	KESTIN 77
28.48	4.132000	175.7	1.294300	KESTIN 77
28.52	2.600000	1.0	1.067400	KESTIN 77
28.53	2.600000	1.0	1.068700	KESTIN 77
28.53	4.132000	205.1	1.297100	KESTIN 77
28.54	2.600000	172.7	1.074300	KESTIN 77
28.54	4.132000	205.1	1.293500	KESTIN 77
28.55	2.600000	35.5	1.067500	KESTIN 77
28.55	2.600000	35.5	1.067600	KESTIN 77
28.56	5.614000	1.0	1.521000	KESTIN 77
28.57	2.600000	69.9	1.068900	KESTIN 77
28.57	2.600000	69.9	1.069000	KESTIN 77
28.59	2.600000	104.4	1.070200	KESTIN 77
28.59	4.132000	240.9	1.294800	KESTIN 77
28.60	2.600000	104.4	1.070000	KESTIN 77
28.61	2.600000	139.2	1.071100	KESTIN 77
28.62	2.600000	139.2	1.068400	KESTIN 77
28.64	2.600000	174.1	1.072600	KESTIN 77
28.65	2.600000	174.1	1.072500	KESTIN 77
28.66	2.600000	207.8	1.074200	KESTIN 77
28.66	2.600000	241.6	1.076100	KESTIN 77
28.67	2.600000	207.8	1.076000	KESTIN 77
28.67	2.600000	276.1	1.078400	KESTIN 77
28.67	2.600000	310.6	1.078500	KESTIN 77
28.68	2.600000	241.6	1.077600	KESTIN 77
28.68	4.132000	240.9	1.295200	KESTIN 77
28.69	2.600000	276.1	1.077700	KESTIN 77
28.70	2.600000	310.6	1.082800	KESTIN 77
28.72	4.132000	1.0	1.276900	KESTIN 77
28.75	4.132000	107.2	1.282100	KESTIN 77
28.75	4.132000	273.0	1.294600	KESTIN 77
28.77	4.132000	205.4	1.290600	KESTIN 77
28.77	4.132000	273.0	1.294600	KESTIN 77
28.82	4.132000	307.1	1.296900	KESTIN 77

28.83	4.132000	307.1	1.295600	KESTIN 77
30.00	.007840	1.0	.798450	GONCALVES 77
30.00	.012850	1.0	.798910	GONCALVES 77
30.00	.015980	1.0	.799220	GONCALVES 77
30.00	.020270	1.0	.799560	GONCALVES 77
30.00	.061770	1.0	.802500	GONCALVES 77
30.00	.098600	1.0	.805000	LENGYEL 64
30.00	.110940	1.0	.806600	GONCALVES 77
30.00	.236310	1.0	.816070	GONCALVES 77
30.00	.497100	1.0	.834800	LENGYEL 64
30.00	.569740	1.0	.841140	GONCALVES 77
30.00	.853820	1.0	.864030	GONCALVES 77
30.00	.986500	1.0	.874300	LENGYEL 64
30.00	1.000000	1.0	.882800	SURYANARAYANA 58B
30.00	1.471300	1.0	.918000	KESTIN 77B
30.00	1.471300	34.8	.919000	KESTIN 77B
30.00	1.471300	70.0	.919000	KESTIN 77B
30.00	1.471300	104.4	.920000	KESTIN 77B
30.00	1.471300	138.9	.919000	KESTIN 77B
30.00	1.471300	173.4	.923000	KESTIN 77B
30.00	1.471300	205.1	.923000	KESTIN 77B
30.00	1.471300	238.9	.926000	KESTIN 77B
30.00	1.471300	273.0	.924000	KESTIN 77B
30.00	1.471300	307.1	.925000	KESTIN 77B
30.00	1.471300	156.8	.921000	KESTIN 77B
30.00	1.471300	1.0	.920000	KESTIN 77B
30.00	1.474580	1.0	.917580	GONCALVES 77
30.00	1.500000	1.0	.918700	SURYANARAYANA 58B
30.00	1.993000	1.0	.968800	LENGYEL 64
30.00	2.000000	1.0	.966600	SURYANARAYANA 58B
30.00	2.500000	1.0	1.024000	SURYANARAYANA 58B
30.00	2.513930	1.0	1.022660	GONCALVES 77
30.00	2.929600	1.0	1.072500	LENGYEL 64
30.00	3.000000	1.0	1.081000	SURYANARAYANA 58B
30.00	3.093920	1.0	1.091070	GONCALVES 77
30.00	3.486500	1.0	1.142900	LENGYEL 64
30.00	3.500000	1.0	1.144000	SURYANARAYANA 58B
30.00	3.987300	1.0	1.212100	LENGYEL 64
30.00	4.000000	1.0	1.214000	SURYANARAYANA 58B
30.00	4.500000	1.0	1.287000	SURYANARAYANA 58B
30.00	5.000000	1.0	1.363000	SURYANARAYANA 58B
30.00	5.243240	1.0	1.412550	GONCALVES 77
30.00	5.495200	1.0	1.463300	LENGYEL 64
30.00	5.802300	1.0	1.522700	LENGYEL 64
30.00	5.822670	1.0	1.521720	GONCALVES 77
30.00	6.180000	1.0	1.610000	POSTNIKOV 70
30.50	2.551400	1.0	1.016000	KESTIN 77B
30.50	2.551400	36.9	1.017000	KESTIN 77B
30.50	2.551400	72.0	1.019000	KESTIN 77B
30.50	2.551400	106.5	1.022000	KESTIN 77B
30.50	2.551400	141.0	1.023000	KESTIN 77B
30.50	2.551400	175.1	1.023000	KESTIN 77B
30.50	2.551400	208.5	1.026000	KESTIN 77B
30.50	2.551400	239.6	1.026000	KESTIN 77B
30.50	2.551400	276.1	1.029000	KESTIN 77B
30.50	2.551400	311.3	1.030000	KESTIN 77B
30.50	2.551400	158.2	1.024000	KESTIN 77B
30.50	2.551400	1.0	1.019000	KESTIN 77B
31.00	3.267200	1.0	1.096000	KESTIN 77B
31.00	3.267200	35.7	1.096000	KESTIN 77B
31.00	3.267200	70.1	1.097000	KESTIN 77B
31.00	3.267200	104.8	1.100000	KESTIN 77B

