REFERENCES

1 . Schiff, D., Verlet, L. "Ground State of Liquid Helium-4 and Helium-3", Physical Review . 160 , (1967) : 208 - 218.

2 . McMillan, W.L. "Ground State of Liquid ^{4}He", Physical Review . 138A, (1965) : 442 - 451.

3 . Jastrow, R. "Many-Body Problem with Strong Forces", Physical Review . 98, (1955) : 1479 - 1487.

4 . Tilly, David R. and Tilly, John. Superfluidity and Superconductivity. 262 pp . Van Nostrand Reinhold, New York, 1974

5 . Visoottiviseth, Kitt. "Reduced Density Matrices and Thermo-hydrodynamic Equation of He II", J. Sci. Soc. Thailand . 9, (1983) : 223 - 232.

6 . Puoskari, M. and Kallio, A. "Hypernetted-chain theory of the momentum distribution for Bose systems with mixture formalism", Physical Review . 30B, (1984) : 152 - 158

7 . de Boer., Michels, A. Physica. 6, (1938) : 945 - 951.

8 . Sposito, Garrison; and Hukoveh, Edward. "The Interatomic Potential in Liquid ^{4}He II. Fourier Transform of the Potential", J. Low. Temp. Phys. 9, (1972) : 495 - 498.

9 . Aziz, R.A., Nain, V.P.S., Carley, J.S., Taylor, W.L. and McConville, G.T. "An Accurate Interatomic Potential for Helium", J. Chem. Phys. 70, (1979) : 4330 - 4342.

10. London, F. Superfluids. 217 pp . Wiley, New York, Vol 1. 1954.

11 . Lam, P.M. and Ristig, M.L. "Condensed Phase of Liquid ^{4}He", Physical Review . 20B, (1979) : 1960 - 1968.

12 . Cummings, F.W. and Visoottiviseth, Kitt. "The Equilibrium Condensate Fraction in Superfluid Helium", J. Sci. Soc. Thailand . 1, (1975) : 226 - 232.

13 . Kalos, M.H., Lee, M.A., Whitlock, P.A. and Chester, G.V. "Modern Potential and the Properties of Condensed ^{4}He", Physical Review . 24B, (1981) : 115 - 130.

14 . Cummings, F.W. "Macroscopic Wave Function", in Statistical Mechanics . (Rice, S.A.,et.al.,ed.) p.319 - 333, the Univ. of Chicago Press, 410 pp, 1972.

15 . Tisza, L. "The Theory of Liquid Helium", Physical Review . 1, (1947) : 838 - 854.

16 . Landau, L. "The Theory of Superfluidity of Helium II", J. Phys U.S.S.R. 5, (1969) : 71 - 89.

17 . Fröhlich, H. "The Microscopic Wave Equation of Superfluids", Phys Kondens Materie . 9, (1969) : 350 - 358.

18 . Cummings, F.W., Hyland, G.J. and Rowland, G. "Proposal for Measurement of Helium II Condensate", Phys. Kondens Materie . 12, (1970) : 90 - 95.

19 . Penrose, O. and Onsager, L. "Bose-Einstein Condensation and Liquid Helium", Physical Review . 104, (1956) : 576 - 584

20 . Yang, C.N. "Concept of Off-Diagonal Long-Range Order and the Quantum Phase of Liquid He and of Superconductors", Rev. Mod. Phys . 34, (1962) : 694 - 704.

21 . Sears, V.F., Svensson, E.C., Martel, P. and Wood, A.D.B. "Neutron-Scattering Determination of the Momentum Distribution and the Condensate Fraction in Liquid ^{4}He", Physical Review Letters . 49, (1982) : 279 - 282.

22 . Cummings, F.W. "The Condensate in ^{4}He II as a Pilot Wave", Physical Letters . 34A, (1971) : 196 - 197.

23 . Beliaev,S.T. "Application of the Methods of Quantum Field Theory to a System of Bosons", JETP 34(7), (1958): 289 - 299.

24 . Terreaux, C. and Lal, P. "A Consistent Form of Reduced Density Matrices of Superfluids", Phys. Kondens. Materie . 12, (1970) : 131 - 137.