31.00	3.267200	139.6	1.101000	KESTIN 77B
31.00	3.267200	174.8	1.101000	KESTIN 77B
31.00	3.267200	208.2	1.107000	KESTIN 77B
31.00	3.267200	242.6	1.106000	KESTIN 77B
31.00	3.267200	275.9	1.111000	KESTIN 77B
31.00	3.267200	311.3	1.113000	KESTIN 77B
31.00	3.267200	156.2	1.102000	KESTIN 77B
31.00	3.267200	1.0	1.095000	KESTIN 77B
34.15	5.614000	1.0	1.359100	KESTIN 77
34.38	5.614000	173.4	1.366500	KESTIN 77
34.42	5.614000	36.5	1.353200	KESTIN 77
34.43	5.614000	36.5	1.356000	KESTIN 77
34.45	5.614000	70.7	1.356400	KESTIN 77
34.45	5.614000	70.7	1.357500	KESTIN 77
34.45	5.614000	138.2	1.362200	KESTIN 77
34.45	5.614000	138.2	1.362400	KESTIN 77
34.46	5.614000	1.0	1.349600	KESTIN 77
34.46	5.614000	105.1	1.359500	KESTIN 77
34.47	5.614000	1.0	1.350400	KESTIN 77
34.47	5.614000	174.1	1.363400	KESTIN 77
34.48	5.614000	105.1	1.359100	KESTIN 77
34.48	5.614000	174.1	1.365400	KESTIN 77
34.49	5.614000	207.2	1.369500	KESTIN 77
34.50	5.614000	207.2	1.367800	KESTIN 77
34.50	5.614000	241.6	1.371900	KESTIN 77
34.50	5.614000	275.4	1.374200	KESTIN 77
34.51	5.614000	241.6	1.368900	KESTIN 77
34.51	5.614000	275.4	1.373200	KESTIN 77
34.51	5.614000	311.3	1.378400	KESTIN 77
34.53	5.614000	311.3	1.379000	KESTIN 77
35.00	.001000	1.0	.719609	KAMINSKY 56
35.00	.002000	1.0	.719738	KAMINSKY 56
35.00	.005020	1.0	.720155	KAMINSKY 56
35.00	.010000	1.0	.720550	CHACRAVARTI 40
35.00	.010050	1.0	.720568	KAMINSKY 56
35.00	.020000	1.0	.721560	CHACRAVARTI 40
35.00	.020120	1.0	.721357	KAMINSKY 56
35.00	.030000	1.0	.722350	CHACRAVARTI 40
35.00	.040000	1.0	.723210	CHACRAVARTI 40
35.00	.050000	1.0	.724080	CHACRAVARTI 40
35.00	.060000	1.0	.724870	CHACRAVARTI 40
35.00	.070000	1.0	.725660	CHACRAVARTI 40
35.00	.201920	1.0	.734666	KAMINSKY 56
35.00	.405280	1.0	.749090	KAMINSKY 56
35.00	.507550	1.0	.756377	KAMINSKY 56
35.00	1.000000	1.0	.785600	SURYANARAYANA 58B
35.00	1.500000	1.0	.823700	SURYANARAYANA 58B
35.00	2.000000	1.0	.868300	SURYANARAYANA 58B
35.00	2.500000	1.0	.918700	SURYANARAYANA 58B
35.00	3.000000	1.0	.974100	SURYANARAYANA 58B
35.00	3.500000	1.0	1.022000	SURYANARAYANA 58B
35.00	4.000000	1.0	1.083000	SURYANARAYANA 58B
35.00	4.428900	1.0	1.166000	KESTIN 77B
35.00	4.428900	35.3	1.171000	KESTIN 77B
35.00	4.428900	71.0	1.170000	KESTIN 77B
35.00	4.428900	105.1	1.176000	KESTIN 77B
35.00	4.428900	140.3	1.179000	KESTIN 77B
35.00	4.428900	174.8	1.180000	KESTIN 77B
35.00	4.428900	207.9	1.183000	KESTIN 77B
35.00	4.428900	243.0	1.185000	KESTIN 77B
35.00	4.428900	278.2	1.191000	KESTIN 77B
35.00	4.428900	310.9	1.193000	KESTIN 77B

35.00	4.428900	156.2	1.179000	KESTIN 77B
35.00	4.428900	1.0	1.166000	KESTIN 77B
35.00	4.500000	1.0	1.153000	SURYANARAYANA 58B
35.00	5.000000	1.0	1.234000	SURYANARAYANA 58B
35.50	4.428900	1.0	1.151000	KESTIN 77B
35.50	4.428900	35.3	1.153000	KESTIN 77B
35.50	4.428900	70.0	1.156000	KESTIN 77B
35.50	4.428900	107.3	1.157000	KESTIN 77B
35.50	4.428900	139.6	1.158000	KESTIN 77B
35.50	4.428900	173.7	1.161000	KESTIN 77B
35.50	4.428900	202.9	1.164000	KESTIN 77B
35.50	4.428900	244.1	1.168000	KESTIN 77B
35.50	4.428900	277.3	1.169000	KESTIN 77B
35.50	4.428900	307.1	1.173000	KESTIN 77B
35.50	4.428900	157.2	1.160000	KESTIN 77B
35.50	4.428900	1.0	1.151000	KESTIN 77B
35.50	4.428900	1.0	1.152000	KESTIN 77B
35.51	4.132000	1.0	1.115000	KESTIN 77
35.51	4.132000	1.0	1.115600	KESTIN 77
35.53	4.132000	1.0	1.115600	KESTIN 77
35.56	4.132000	1.0	1.112600	KESTIN 77
35.56	4.132000	34.7	1.115800	KESTIN 77
35.56	4.132000	34.7	1.117700	KESTIN 77
35.58	4.132000	1.0	1.112700	KESTIN 77
35.59	4.132000	107.5	1.121700	KESTIN 77
35.60	4.132000	70.0	1.117100	KESTIN 77
35.60	4.132000	70.0	1.117800	KESTIN 77
35.60	4.132000	70.0	1.118300	KESTIN 77
35.62	4.132000	103.8	1.119200	KESTIN 77
35.63	4.132000	103.8	1.118900	KESTIN 77
35.64	4.132000	138.3	1.120100	KESTIN 77
35.65	4.132000	138.3	1.120500	KESTIN 77
35.65	4.132000	206.6	1.125600	KESTIN 77
35.66	4.132000	172.3	1.122500	KESTIN 77
35.66	4.132000	172.3	1.122700	KESTIN 77
35.68	4.132000	240.3	1.126600	KESTIN 77
35.69	4.132000	205.0	1.126000	KESTIN 77
35.69	4.132000	205.0	1.126100	KESTIN 77
35.69	4.132000	240.3	1.126400	KESTIN 77
35.70	4.132000	274.2	1.127500	KESTIN 77
35.70	4.132000	274.2	1.128000	KESTIN 77
35.70	4.132000	304.4	1.131000	KESTIN 77
35.70	4.132000	306.5	1.131100	KESTIN 77
35.89	2.600000	1.0	.926200	KESTIN 77
35.96	2.600000	1.0	.926000	KESTIN 77
36.06	2.600000	35.3	.922500	KESTIN 77
36.08	2.600000	35.3	.922800	KESTIN 77
36.11	2.600000	1.0	.921100	KESTIN 77
36.16	2.600000	70.4	.923800	KESTIN 77
36.19	2.600000	70.4	.921700	KESTIN 77
36.24	2.600000	104.4	.922800	KESTIN 77
36.24	2.600000	174.1	.925600	KESTIN 77
36.25	2.600000	104.4	.922600	KESTIN 77
36.26	2.600000	139.2	.923000	KESTIN 77
36.27	2.600000	139.2	.925300	KESTIN 77
36.30	2.600000	174.1	.923400	KESTIN 77
36.30	2.600000	174.1	.924700	KESTIN 77
36.32	2.600000	206.5	.924700	KESTIN 77
36.32	2.600000	206.5	.925000	KESTIN 77
36.35	2.600000	239.7	.926900	KESTIN 77
36.35	2.600000	239.7	.927100	KESTIN 77
36.35	2.600000	305.1	.928400	KESTIN 77