25 . Visoottiviseth, Kitt. "Chemical Potential of Liquid ^{4}He II", J. Sc. Research, Fac. Sci, Chulalongkorn Univ, Bangkok, Thailand . 9 (1984) : 1 - 10

26 . Sears, V.F. "Kinetic Energy and Condensate Fraction of Superfluid ^{4}He", Physical Review . 28B, (1983) : 5109 - 5116.

27 . Bogolubov, N.N. Lecture on Quantum Statistics,,Vol 1 & 2 Gordon and Breach, New York, 242 pp & 231 pp, 1967,1970.

28 . Gross, E.P. "Theory of Liquid Helium", in Quantum Fluids,(Wiser, N. and Amit, D.J.,ed.) p.285 -316, Gordon and Breach, New York, 614 pp, 1970.

29 . Visoottiviseth, Kitt. "Superfluid Condensate in Liquid ^{4}He II", Ph.D. Dissertation, University of California, Riverside, U.S.A. (1973).

30 . Visoottiviseth, Kitt. "Condensate Fraction of Liquid ^{4}He at 0 K and near T_λ", 10 th Conference of Science and Technology of Thailand, (1984) : 132 - 133.

31 . Francis, W.P., Chester, G.V., and Reatto, L. "Ground State of Liquid He^4", Physical Review . 1A, (1970) : 86-97.

32 . Whitlock, P.A, Ceperley, D.M, Chester,G.V, and Kalos, M.H. "Properties of Liquid and Solid ^{4}He", Physical Review . 19B, (1979) : 5598-5633.

33 . Wong, V.K. "Phenomenological Theory for Liquid Helium Near the λ-Transition", Physics Letters . 27A, (1968) : 269-270.

34 . Tyson, J.A, and Douglass, D.H. "Superfluid Density and Scaling Laws for Liquid Helium Near T_λ", Physical Review Letters . 17 , (1966) : 472-474.

35 . Creswick, J. "On the Relation Between the Normal Fluid Density and the One Particle Green Function for Bose Fluids" Physica . 112A, (1982) : 597-604.

36 . Fröhlich, H. "Microscopic Derivation of the Equation of Hydrodynamics" , Physica . 37 , (1967) : 215-226.

37 . Fröhlich, H. "Proceedings of the International Conference on Statistical Mechanics, Kyoto 1968", J. Phys. Soc. Japan . 26 , supplement, (1969): 189-195.

38 . Griffin,A. "Structure of the Staic Pair-Correlation Function in Superfluid ^{4}He", Physical Review . 22B, (1980) : 5193-5198.

39 . Yukalov, V.I. "Pair Correlations in Superfluid Helium", Physics Letters . 83A, (1981) : 26-28.

40 . Ghassib, H.B, and Sridhar, R. "On the Fröhlich Decomposition and the Condensate Fraction in He II", Physics Letters . 100A, (1984) : 198-200.

APPENDIX A

Here we wish to demonstrate one result used in equation (4-38):

Consider

$$(\nabla' - \nabla'') = (\frac{\partial}{\partial x'} - \frac{\partial}{\partial x''})\hat{i} + (\frac{\partial}{\partial y'} - \frac{\partial}{\partial y''})\hat{j} + (\frac{\partial}{\partial z'} - \frac{\partial}{\partial z''})\hat{k} \quad \text{(A-1)}$$

and $\vec{r} = \vec{x}' - \vec{x}''$; $\vec{R} = \frac{\vec{x}' - \vec{x}''}{2}$ (A-2)

which

$$r_x = x' - x'' \; ; \quad r_y = y' - y'' \; ; \quad r_z = z' - z''$$

$$R_x = \frac{x' + x''}{2} \; ; \quad R_y = \frac{y' + y''}{2} \; ; \quad R_z = \frac{z' + z''}{2} \quad \text{(A-3)}$$

thus

$$\frac{\partial}{\partial x'} = \frac{\partial}{\partial r_x} \cdot \frac{\partial r_x}{\partial x'} = \frac{\partial}{\partial r_x} \quad \text{(A-4)}$$

$$\frac{\partial}{\partial x''} = \frac{\partial}{\partial r_x} \cdot \frac{\partial r_x}{\partial x''} = \frac{\partial}{\partial r_x} \quad \text{(A-5)}$$