36.36	2.600000	305.1	.928100	KESTIN 77
36.36	2.600000	274.7	.928600	KESTIN 77
36.38	2.600000	274.7	.928400	KESTIN 77
40.00	.017190	1.0	.654010	GONCALVES 77
40.00	.053510	1.0	.656780	GONCALVES 77
40.00	.098600	1.0	.658500	LENGYEL 64
40.00	.099900	1.0	.660100	KOROSI 68
40.00	.172300	1.0	.664960	GONCALVES 77
40.00	.497100	1.0	.685300	LENGYEL 64
40.00	.558930	1.0	.690910	GONCALVES 77
40.00	.716900	1.0	.701600	KOROSI 68
40.00	.986500	1.0	.720900	LENGYEL 64
40.00	1.000000	1.0	.720800	SURYANARAYANA 58B
40.00	1.094000	1.0	.730000	EZROKHI 52
40.00	1.139470	1.0	.732050	GONCALVES 77
40.00	1.413800	1.0	.753900	KOROSI 68
40.00	1.500000	1.0	.755400	SURYANARAYANA 58B
40.00	1.993000	1.0	.801100	LENGYEL 64
40.00	2.000000	1.0	.799100	SURYANARAYANA 58B
40.00	2.355460	1.0	.831990	GONCALVES 77
40.00	2.500000	1.0	.842200	SURYANARAYANA 58B
40.00	2.700000	1.0	.868000	EZROKHI 52
40.00	2.929600	1.0	.886700	LENGYEL 64
40.00	3.000000	1.0	.896400	SURYANARAYANA 58B
40.00	3.267200	1.0	.926000	KESTIN 77B
40.00	3.267200	34.5	.928000	KESTIN 77B
40.00	3.267200	70.0	.930000	KESTIN 77B
40.00	3.267200	103.9	.931000	KESTIN 77B
40.00	3.267200	138.6	.931000	KESTIN 77B
40.00	3.267200	174.8	.933000	KESTIN 77B
40.00	3.267200	209.2	.934000	KESTIN 77B
40.00	3.267200	242.7	.937000	KESTIN 77B
40.00	3.267200	276.8	.936000	KESTIN 77B
40.00	3.267200	310.9	.940000	KESTIN 77B
40.00	3.267200	171.7	.931000	KESTIN 77B
40.00	3.267200	1.0	.924000	KESTIN 77B
40.00	3.486500	1.0	.944800	LENGYEL 64
40.00	3.500000	1.0	.939500	SURYANARAYANA 58B
40.00	3.534500	1.0	.950800	KOROSI 68
40.00	3.879790	1.0	.987370	GONCALVES 77
40.00	3.987300	1.0	1.000000	LENGYEL 64
40.00	4.000000	1.0	.999600	SURYANARAYANA 58B
40.00	4.300000	1.0	1.040000	EZROKHI 52
40.00	4.500000	1.0	1.054000	SURYANARAYANA 58B
40.00	5.000000	1.0	1.127000	SURYANARAYANA 58B
40.00	5.380000	1.0	1.190000	EZROKHI 52
40.00	5.452410	1.0	1.191530	GONCALVES 77
40.00	5.495200	1.0	1.198500	LENGYEL 64
40.00	5.802300	1.0	1.244000	LENGYEL 64
40.00	6.150000	1.0	1.300000	EZROKHI 52
40.00	6.220000	1.0	1.350000	POSTNIKOV 70
40.50	.479500	1.0	.679000	KESTIN 77B
40.50	.479500	35.7	.679000	KESTIN 77B
40.50	.479500	70.8	.679000	KESTIN 77B
40.50	.479500	105.1	.680000	KESTIN 77B
40.50	.479500	140.6	.679000	KESTIN 77B
40.50	.479500	173.4	.681000	KESTIN 77B
40.50	.479500	207.2	.681000	KESTIN 77B
40.50	.479500	242.3	.686000	KESTIN 77B
40.50	.479500	276.1	.680000	KESTIN 77B
40.50	.479500	311.3	.683000	KESTIN 77B
40.50	.479500	157.9	.682000	KESTIN 77B

40.50	.479500	1.0	.679000	KESTIN 77B
40.50	1.471300	1.0	.751000	KESTIN 77B
40.50	1.471300	34.8	.753000	KESTIN 77B
40.50	1.471300	70.0	.753000	KESTIN 77B
40.50	1.471300	104.4	.753000	KESTIN 77B
40.50	1.471300	138.6	.755000	KESTIN 77B
40.50	1.471300	173.4	.755000	KESTIN 77B
40.50	1.471300	207.2	.757000	KESTIN 77B
40.50	1.471300	241.6	.757000	KESTIN 77B
40.50	1.471300	276.5	.758000	KESTIN 77B
40.50	1.471300	310.6	.760000	KESTIN 77B
40.50	1.471300	157.2	.754000	KESTIN 77B
40.50	1.471300	1.0	.750000	KESTIN 77B
40.50	1.471300	1.0	.748000	KESTIN 77B
40.57	5.614000	176.8	1.214900	KESTIN 77
40.68	5.614000	1.0	1.198600	KESTIN 77
40.68	5.614000	104.0	1.207000	KESTIN 77
40.68	5.614000	308.5	1.222100	KESTIN 77
40.68	5.614000	308.5	1.224000	KESTIN 77
40.69	5.614000	104.0	1.205400	KESTIN 77
40.70	5.614000	36.3	1.200400	KESTIN 77
40.70	5.614000	138.2	1.209200	KESTIN 77
40.70	5.614000	241.6	1.218100	KESTIN 77
40.70	5.614000	241.6	1.219300	KESTIN 77
40.71	5.614000	1.0	1.196000	KESTIN 77
40.71	5.614000	70.1	1.201500	KESTIN 77
40.71	5.614000	36.3	1.202000	KESTIN 77
40.71	5.614000	70.1	1.202900	KESTIN 77
40.71	5.614000	138.2	1.206900	KESTIN 77
40.71	5.614000	206.5	1.214000	KESTIN 77
40.71	5.614000	276.8	1.222200	KESTIN 77
40.71	5.614000	276.8	1.223000	KESTIN 77
40.72	5.614000	173.4	1.212500	KESTIN 77
40.72	5.614000	206.5	1.215200	KESTIN 77
40.73	5.614000	173.4	1.211400	KESTIN 77
41.00	2.551400	1.0	.834000	KESTIN 77B
41.00	2.551400	36.2	.835000	KESTIN 77B
41.00	2.551400	71.0	.836000	KESTIN 77B
41.00	2.551400	105.8	.839000	KESTIN 77B
41.00	2.551400	142.7	.840000	KESTIN 77B
41.00	2.551400	172.7	.843000	KESTIN 77B
41.00	2.551400	209.2	.848000	KESTIN 77B
41.00	2.551400	240.6	.845000	KESTIN 77B
41.00	2.551400	267.1	.844000	KESTIN 77B
41.00	2.551400	308.5	.847000	KESTIN 77B
41.00	2.551400	157.5	.840000	KESTIN 77B
41.00	2.551400	1.0	.834000	KESTIN 77B
42.50	.001000	1.0	.623643	KAMINSKY 56
42.50	.002010	1.0	.623780	KAMINSKY 56
42.50	.005030	1.0	.624080	KAMINSKY 56
42.50	.010080	1.0	.624504	KAMINSKY 56
42.50	.020170	1.0	.625289	KAMINSKY 56
42.50	.212480	1.0	.637821	KAMINSKY 56
42.50	.426460	1.0	.651300	KAMINSKY 56
42.50	.519040	1.0	.658070	KAMINSKY 56
44.50	5.405400	1.0	1.092000	KESTIN 77B
44.50	5.405400	35.0	1.094000	KESTIN 77B
44.50	5.405400	71.2	1.099000	KESTIN 77B
44.50	5.405400	110.3	1.099000	KESTIN 77B
44.50	5.405400	142.4	1.105000	KESTIN 77B
44.50	5.405400	176.5	1.107000	KESTIN 77B
44.50	5.405400	208.1	1.111000	KESTIN 77B

44.50	5.405400	243.9	1.112000	KESTIN 77B
44.50	5.405400	278.6	1.112000	KESTIN 77B
44.50	5.405400	313.0	1.115000	KESTIN 77B
44.50	5.405400	173.9	1.106000	KESTIN 77B
44.50	5.405400	1.0	1.096000	KESTIN 77B
45.00	1.000000	1.0	.659200	SURYANARAYANA 58B
45.00	1.500000	1.0	.692000	SURYANARAYANA 58B
45.00	2.000000	1.0	.729500	SURYANARAYANA 58B
45.00	2.500000	1.0	.770600	SURYANARAYANA 58B
45.00	3.000000	1.0	.817700	SURYANARAYANA 58B
45.00	3.500000	1.0	.860000	SURYANARAYANA 58B
45.00	4.000000	1.0	.907100	SURYANARAYANA 58B
45.00	4.428900	1.0	.974000	KESTIN 77B
45.00	4.428900	34.8	.973000	KESTIN 77B
45.00	4.428900	72.0	.978000	KESTIN 77B
45.00	4.428900	105.1	.980000	KESTIN 77B
45.00	4.428900	141.0	.980000	KESTIN 77B
45.00	4.428900	175.2	.983000	KESTIN 77B
45.00	4.428900	208.9	.985000	KESTIN 77B
45.00	4.428900	242.0	.983500	KESTIN 77B
45.00	4.428900	274.2	.988000	KESTIN 77B
45.00	4.428900	312.3	.988000	KESTIN 77B
45.00	4.428900	159.6	.981000	KESTIN 77B
45.00	4.428900	1.0	.970000	KESTIN 77B
45.00	4.428900	1.0	.973000	KESTIN 77B
45.00	4.500000	1.0	.964900	SURYANARAYANA 58B
45.00	5.000000	1.0	1.032000	SURYANARAYANA 58B
50.00	.017190	1.0	.547830	GONCALVES 77
50.00	.053510	1.0	.550230	GONCALVES 77
50.00	.172300	1.0	.557490	GONCALVES 77
50.00	.558930	1.0	.581010	GONCALVES 77
50.00	1.000000	1.0	.608600	SURYANARAYANA 58B
50.00	1.139470	1.0	.617370	GONCALVES 77
50.00	1.500000	1.0	.638100	SURYANARAYANA 58B
50.00	2.000000	1.0	.675300	SURYANARAYANA 58B
50.00	2.355460	1.0	.703400	GONCALVES 77
50.00	2.500000	1.0	.712500	SURYANARAYANA 58B
50.00	3.000000	1.0	.754600	SURYANARAYANA 58B
50.00	3.500000	1.0	.792300	SURYANARAYANA 58B
50.00	3.879790	1.0	.833840	GONCALVES 77
50.00	4.000000	1.0	.837200	SURYANARAYANA 58B
50.00	4.500000	1.0	.886400	SURYANARAYANA 58B
50.00	5.000000	1.0	.945400	SURYANARAYANA 58B
50.00	5.452410	1.0	1.000720	GONCALVES 77
50.00	6.280000	1.0	1.120000	POSTNIKOV 70
54.00	.475500	1.0	.548000	KESTIN 77B
54.00	.475500	35.7	.549000	KESTIN 77B
54.00	.475500	70.1	.544000	KESTIN 77B
54.00	.475500	104.6	.543000	KESTIN 77B
54.00	.475500	141.0	.542000	KESTIN 77B
54.00	.475500	174.8	.544000	KESTIN 77B
54.00	.475500	207.9	.542000	KESTIN 77B
54.00	.475500	241.3	.544000	KESTIN 77B
54.00	.475500	275.1	.547000	KESTIN 77B
54.00	.475500	310.4	.549000	KESTIN 77B
54.00	.475500	158.9	.543000	KESTIN 77B
54.00	1.471300	1.0	.598000	KESTIN 77B
54.00	1.471300	34.8	.601000	KESTIN 77B
54.00	1.471300	70.0	.600000	KESTIN 77B
54.00	1.471300	104.4	.601000	KESTIN 77B
54.00	1.471300	139.3	.600000	KESTIN 77B
54.00	1.471300	174.1	.604000	KESTIN 77B

54.00	1.471300	207.7	.605000	KESTIN 77B
54.00	1.471300	243.2	.605000	KESTIN 77B
54.00	1.471300	276.1	.607000	KESTIN 77B
54.00	1.471300	311.3	.607000	KESTIN 77B
54.00	1.471300	158.4	.603000	KESTIN 77B
54.00	1.471300	1.0	.600000	KESTIN 77B
55.00	1.000000	1.0	.561000	SURYANARAYANA 58B
55.00	1.500000	1.0	.589700	SURYANARAYANA 58B
55.00	2.000000	1.0	.622900	SURYANARAYANA 58B
55.00	2.500000	1.0	.659200	SURYANARAYANA 58B
55.00	3.000000	1.0	.696000	SURYANARAYANA 58B
55.00	3.267200	1.0	.723000	KESTIN 77B
55.00	3.267200	1.0	.724000	KESTIN 77B
55.00	3.267200	4.5	.723000	KESTIN 77B
55.00	3.267200	14.1	.725000	KESTIN 77B
55.00	3.267200	32.9	.723000	KESTIN 77B
55.00	3.267200	69.6	.726000	KESTIN 77B
55.00	3.267200	104.1	.728000	KESTIN 77B
55.00	3.267200	139.3	.729000	KESTIN 77B
55.00	3.267200	173.4	.731000	KESTIN 77B
55.00	3.267200	207.9	.733000	KESTIN 77B
55.00	3.267200	241.4	.732000	KESTIN 77B
55.00	3.267200	276.8	.736000	KESTIN 77B
55.00	3.267200	310.6	.739000	KESTIN 77B
55.00	3.267200	159.6	.730000	KESTIN 77B
55.00	3.267200	1.0	.725000	KESTIN 77B
55.00	3.500000	1.0	.739800	SURYANARAYANA 58B
55.00	4.000000	1.0	.772600	SURYANARAYANA 58B
55.00	4.500000	1.0	.819000	SURYANARAYANA 58B
55.00	5.000000	1.0	.869400	SURYANARAYANA 58B
56.00	4.428900	1.0	.818000	KESTIN 77B
56.00	4.428900	36.3	.817000	KESTIN 77B
56.00	4.428900	70.1	.821000	KESTIN 77B
56.00	4.428900	106.5	.819000	KESTIN 77B
56.00	4.428900	141.0	.823000	KESTIN 77B
56.00	4.428900	174.8	.826000	KESTIN 77B
56.00	4.428900	207.9	.827000	KESTIN 77B
56.00	4.428900	241.6	.828000	KESTIN 77B
56.00	4.428900	276.8	.832000	KESTIN 77B
56.00	4.428900	310.6	.834000	KESTIN 77B
56.00	4.428900	158.6	.825000	KESTIN 77B
56.00	4.428900	1.0	.814000	KESTIN 77B
60.00	.099900	1.0	.472400	KOROSI 68
60.00	.706900	1.0	.506100	KOROSI 68
60.00	1.094000	1.0	.526000	EZROKHI 52
60.00	1.413800	1.0	.546500	KOROSI 68
60.00	2.551400	2.1	.618000	KESTIN 77B
60.00	2.551400	37.2	.619000	KESTIN 77B
60.00	2.551400	70.7	.621000	KESTIN 77B
60.00	2.551400	104.4	.620000	KESTIN 77B
60.00	2.551400	141.7	.622000	KESTIN 77B
60.00	2.551400	174.4	.623000	KESTIN 77B
60.00	2.551400	206.8	.624000	KESTIN 77B
60.00	2.551400	239.6	.626000	KESTIN 77B
60.00	2.551400	276.1	.631000	KESTIN 77B
60.00	2.551400	309.2	.631000	KESTIN 77B
60.00	2.551400	1.4	.616000	KESTIN 77B
60.00	2.700000	1.0	.629000	EZROKHI 52
60.00	3.534500	1.0	.691300	KOROSI 68
60.00	4.300000	1.0	.750000	EZROKHI 52
60.00	5.380000	1.0	.851000	EZROKHI 52
60.00	5.405400	1.0	.854000	KESTIN 77B