Substracting equation (A-5) with equation (A-4), thus

$$\frac{\partial}{\partial x'} - \frac{\partial}{\partial x''} = \frac{2\partial}{\partial r_x} \quad \text{(A-6)}$$

In similary ,

$$\frac{\partial}{\partial y'} - \frac{\partial}{\partial y''} = \frac{2\partial}{\partial r_y} \quad \text{(A-7)}$$

$$\frac{\partial}{\partial z'} - \frac{\partial}{\partial z''} = \frac{2\partial}{\partial r_z} \quad \text{(A-8)}$$

thus

$$\left(\frac{\partial}{\partial x'} - \frac{\partial}{\partial x''}\right)\hat{i} + \left(\frac{\partial}{\partial y'} - \frac{\partial}{\partial y''}\right)\hat{j} + \left(\frac{\partial}{\partial z'} - \frac{\partial}{\partial z''}\right)\hat{k} = \frac{2\partial}{\partial r_x}\hat{i} + \frac{2\partial}{\partial r_y}\hat{j} + \frac{2\partial}{\partial r_z}\hat{k} \tag{A-9}$$

$$(\nabla' - \nabla'') = 2\nabla_{\vec{r}} \tag{A-10}$$

and

$$(\nabla' + \nabla'') = \left(\frac{\partial}{\partial x'} + \frac{\partial}{\partial x''}\right)\hat{i} + \left(\frac{\partial}{\partial y'} + \frac{\partial}{\partial y''}\right)\hat{j} + \left(\frac{\partial}{\partial z'} + \frac{\partial}{\partial z''}\right)\hat{k} \tag{A-11}$$

$$\frac{\partial}{\partial x'} = \frac{\partial}{\partial R_x}\frac{\partial R_x}{\partial x'} = \frac{1}{2}\frac{\partial}{\partial R_x} \tag{A-12}$$

$$\frac{\partial}{\partial x''} = \frac{\partial}{\partial R_x}\frac{\partial R_x}{\partial x''} = \frac{1}{2}\frac{\partial}{\partial R_x} \tag{A-13}$$

thus

$$\frac{\partial}{\partial x'} + \frac{\partial}{\partial x''} = \frac{\partial}{\partial R_x} \tag{A-14}$$

and

$$\frac{\partial}{\partial y'} + \frac{\partial}{\partial y''} = \frac{\partial}{\partial R_y} \tag{A-15}$$

$$\frac{\partial}{\partial z'} + \frac{\partial}{\partial z''} = \frac{\partial}{\partial R_z} \tag{A-16}$$

we thus obtain

$$\left(\frac{\partial}{\partial x'} + \frac{\partial}{\partial x''}\right)\hat{i} + \left(\frac{\partial}{\partial y'} + \frac{\partial}{\partial y''}\right)\hat{j} + \left(\frac{\partial}{\partial z'} + \frac{\partial}{\partial z''}\right)\hat{k} = \frac{\partial}{\partial R_x}\hat{i} + \frac{\partial}{\partial R_y}\hat{j} + \frac{\partial}{\partial R_z}\hat{k}$$

$$(\nabla' + \nabla'') = \nabla_{\vec{R}} \tag{A-17}$$

thus

$$(\nabla' - \nabla'')^2 = \nabla^2_{\vec{r}} \tag{A-18}$$

and

$$(\nabla'^2 - \nabla''^2) = (\nabla' - \nabla'')(\nabla' + \nabla'') = 2\nabla_{\vec{r}}\nabla_{\vec{R}} \tag{A-19}$$

APPENDIX B

LIST OF COMPUTER PROGRAM

```
10  REM    CALCULATION OF GROUND STATE ENERGY OF  LIQUID HELIUM-4 AT LOW
     TEMPERATURE BY USING LENNARD-JONES 12-6 POTENTIAL AND READING CURV
    E OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
     TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
    3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
    666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
    12,.1107,.1101
230  PRINT "    "
240  PRINT "f(R) =      "
250  PRINT "     "
260  PRINT "    "
270  PRINT "H(R) =       "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N) * HH(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "    "
450 N = 1
460 P = 1
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
    8);GG(N); TAB( 44);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
    76); FN M(R / 10): PRINT
490 W = W +  FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
    ,4,2,4,1
540  PRINT "TOTAL OF     =";W
550  PRINT "  "
560  PRINT "    "
570  PRINT " V(R) =        "
580  PRINT "          "
590  PRINT "          "
600 B = 0.1 * W / 3
610  PRINT "          "
620  PRINT "             =";B
630  PRINT "          "
```

TABLE III

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r),\quad f(r) = \exp\{-(2.6/r)^5\}$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$\$(r)$	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$I^{\mu 1}_{L-J} = V(r)_{L-J}\, S(r)\, h(r)\, r^2$$

r	r^2	$V(r)_{L-J}$	$S(r)$	$h(r)$	$I^{\mu 1}_{L-J}$		$T^{\mu 1}$
1.1	1.21	1006377.48	5.65915894E-32	.642696629	4.42898482E-26	1	0
1.2	1.44	352687.833	1.05920661E-20	.590786517	3.17807563E-15	4	0
1.3	1.6899	134071.796	6.87779354E-14	.54764045	8.53381231E-09	2	0
1.4	1.96	54552.7193	1.28750209E-09	.501573034	6.90485556E-05	4	2.7E-04
1.5	2.25	23498.109	7.50904352E-07	.455393259	.0180795098	2	.03615
1.6	2.56	10613.3432	4.92913824E-05	.384269663	.514634943	4	2.05853
1.7	2.89	4983.4831	9.57837263E-04	.386292135	5.32891051	2	10.65782
1.8	3.24	2412.55946	7.14922473E-03	.351797753	19.6596167	4	78.63846
1.9	3.61	1193.84307	.0293965263	.317191011	40.1856809	2	80.37136
2	4	597.921527	.0819151058	.291235955	57.0575563	4	228.23022
2.1	4.41	299.21437	.171541438	.265280899	60.0476563	2	120.09531
2.2	4.84	146.728331	.292890665	.239438202	49.8033221	4	199.21328
2.3	5.29	68.0431978	.434142911	.216292135	33.7997765	2	67.59955
2.4	5.76	27.3877178	.57653652	.193258427	17.576953	4	70.30781
2.5	6.25	6.63740117	.704195695	.170224719	4.97272082	2	9.94544
2.6	6.76	-3.59186254	.814685742	.15011236	-2.96942917	4	-11.87772
2.7	7.29	-8.24587727	.896057789	.12988764	-6.99629707	2	-13.9926
2.8	7.84	-9.96711542	.969970965	.115505618	-8.75482345	4	-35.0193
2.9	8.41	-10.1801769	1.00550256	.0982022472	-8.45387702	2	-16.90776
3	9	-9.65565236	1.0436787	.086741573	-7.86716472	4	-31.46866
3.1	9.6099	-8.80863177	1.06193691	.0751685393	-6.75712805	2	-13.51426
3.2	10.24	-7.85934263	1.06292311	.0635955056	-5.44019482	4	-21.76078
3.3	10.89	-6.92079309	1.06630352	.0549438202	-4.41553609	2	-8.83108
3.4	11.56	-6.04711559	1.05825658	.0462921348	-3.42455615	4	-13.69823
3.5	12.25	-5.26044309	1.04043303	.0376404495	-2.52363968	2	-5.04728
3.6	12.96	-4.56591178	1.03372775	.0319101123	-1.95194251	4	-7.80778
3.7	13.69	-3.96003174	1.0010851	.0232584269	-1.26227345	2	-2.52455
3.8	14.44	-3.43532491	.98282038	.0175280899	-.854562356	4	-3.41825
3.9	15.21	-2.98285367	.98101201	.0147191011	-.65511384	2	-1.31023
4	16	-2.59355654	.954399796	8.87640451E-03	-.351546781	4	-1.40619
4.1	16.81	-2.25891254	.946016069	5.95505619E-03	-.213920057	2	-.42785
4.2	17.64	-1.97123168	.936340737	3.14606742E-03	-.102432599	4	-.40974
4.3	18.49	-1.72374243	.932420832	1.34831459E-03	-.0400693672	2	-.08014
4.4	19.36	-1.51057288	.936410392	7.86516843E-04	-.0215387893	4	-.08616
4.5	20.25	-1.32668093	.938493631	1.1235954E-04	-2.83291011E-03	1	-2.84E-03