60.00	5.405400	33.3	.856000	KESTIN 77B
60.00	5.405400	72.6	.859000	KESTIN 77B
60.00	5.405400	105.1	.861000	KESTIN 77B
60.00	5.405400	137.2	.862000	KESTIN 77B
60.00	5.405400	177.5	.862000	KESTIN 77B
60.00	5.405400	210.8	.867000	KESTIN 77B
60.00	5.405400	231.5	.870000	KESTIN 77B
60.00	5.405400	274.7	.869000	KESTIN 77B
60.00	5.405400	313.9	.875000	KESTIN 77B
60.00	5.405400	156.0	.864000	KESTIN 77B
60.00	5.405400	1.0	.855000	KESTIN 77B
60.00	6.150000	1.0	.926000	EZROKHI 52
60.00	6.350000	1.0	.970000	POSTNIKOV 70
69.00	.475500	1.0	.430000	KESTIN 77B
69.00	.475500	36.2	.434000	KESTIN 77B
69.00	.475500	71.0	.432000	KESTIN 77B
69.00	.475500	104.8	.433000	KESTIN 77B
69.00	.475500	139.8	.436000	KESTIN 77B
69.00	.475500	175.1	.439000	KESTIN 77B
69.00	.475500	207.9	.434000	KESTIN 77B
69.00	.475500	241.0	.439000	KESTIN 77B
69.00	.475500	273.2	.438000	KESTIN 77B
69.00	.475500	309.7	.441000	KESTIN 77B
69.00	.475500	152.7	.436000	KESTIN 77B
69.00	.475500	1.0	.429000	KESTIN 77B
70.00	1.471300	16.2	.478000	KESTIN 77B
70.00	1.471300	36.2	.477000	KESTIN 77B
70.00	1.471300	70.0	.480000	KESTIN 77B
70.00	1.471300	103.8	.479000	KESTIN 77B
70.00	1.471300	131.4	.480000	KESTIN 77B
70.00	1.471300	174.8	.479000	KESTIN 77B
70.00	1.471300	207.7	.481000	KESTIN 77B
70.00	1.471300	242.0	.485000	KESTIN 77B
70.00	1.471300	275.9	.484000	KESTIN 77B
70.00	1.471300	310.6	.484000	KESTIN 77B
70.00	1.471300	156.5	.480000	KESTIN 77B
70.00	1.471300	17.6	.476000	KESTIN 77B
70.00	3.267200	7.9	.584000	KESTIN 77B
70.00	3.267200	7.9	.586000	KESTIN 77B
70.00	3.267200	9.0	.587000	KESTIN 77B
70.00	3.267200	21.7	.585000	KESTIN 77B
70.00	3.267200	21.9	.587000	KESTIN 77B
70.00	3.267200	35.1	.586000	KESTIN 77B
70.00	3.267200	70.4	.588000	KESTIN 77B
70.00	3.267200	104.3	.589000	KESTIN 77B
70.00	3.267200	139.6	.590000	KESTIN 77B
70.00	3.267200	173.4	.595000	KESTIN 77B
70.00	3.267200	208.2	.597000	KESTIN 77B
70.00	3.267200	242.3	.596000	KESTIN 77B
70.00	3.267200	276.8	.597000	KESTIN 77B
70.00	3.267200	310.8	.600000	KESTIN 77B
70.00	3.267200	158.2	.591000	KESTIN 77B
70.00	3.267200	12.4	.586000	KESTIN 77B
70.00	6.430000	1.0	.840000	POSTNIKOV 70
71.00	4.428900	7.9	.662000	KESTIN 77B
71.00	4.428900	34.8	.662000	KESTIN 77B
71.00	4.428900	70.0	.663000	KESTIN 77B
71.00	4.428900	104.6	.664000	KESTIN 77B
71.00	4.428900	139.6	.666000	KESTIN 77B
71.00	4.428900	175.1	.670000	KESTIN 77B
71.00	4.428900	207.9	.671000	KESTIN 77B
71.00	4.428900	243.4	.671000	KESTIN 77B

71.00	4.428900	277.5	.674000	KESTIN 77B
71.00	4.428900	311.1	.676000	KESTIN 77B
71.00	4.428900	157.5	.668000	KESTIN 77B
71.00	4.428900	12.7	.659000	KESTIN 77B
71.00	4.428900	7.9	.663000	KESTIN 77B
75.00	.100100	1.0	.383600	KOROSI 68
75.00	.708300	1.0	.412500	KOROSI 68
75.00	1.416600	1.0	.447000	KOROSI 68
75.00	3.540800	1.0	.567100	KOROSI 68
78.50	1.471300	1.0	.425000	KESTIN 77B
78.50	1.471300	35.5	.427000	KESTIN 77B
78.50	1.471300	70.0	.427000	KESTIN 77B
78.50	1.471300	104.6	.429000	KESTIN 77B
78.50	1.471300	139.6	.429000	KESTIN 77B
78.50	1.471300	173.4	.431000	KESTIN 77B
78.50	1.471300	207.9	.433000	KESTIN 77B
78.50	1.471300	242.2	.433000	KESTIN 77B
78.50	1.471300	275.6	.433000	KESTIN 77B
78.50	1.471300	311.3	.436000	KESTIN 77B
78.50	1.471300	156.2	.431000	KESTIN 77B
78.50	1.471300	1.0	.426000	KESTIN 77B
78.50	1.471300	1.0	.428000	KESTIN 77B
80.00	2.551400	1.7	.474000	KESTIN 77B
80.00	2.551400	36.2	.476000	KESTIN 77B
80.00	2.551400	71.3	.477000	KESTIN 77B
80.00	2.551400	105.5	.479000	KESTIN 77B
80.00	2.551400	141.0	.479000	KESTIN 77B
80.00	2.551400	173.4	.481000	KESTIN 77B
80.00	2.551400	206.5	.482000	KESTIN 77B
80.00	2.551400	239.6	.483000	KESTIN 77B
80.00	2.551400	274.7	.484000	KESTIN 77B
80.00	2.551400	307.8	.486000	KESTIN 77B
80.00	2.551400	1.7	.474000	KESTIN 77B
80.00	5.405400	8.6	.654000	KESTIN 77B
80.00	5.405400	34.5	.656000	KESTIN 77B
80.00	5.405400	70.1	.656000	KESTIN 77B
80.00	5.405400	104.4	.659000	KESTIN 77B
80.00	5.405400	138.9	.664000	KESTIN 77B
80.00	5.405400	173.4	.660000	KESTIN 77B
80.00	5.405400	208.6	.665000	KESTIN 77B
80.00	5.405400	243.0	.665000	KESTIN 77B
80.00	5.405400	276.8	.667000	KESTIN 77B
80.00	5.405400	312.7	.669000	KESTIN 77B
80.00	5.405400	214.1	.662000	KESTIN 77B
80.00	5.405400	110.6	.654000	KESTIN 77B
80.00	5.405400	10.3	.653000	KESTIN 77B
80.00	6.510000	1.0	.740000	POSTNIKOV 70
84.00	.475500	1.0	.356000	KESTIN 77B
84.00	.475500	36.9	.358000	KESTIN 77B
84.00	.475500	105.5	.359000	KESTIN 77B
84.00	.475500	174.1	.360000	KESTIN 77B
84.00	.475500	240.1	.363000	KESTIN 77B
84.00	.475500	308.9	.365000	KESTIN 77B
84.00	.475500	161.3	.362000	KESTIN 77B
84.00	.475500	1.0	.356000	KESTIN 77B
84.00	3.267200	8.6	.494000	KESTIN 77B
84.00	3.267200	10.3	.494000	KESTIN 77B
84.00	3.267200	21.7	.495000	KESTIN 77B
84.00	3.267200	35.6	.496000	KESTIN 77B
84.00	3.267200	70.1	.496000	KESTIN 77B
84.00	3.267200	104.4	.497000	KESTIN 77B
84.00	3.267200	139.6	.498000	KESTIN 77B

84.00	3.267200	173.6	.499000	KESTIN 77B
84.00	3.267200	207.5	.501000	KESTIN 77B
84.00	3.267200	242.7	.503000	KESTIN 77B
84.00	3.267200	276.5	.504000	KESTIN 77B
84.00	3.267200	311.1	.504000	KESTIN 77B
84.00	3.267200	159.9	.498000	KESTIN 77B
84.00	3.267200	10.5	.493000	KESTIN 77B
85.00	4.428900	10.0	.558000	KESTIN 77B
85.00	4.428900	34.8	.556000	KESTIN 77B
85.00	4.428900	71.2	.560000	KESTIN 77B
85.00	4.428900	105.5	.562000	KESTIN 77B
85.00	4.428900	140.6	.563000	KESTIN 77B
85.00	4.428900	174.8	.563000	KESTIN 77B
85.00	4.428900	206.8	.565000	KESTIN 77B
85.00	4.428900	242.5	.568000	KESTIN 77B
85.00	4.428900	276.8	.569000	KESTIN 77B
85.00	4.428900	311.3	.570000	KESTIN 77B
85.00	4.428900	157.0	.563000	KESTIN 77B
85.00	4.428900	7.6	.557000	KESTIN 77B
85.00	4.428900	10.7	.557000	KESTIN 77B
94.00	5.405400	10.2	.556000	KESTIN 77B
94.00	5.405400	34.7	.557000	KESTIN 77B
94.00	5.405400	68.2	.559000	KESTIN 77B
94.00	5.405400	103.9	.561000	KESTIN 77B
94.00	5.405400	137.6	.561000	KESTIN 77B
94.00	5.405400	172.5	.565000	KESTIN 77B
94.00	5.405400	209.2	.567000	KESTIN 77B
94.00	5.405400	242.9	.566000	KESTIN 77B
94.00	5.405400	279.6	.568000	KESTIN 77B
94.00	5.405400	312.8	.566000	KESTIN 77B
94.00	5.405400	161.7	.562000	KESTIN 77B
94.00	5.405400	14.3	.557000	KESTIN 77B
96.00	.475500	7.2	.311000	KESTIN 77B
96.00	.475500	33.8	.312000	KESTIN 77B
96.00	.475500	103.1	.314000	KESTIN 77B
96.00	.475500	173.4	.315000	KESTIN 77B
96.00	.475500	240.6	.317000	KESTIN 77B
96.00	.475500	305.4	.318000	KESTIN 77B
96.00	.475500	77.6	.314000	KESTIN 77B
97.00	4.428900	10.0	.489000	KESTIN 77B
97.00	4.428900	34.8	.490000	KESTIN 77B
97.00	4.428900	70.7	.492000	KESTIN 77B
97.00	4.428900	105.0	.493000	KESTIN 77B
97.00	4.428900	142.2	.494000	KESTIN 77B
97.00	4.428900	175.5	.496000	KESTIN 77B
97.00	4.428900	207.3	.497000	KESTIN 77B
97.00	4.428900	239.6	.498000	KESTIN 77B
97.00	4.428900	270.8	.499000	KESTIN 77B
97.00	4.428900	280.9	.500000	KESTIN 77B
97.00	4.428900	159.4	.495000	KESTIN 77B
97.00	4.428900	10.8	.488000	KESTIN 77B
98.50	1.471300	4.5	.340000	KESTIN 77B
98.50	1.471300	34.5	.341000	KESTIN 77B
98.50	1.471300	67.9	.341000	KESTIN 77B
98.50	1.471300	103.8	.343000	KESTIN 77B
98.50	1.471300	140.3	.344000	KESTIN 77B
98.50	1.471300	175.5	.344000	KESTIN 77B
98.50	1.471300	206.8	.346000	KESTIN 77B
98.50	1.471300	242.9	.346000	KESTIN 77B
98.50	1.471300	276.8	.349000	KESTIN 77B
98.50	1.471300	310.9	.348000	KESTIN 77B
98.50	1.471300	185.1	.345000	KESTIN 77B

98.50	1.471300	12.2	.340000	KESTIN 77B
98.50	3.267200	7.7	.421000	KESTIN 77B
98.50	3.267200	9.3	.422000	KESTIN 77B
98.50	3.267200	22.0	.421000	KESTIN 77B
98.50	3.267200	35.1	.422000	KESTIN 77B
98.50	3.267200	70.1	.424000	KESTIN 77B
98.50	3.267200	104.1	.425000	KESTIN 77B
98.50	3.267200	139.9	.426000	KESTIN 77B
98.50	3.267200	172.5	.426000	KESTIN 77B
98.50	3.267200	207.9	.428000	KESTIN 77B
98.50	3.267200	241.6	.429000	KESTIN 77B
98.50	3.267200	276.3	.431000	KESTIN 77B
98.50	3.267200	310.9	.432000	KESTIN 77B
98.50	3.267200	159.9	.426000	KESTIN 77B
98.50	3.267200	9.5	.421000	KESTIN 77B
100.00	.100400	1.0	.286900	KOROSI 68
100.00	.710300	1.0	.309700	KOROSI 68
100.00	1.420700	1.0	.337100	KOROSI 68
100.00	3.550200	1.0	.429900	KOROSI 68
101.00	2.551400	5.8	.378000	KESTIN 77B
101.00	2.551400	35.1	.378000	KESTIN 77B
101.00	2.551400	71.3	.379000	KESTIN 77B
101.00	2.551400	105.8	.381000	KESTIN 77B
101.00	2.551400	139.9	.382000	KESTIN 77B
101.00	2.551400	174.4	.382000	KESTIN 77B
101.00	2.551400	206.8	.385000	KESTIN 77B
101.00	2.551400	238.2	.385000	KESTIN 77B
101.00	2.551400	272.7	.386000	KESTIN 77B
101.00	2.551400	308.5	.386000	KESTIN 77B
101.00	2.551400	161.0	.382000	KESTIN 77B
101.00	2.551400	6.5	.377000	KESTIN 77B
101.00	5.405400	13.8	.524000	KESTIN 77B
101.00	5.405400	35.5	.523000	KESTIN 77B
101.00	5.405400	71.3	.525000	KESTIN 77B
101.00	5.405400	107.2	.527000	KESTIN 77B
101.00	5.405400	139.9	.528000	KESTIN 77B
101.00	5.405400	175.8	.527000	KESTIN 77B
101.00	5.405400	211.3	.532000	KESTIN 77B
101.00	5.405400	244.4	.534000	KESTIN 77B
101.00	5.405400	276.8	.535000	KESTIN 77B
101.00	5.405400	313.7	.536000	KESTIN 77B
101.00	5.405400	155.8	.529000	KESTIN 77B
101.00	5.405400	88.4	.526000	KESTIN 77B
101.00	5.405400	11.9	.523000	KESTIN 77B
108.50	.475500	10.7	.274000	KESTIN 77B
108.50	.475500	36.5	.275000	KESTIN 77B
108.50	.475500	102.5	.276000	KESTIN 77B
108.50	.475500	237.5	.280000	KESTIN 77B
108.50	.475500	307.0	.282000	KESTIN 77B
108.50	.475500	162.0	.278000	KESTIN 77B
108.50	.475500	14.1	.274000	KESTIN 77B
113.00	3.267200	8.8	.366000	KESTIN 77B
113.00	3.267200	8.9	.366000	KESTIN 77B
113.00	3.267200	21.7	.366000	KESTIN 77B
113.00	3.267200	34.8	.367000	KESTIN 77B
113.00	3.267200	70.0	.368000	KESTIN 77B
113.00	3.267200	104.1	.369000	KESTIN 77B
113.00	3.267200	139.3	.370000	KESTIN 77B
113.00	3.267200	174.1	.371000	KESTIN 77B
113.00	3.267200	206.7	.372000	KESTIN 77B
113.00	3.267200	242.3	.374000	KESTIN 77B
113.00	3.267200	275.8	.375000	KESTIN 77B

113.00	3.267200	310.8	.376000	KESTIN 77B
113.00	3.267200	163.2	.370000	KESTIN 77B
113.00	3.267200	8.8	.365000	KESTIN 77B
114.00	4.428900	14.7	.414000	KESTIN 77B
114.00	4.428900	36.4	.415000	KESTIN 77B
114.00	4.428900	70.5	.415000	KESTIN 77B
114.00	4.428900	104.4	.418000	KESTIN 77B
114.00	4.428900	140.3	.419000	KESTIN 77B
114.00	4.428900	174.6	.419000	KESTIN 77B
114.00	4.428900	210.3	.421000	KESTIN 77B
114.00	4.428900	242.3	.422000	KESTIN 77B
114.00	4.428900	276.5	.424000	KESTIN 77B
114.00	4.428900	307.8	.426000	KESTIN 77B
114.00	4.428900	157.9	.419000	KESTIN 77B
114.00	4.428900	10.0	.413000	KESTIN 77B
120.00	1.471300	8.3	.278000	KESTIN 77B
120.00	1.471300	35.8	.278000	KESTIN 77B
120.00	1.471300	68.8	.279000	KESTIN 77B
120.00	1.471300	104.4	.279000	KESTIN 77B
120.00	1.471300	138.2	.281000	KESTIN 77B
120.00	1.471300	174.4	.282000	KESTIN 77B
120.00	1.471300	207.5	.283000	KESTIN 77B
120.00	1.471300	241.6	.284000	KESTIN 77B
120.00	1.471300	274.1	.285000	KESTIN 77B
120.00	1.471300	311.6	.286000	KESTIN 77B
120.00	1.471300	153.0	.282000	ABE 77
120.00	1.471300	8.3	.277000	KESTIN 77B
121.00	2.551400	306.5	.323000	KESTIN 77B
121.00	2.551400	10.7	.313000	KESTIN 77B
121.00	2.551400	6.5	.314000	KESTIN 77B
121.00	2.551400	36.2	.315000	KESTIN 77B
121.00	2.551400	68.9	.315000	KESTIN 77B
121.00	2.551400	103.8	.315000	KESTIN 77B
121.00	2.551400	139.6	.317000	KESTIN 77B
121.00	2.551400	172.7	.319000	KESTIN 77B
121.00	2.551400	205.4	.320000	KESTIN 77B
121.00	2.551400	238.2	.321000	KESTIN 77B
121.00	2.551400	272.7	.322000	KESTIN 77B
125.00	.100900	1.0	.226000	KOROSI 68
125.00	.714400	1.0	.245200	KOROSI 68
125.00	1.428900	1.0	.267800	KOROSI 68
125.00	3.568600	1.0	.343300	KOROSI 68
18.00	.475500	1.0	1.089000	KESTIN 77B
126.00	.475500	9.3	.234000	KESTIN 77B
126.00	.475500	35.1	.234000	KESTIN 77B
126.00	.475500	87.2	.237000	KESTIN 77B
126.00	.475500	135.5	.237000	KESTIN 77B
126.00	.475500	185.1	.238000	KESTIN 77B
126.00	.475500	252.0	.241000	KESTIN 77B
126.00	.475500	309.6	.242000	KESTIN 77B
126.00	.475500	165.1	.238000	KESTIN 77B
126.00	.475500	15.5	.234000	KESTIN 77B
129.00	4.428900	11.4	.361000	KESTIN 77B
129.00	4.428900	33.8	.365000	KESTIN 77B
129.00	4.428900	70.0	.365000	KESTIN 77B
129.00	4.428900	105.1	.366000	KESTIN 77B
129.00	4.428900	140.8	.366000	KESTIN 77B
129.00	4.428900	174.1	.369000	KESTIN 77B
129.00	4.428900	207.2	.369000	KESTIN 77B
129.00	4.428900	241.6	.370000	KESTIN 77B
129.00	4.428900	275.9	.373000	KESTIN 77B
129.00	4.428900	303.7	.373000	KESTIN 77B