$\Sigma T^{\mu 1} = 677.5628$

$\Sigma T^{\mu 1} = 677.5628$

```
10  REM    CALCULATION OF GROUND STATE ENERGY OF LIQUID  HELIUM-4 AT LOW
      TEMPERATURE BY USING LENNARD JONES 12-6 POTENTIAL AND READING CURV
     E OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT " ·"
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
225  DATA  .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.
     11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,
     .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11
     ,.11,.11,.11,.11,.11,.11,.11
230  PRINT "    "
240  PRINT "$(R) =      "
250. PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 10.1 STEP .1
380  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "    "
450 N = 1
460 P = 1
470  FOR R = 11 TO 101
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
     0);GG(N); TAB( 44);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W +  FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4

535  DATA  2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1

540  PRINT "TOTAL OF    = ";W
550  PRINT "    "
560  PRINT "    "
570  PRINT " V(R) =       "
580  PRINT "         "
590  PRINT "         "
600 B = 0.1 * W / 3
610  PRINT "         "
620  PRINT "            = ";B
630  PRINT "         "
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$S(r) = (1/\rho_c)\Omega_1(r) f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	S(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04
4.6	.11	1	.943945403	.943945402	0
4.7	.11	1	.94951335	.94951335	0
4.8	.11	1	.954440974	.954440973	0
4.9	.11	1	.958810665	.958810664	0
5	.11	1	.962693299	.962693298	0
5.1	.11	1	.966149929	.966149929	0

(cont.)

5.3	.11	1	.971988742	.971988742	0
5.4	.11	1	.974455868	.974455868	0
5.5	.11	1	.976668802	.976668802	0
5.6	.11	1	.978657252	.978657252	0
5.7	.11	1	.980447081	.980447081	0
5.8	.11	1	.982060849	.982060848	0
5.9	.11	1	.983518266	.983518266	0
6	.11	1	.984836593	.984836593	0
6.1	.11	1	.986030965	.986030964	0
6.2	.11	1	.987114682	.987114682	0
6.3	.11	1	.988099453	.988099453	0
6.4	.11	1	.988995603	.988995603	0
6.5	.11	1	.98981225	.98981225	0
6.6	.11	1	.990557467	.990557467	0
6.7	.11	1	.991238405	.991238405	0
6.8	.11	1	.991861415	.991861415	0
6.9	.11	1	.992432146	.992432146	0
7	.11	1	.992955627	.992955627	0
7.1	.11	1	.993436344	.993436344	0
7.2	.11	1	.993878307	.993878307	0
7.3	.11	1	.994285102	.994285102	0
7.4	.11	1	.994659942	.994659942	0
7.5	.11	1	.995005711	.995005711	0
7.6	.11	1	.995325	.995325	0
7.7	.11	1	.995620139	.995620139	0
7.8	.11	1	.99589323	.995893229	0
7.9	.11	1	.996146165	.996146165	0
8	.11	1	.996380657	.996380657	0
8.1	.11	1	.996598254	.996598254	0
8.2	.11	1	.996800355	.996800355	0
8.3	.11	1	.996988232	.996988232	0
8.4	.11	1	.997163038	.997163038	0
8.5	.11	1	.997325819	.997325819	0
8.6	.11	1	.997477529	.997477529	0
8.7	.11	1	.997619035	.997619035	0
8.8	.11	1	.997751129	.997751129	0
8.9	.11	1	.997874531	.997874531	0
9	.11	1	.997989901	.997989902	0
9.1	.11	1	.998097843	.998097843	0