129.00	4.428900	161.4	.368000	KESTIN 77B
129.00	4.428900	16.5	.364000	KESTIN 77B
131.00	5.405400	15.5	.395000	KESTIN 77B
131.00	5.405400	34.8	.396000	KESTIN 77B
131.00	5.405400	69.3	.398000	KESTIN 77B
131.00	5.405400	105.8	.399000	KESTIN 77B
131.00	5.405400	139.9	.399000	KESTIN 77B
131.00	5.405400	174.4	.399000	KESTIN 77B
131.00	5.405400	207.9	.404000	KESTIN 77B
131.00	5.405400	243.9	.403000	KESTIN 77B
131.00	5.405400	275.4	.405000	KESTIN 77B
131.00	5.405400	315.4	.406000	KESTIN 77B
131.00	5.405400	156.5	.401000	KESTIN 77B
131.00	5.405400	15.5	.395000	KESTIN 77B
131.50	3.267200	7.2	.313000	KESTIN 77B
131.50	3.267200	8.5	.313000	KESTIN 77B
131.50	3.267200	21.7	.312000	KESTIN 77B
131.50	3.267200	35.1	.313000	KESTIN 77B
131.50	3.267200	70.1	.314000	KESTIN 77B
131.50	3.267200	104.8	.314000	KESTIN 77B
131.50	3.267200	140.3	.316000	KESTIN 77B
131.50	3.267200	175.1	.318000	KESTIN 77B
131.50	3.267200	207.7	.318000	KESTIN 77B
131.50	3.267200	242.[illegible]	.319000	KESTIN 77B
131.50	3.267200	276.6	.320000	KESTIN 77B
131.50	3.267200	310.9	.322000	KESTIN 77B
131.50	3.267200	159.8	.317000	KESTIN 77B
131.50	3.267200	10.7	.312000	KESTIN 77B
135.50	1.471300	8.4	.246000	KESTIN 77B
135.50	1.471300	34.1	.245000	KESTIN 77B
135.50	1.471300	70.3	.246000	KESTIN 77B
135.50	1.471300	105.8	.247000	KESTIN 77B
135.50	1.471300	138.9	.248000	KESTIN 77B
135.50	1.471300	174.1	.249000	KESTIN 77B
135.50	1.471300	207.5	.251000	KESTIN 77B
135.50	1.471300	242.3	.251000	KESTIN 77B
135.50	1.471300	277.8	.252000	KESTIN 77B
135.50	1.471300	311.6	.252000	KESTIN 77B
135.50	1.471300	160.3	.249000	KESTIN 77B
135.50	1.471300	11.7	.245000	KESTIN 77B
136.00	2.551400	7.2	.278000	KESTIN 77B
136.00	2.551400	35.5	.278000	KESTIN 77B
136.00	2.551400	68.6	.279000	KESTIN 77B
136.00	2.551400	101.7	.281000	KESTIN 77B
136.00	2.551400	139.6	.281000	KESTIN 77B
136.00	2.551400	175.1	.283000	KESTIN 77B
136.00	2.551400	206.1	.283000	KESTIN 77B
136.00	2.551400	240.6	.284000	KESTIN 77B
136.00	2.551400	272.7	.285000	KESTIN 77B
136.00	2.551400	307.5	.286000	KESTIN 77B
136.00	2.551400	14.5	.278000	KESTIN 77B
148.00	.475500	10.0	.198000	KESTIN 77B
148.00	.475500	51.0	.201000	KESTIN 77B
148.00	.475500	103.8	.200000	KESTIN 77B
148.00	.475500	153.4	.202000	KESTIN 77B
148.00	.475500	206.5	.203000	KESTIN 77B
148.00	.475500	251.6	.204000	KESTIN 77B
148.00	.475500	305.1	.205000	KESTIN 77B
148.00	5.405400	36.7	.347000	KESTIN 77B
148.00	5.405400	71.3	.348000	KESTIN 77B
148.00	5.405400	104.6	.350000	KESTIN 77B
148.00	5.405400	138.2	.350000	KESTIN 77B

148.00	5.405400	173.9	.352000	KESTIN 77B
148.00	5.405400	210.4	.354000	KESTIN 77B
148.00	5.405400	243.4	.355000	KESTIN 77B
148.00	5.405400	277.3	.356000	KESTIN 77B
148.00	5.405400	312.7	.355000	KESTIN 77B
148.00	5.405400	161.7	.352000	KESTIN 77B
148.00	5.405400	7.7	.346000	KESTIN 77B
150.00	.162000	1.0	.185800	KOROSI 68
150.00	.721700	1.0	.202000	KOROSI 68
150.00	1.443800	1.0	.221300	KOROSI 68
150.00	3.602400	1.0	.285200	KOROSI 68
151.00	2.551400	7.9	.249000	KESTIN 77B
151.00	2.551400	35.8	.250000	KESTIN 77B
151.00	2.551400	59.6	.251000	KESTIN 77B
151.00	2.551400	104.1	.251000	KESTIN 77B
151.00	2.551400	138.2	.253000	KESTIN 77B
151.00	2.551400	174.8	.254000	KESTIN 77B
151.00	2.551400	206.1	.255000	KESTIN 77B
151.00	2.551400	239.9	.255000	KESTIN 77B
151.00	2.551400	271.3	.256000	KESTIN 77B
151.00	2.551400	305.8	.257000	KESTIN 77B
151.00	2.551400	19.3	.249000	KESTIN 77B
152.00	1.471300	3.4	.218000	KESTIN 77B
152.00	1.471300	35.8	.219000	KESTIN 77B
152.00	1.471300	70.7	.219000	KESTIN 77B
152.00	1.471300	108.1	.220000	KESTIN 77B
152.00	1.471300	140.6	.221000	KESTIN 77B
152.00	1.471300	172.3	.222000	KESTIN 77B
152.00	1.471300	211.3	.223000	KESTIN 77B
152.00	1.471300	243.2	.223000	KESTIN 77B
152.00	1.471300	276.1	.225000	KESTIN 77B
152.00	1.471300	311.6	.225000	KESTIN 77B
152.00	1.471300	159.4	.222000	KESTIN 77B
152.00	1.471300	20.2	.219000	KESTIN 77B
154.00	3.267200	8.1	.265000	KESTIN 77B
154.00	3.267200	19.3	.265000	KESTIN 77B
154.00	3.267200	24.8	.265000	KESTIN 77B
154.00	3.267200	35.5	.266000	KESTIN 77B
154.00	3.267200	70.1	.267000	KESTIN 77B
154.00	3.267200	106.2	.268000	KESTIN 77B
154.00	3.267200	139.6	.270000	KESTIN 77B
154.00	3.267200	173.8	.270000	KESTIN 77B
154.00	3.267200	208.2	.271000	KESTIN 77B
154.00	3.267200	242.3	.272000	KESTIN 77B
154.00	3.267200	276.5	.272000	KESTIN 77B
154.00	3.267200	312.1	.273000	KESTIN 77B
154.00	3.267200	161.7	.269000	KESTIN 77B

Table 2. Smoothed values of the viscosity of NaCl solutions calculated from Eq 11.