9.2	.11	1	.998198907	.998198907	0
9.3	.11	1	.998293599	.998293599	0
9.4	.11	1	.998382382	.998382382	0
9.5	.11	1	.998465682	.998465682	0
9.6	.11	1	.99854389	.99854389	0
9.7	.11	1	.998617365	.998617365	0
9.8	.11	1	.998686437	.998686437	0
9.9	.11	1	.998751411	.998751411	0
10	.11	1	.998812568	.998812568	0

$$I^{\mu\Pi}_{L-J} = V(r)_{L-J} S(r) r^2$$

r	r^2	$V(r)_{L-J}$	S(r)	h(r)	$I^{\mu\Pi}_{L-J}$		$T^{\mu\Pi}$
1.1	1.21	1006377.48	5.65915894E-32	.642696629	6.89125261E-26	1	0
1.2	1.44	352687.833	1.05920661E-20	.590786517	5.3793977E-15	4	0
1.3	1.6899	134071.796	6.87779354E-14	.54764045	1.55828743E-08	2	0
1.4	1.96	54552.7193	1.28750209E-09	.501573034	1.37664011E-04	4	5.5E-04
1.5	2.25	23498.109	7.50904352E-07	.455393259	.0397008727	2	.0794
1.6	2.56	10613.3432	4.92913824E-05	.384269663	1.33925468	4	5.35701
1.7	2.89	4983.4831	9.57837263E-04	.386292135	13.7950272	2	27.59005
1.8	3.24	2412.55946	7.14922473E-03	.351797753	55.8832925	4	223.53316
1.9	3.61	1193.84307	.0293965263	.317191011	126.69237	2	253.38473
2	4	597.921527	.0819151058	.291235955	195.91522	4	783.66088
2.1	4.41	299.21437	.171541438	.265280899	226.354994	2	452.70998
2.2	4.84	146.728331	.292890665	.239438202	208.000735	4	832.00293
2.3	5.29	68.0431978	.434142911	.216292135	156.269097	2	312.53819
2.4	5.76	27.3877178	.57653652	.193258427	90.9505123	4	363.80204
2.5	6.25	6.63740117	.704195695	.170224719	29.2126833	2	58.42536
2.6	6.76	-3.59186254	.814685742	.15011236	-19.781377	4	-79.12551
2.7	7.29	-8.24587727	.896057789	.12988764	-53.8642248	2	-107.72845
2.8	7.84	-9.96711542	.969970965	.115505618	-75.7956504	4	-303.18261
2.9	8.41	-10.1801769	1.00550256	.0982022472	-86.0863908	2	-172.17279
3	9	-9.65565236	1.0436787	.086741573	-90.6965881	4	-362.78636
3.1	9.6099	-8.80863177	1.06193691	.0751685393	-89.8930338	2	-179.78607
3.2	10.24	-7.85934263	1.06292311	.0635955056	-85.5436995	4	-342.1748
3.3	10.89	-6.92079309	1.06630352	.0549438202	-80.3645628	2	-160.72913
3.4	11.56	-6.04711559	1.05825658	.0462921348	-73.9770624	4	-295.90825
3.5	12.25	-5.26044309	1.04043303	.0376404495	-67.0459497	2	-134.0919
3.6	12.96	-4.56591178	1.03372775	.0319101123	-61.1700295	4	-244.68012
3.7	13.69	-3.96003174	1.0010851	.0232584269	-54.2716606	2	-108.54333
3.8	14.44	-3.43532491	.98282038	.0175280899	-48.7538779	4	-195.01552
3.9	15.21	-2.98285367	.98101201	.0147191011	-44.5077343	2	-89.01547
4	16	-2.59355654	.954399796	8.87640451E-03	-39.6046373	4	-158.41855
4.1	16.81	-2.25891254	.946016069	5.95505619E-03	-35.9224246	2	-71.8448501
4.2	17.64	-1.97123168	.936340737	3.14606742E-03	-32.5589334	4	-130.23574
4.3	18.49	-1.72374243	.932420832	1.34831459E-03	-29.7181144	2	-59.43623
4.4	19.36	-1.51057288	.936410392	7.86516843E-04	-27.3850326	4	-109.54014
4.5	20.25	-1.32668093	.938493631	1.1235954E-04	-25.2129024	2	-50.42581
4.6	21.16	-1.16776382	.943945402	0	-23.3247798	4	-93.29912
4.7	22.09	-1.03016371	.94951335	0	-21.6074262	2	-43.21486
4.8	23.04	-.910777767	.954440973	0	-20.0282946	4	-80.11318
4.9	24.01	-.806976484	.958810664	0	-18.5774412	2	-37.15489