Viscosity, cp

m NaCl / °C	.5	1.0	2.0	3.0	4.0	5.0
0	1.853	1.914	2.058	2.234	2.448	2.701
10.0	1.373	1.428	1.556	1.712	1.899	2.118
20.0	1.049	1.098	1.212	1.349	1.512	1.699
30.0	.827	.871	.972	1.092	1.232	1.391
40.0	.673	.712	.800	.905	1.024	1.158
50.0	.564	.598	.675	.765	.866	.978
60.0	.484	.513	.580	.657	.743	.835
70.0	.423	.449	.507	.572	.644	.719
80.0	.377	.399	.449	.504	.564	.626
90.0	.340	.359	.401	.448	.498	.549
100.0	.310	.326	.362	.401	.443	.487
110.0	.285	.299	.329	.363	.399	.439
120.0	.264	.276	.302	.331	.363	.402
130.0	.246	.256	.279	.305	.336	.376
140.0	.231	.240	.261	.285	.316	.361
150.0	.218	.227	.246	.270	.304	.357

APPENDIX

Dynamic viscosity of water substance from the Eighth International Conference on the Properties of Steam. Giens, France, September 1974. See Reference 11. Only a portion of the tables is reproduced here.

Appendix C

Part 2. Recommended Interpolating Equation

The values appearing in Table 1 may be reproduced within the stated tolerances by the use of the formula given below, wherein

μ denotes the dynamic viscosity
ρ denotes density *)
T denotes absolute temperature on the 1968 Practical Temperature Scale
T^* and ρ^* denote numerical constants which are close to, but do not represent the corresponding critical constants
a_k and b_{ij} are numerical constants.

$$\mu = \mu_o \exp\left[\frac{\rho}{\rho^*} \sum_{i=0}^{5} \sum_{j=0}^{4} b_{ij} \left(\frac{T^*}{T} - 1\right)^i \left(\frac{\rho}{\rho^*} - 1\right)^j\right], \qquad (1)$$

where

$$\frac{\mu_o}{\mu\text{Pa s}} = \left(\frac{T}{T^*}\right)^{1/2} \left[\sum_{k=0}^{3} a_k \left(\frac{T^*}{T}\right)^k\right]^{-1}. \qquad (2)$$

The constants appearing in the preceding equations have the numerical values given below and in Table a for b_{ij}:

$$\left.\begin{aligned} T^* &= 647.27 \text{ K} \\ \rho^* &= 317.763 \text{ kg/m}^3 \end{aligned}\right\} \qquad (3)$$

$$\left.\begin{aligned} a_o &= 0.018\,1583 \\ a_1 &= 0.017\,7624 \\ a_2 &= 0.010\,5287 \\ a_3 &= -0.003\,6744 \end{aligned}\right\} \qquad (4)$$

*) For preference and to reproduce the values given in Appendix D, the density should be computed with the aid of the 1968 IFC Formulation for Scientific and General Use. If another density formulation is used, a relative departure of $\Delta\rho/\rho$ induces at most a relative departure $\pm\ \Delta\mu/\mu = 2.5\ \Delta\rho/\rho$ in viscosity.

Appendix C (cont'd)

Table a Numerical Values of the Coefficients b_{ij}

i=	0	1	2	3	4	5
j=0	0.501 938	0.162 888	-0.130 356	0.907 919	-0.551 119	0.146 543
1	0.235 622	0.789 393	0.673 665	1.207 552	0.067 0665	-0.084 3370
2	-0.274 637	-0.743 539	-0.959 456	-0.687 343	-0.497 089	0.195 286
3	0.145 831	0.263 129	0.347 247	0.213 486	0.100 754	-0.032 932
4	-0.027 0448	-0.025 3093	-0.026 7758	-0.082 2904	0.060 2253	-0.020 2595

The correlating equation presented in this Appendix is valid in the range

$$0 < T < 800°C$$

in temperature, and

$$0 < \rho < 1050 \text{ kg/m}^3$$

in density, which corresponds to an approximate pressure range

$$0 < P < 100 \text{ MPa}$$

its domain of validity can be extended to

$P = 1000$ MPa in the range $0 < T < 100°C$

$P = 350$ MPa in the range $100°C < T < 560°C$.

The equation adopted in this Appendix is not the only possible interpolation formula. An alternative form was given in the paper, "Correlation of Viscosity for Water and Steam", by A. Nagashima, M. Ikeda and I. Tanishita, Proc. Eighth ICPS, Giens, France, 1974.

Appendix D

Viscosity of Compressed Water and Superheated Steam

Viscosity in μPa s ($\equiv 10^{-6}$ kg/m s)

Pressure P in MPa

Temperature T in °C.

(Smoothed values obtained with the aid of eqs. (1) and (2) of Appendix C together with the constants listed therein, and density values based on the 1968 IFC Formulation for Scientific and General Use).

APPENDIX D

Dynamic Viscosity of Water and Steam

P/T	0.0	25.0	50.0	75.0	100.0	150.0	200.0	250.0
0.1	1792	890.7	547.1	378.3	12.28	14.19	16.18	18.22
0.5	1791	890.6	547.1	378.4	282.3	181.9	16.07	18.15
1.0	1790	890.5	547.2	378.6	282.4	182.0	15.93	18.07
2.5	1786	890.2	547.5	378.9	282.8	182.4	133.8	17.83
5.0	1780	889.7	547.9	379.6	283.5	183.1	134.5	106.1
7.5	1775	889.3	548.3	380.2	284.2	183.7	135.1	106.8
10.0	1769	888.8	548.7	380.8	284.8	184.4	135.7	107.5
12.5	1764	888.4	549.1	381.5	285.5	185.0	136.3	108.2
15.0	1759	888.0	549.6	382.1	286.2	185.7	137.0	108.9
17.5	1754	887.7	550.0	382.7	286.9	186.3	137.6	109.5
20.0	1749	887.4	550.4	383.3	287.5	186.9	138.2	110.2
22.5	1744	887.1	550.9	384.0	288.2	187.6	138.8	110.8
25.0	1740	886.8	551.4	384.6	288.9	188.2	139.4	111.4
27.5	1735	886.6	551.8	385.3	289.5	188.8	140.0	112.0
30.0	1731	886.3	552.3	385.9	290.2	189.5	140.5	112.6
35.0	1722	886.0	553.3	387.2	291.6	190.7	141.7	113.8
40.0	1714	885.7	554.3	388.5	292.9	191.9	142.8	115.0
45.0	1707	885.6	555.3	389.8	294.2	193.2	144.0	116.1
50.0	1700	885.5	556.4	391.1	295.6	194.4	145.1	117.2
55.0	1693	885.5	557.5	392.4	296.9	195.6	146.2	118.3
60.0	1687	885.7	558.6	393.7	298.2	196.8	147.3	119.4
65.0	1681	885.9	559.7	395.0	299.6	198.1	148.4	120.5
70.0	1676	886.2	560.9	396.4	300.9	199.3	149.5	121.5
75.0	1671	886.6	562.1	397.7	302.2	200.5	150.6	122.5
80.0	1667	887.1	563.3	399.1	303.6	201.7	151.6	123.5
85.0	1662	887.7	564.6	400.4	304.9	202.9	152.7	124.5
90.0	1659	888.4	565.8	401.8	306.3	204.1	153.7	125.5
95.0	1655	889.1	567.1	403.2	307.6	205.2	154.8	126.5
100.0	1652	889.9	568.4	404.6	309.0	206.4	155.8	127.4

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