5	25	-.716531804	.962693298	0	-17.2450091	4	-68.98004
5.1	26.01	-.637554915	.966149929	0	-16.0214743	2	-32.04295
5.2	27.04	-.568443086	.969233234	0	-14.8977943	4	-59.59118
5.3	28.09	-.507834631	.971988742	0	-13.8654921	2	-27.73099
5.4	29.16	-.454570898	.974455868	0	-12.9166926	4	-51.66678

(cont.)

5.6	31.36	-.366271665	.978657252	0	-11.2411306	4	-44.96453
5.7	32.49	-.329671494	.980447081	0	-10.501595	2	-21.0032
5.8	33.64	-.29724543	.982060848	0	-9.81995664	4	-39.27983
5.9	34.81	-.26846233	.983518266	0	-9.19114906	2	-18.3823
6	36	-.242865077	.984836593	0	-8.61056695	4	-34.44227
6.1	37.21	-.220059457	.986030964	0	-8.07402816	2	-16.14806
6.2	38.44	-.199704816	.987114682	0	-7.57773702	4	-30.31095
6.3	39.69	-.181506198	.988099453	0	-7.11824971	2	-14.2365
6.4	40.96	-.165207705	.988995603	0	-6.69244184	4	-26.76977
6.5	42.25	-.150586886	.98981225	0	-6.29747844	2	-12.59496
6.6	43.56	-.137449996	.990557467	0	-5.93078635	4	-23.72315
6.7	44.89	-.125627972	.991238405	0	-5.59002916	2	-11.18006
6.8	46.24	-.114973007	.991861415	0	-5.27308427	4	-21.09234
6.9	47.61	-.105355649	.992432146	0	-4.97802223	2	-9.95605
7	49	-.0966623117	.992955627	0	-4.70308793	4	-18.81236
7.1	50.41	-.088793157	.993436344	0	-4.44668371	2	-8.89337
7.2	51.84	-.0816602801	.993878307	0	-4.20735415	4	-16.82942
7.3	53.29	-.0751861522	.994285102	0	-3.98377234	2	-7.96755
7.4	54.76	-.0693022833	.994659942	0	-3.77472755	4	-15.09892
7.5	56.25	-.0639480704	.995005711	0	-3.57911411	2	-7.15823
7.6	57.76	-.059069804	.995325	0	-3.39592138	4	-13.58369
7.7	59.29	-.0546198126	.995620139	0	-3.22422491	2	-6.44845
7.8	60.84	-.0505557181	.995893229	0	-3.06317825	4	-12.25272
7.9	62.41	-.0468397933	.996146165	0	-2.9120057	2	-5.82402
8	64	-.0434384031	.996380657	0	-2.76999582	4	-11.07999
8.1	65.61	-.040321518	.996598254	0	-2.6364955	2	-5.273
8.2	67.24	-.0374622913	.996800355	0	-2.51090468	4	-10.04362
8.3	68.89	-.0348366884	.996988232	0	-2.39267152	2	-4.78535
8.4	70.56	-.032423165	.997163038	0	-2.28128818	4	-9.12516
8.5	72.25	-.0302023833	.997325819	0	-2.17628681	2	-4.35258
8.6	73.96	-.0281569648	.997477529	0	-2.0772361	4	-8.30895
8.7	75.69	-.0262712721	.997619035	0	-1.9837381	2	-3.96748
8.8	77.44	-.0245312176	.997751129	0	-1.89542532	4	-7.58171
8.9	79.21	-.0229240951	.997874531	0	-1.81195811	2	-3.62392
9	81	-.0214384308	.997989902	0	-1.73302233	4	-6.93209
9.1	82.81	-.0200638523	.998097843	0	-1.65832719	2	-3.31666
9.2	84.64	-.0187909724	.998198907	0	-1.58760332	4	-6.35042
9.3	86.49	-.0176112863	.998293599	0	-1.52060096	2	-3.04121
9.4	88.36	-.0165170805	.998382382	0	-1.45708841	4	-5.82836
9.5	90.25	-.015501352	.998465682	0	-1.39685052	2	-2.79371
9.6	92.16	-.0145577363	.99854389	0	-1.3396874	4	-5.35875
9.7	94.09	-.0136804433	.998617365	0	-1.28541319	2	-2.57083
9.8	96.04	-.0128642005	.998686437	0	-1.23385494	4	-4.93542
9.9	98.01	-.0121042022	.998751411	0	-1.18485161	2	-2.36971
10	100	-.0113960636	.998812568	0	-1.13825316	4	-4.55302
10.1	102.01	-.010735781	0	0	0	1	0

$\Sigma T^{\mu}\Pi$ = -1112.78424

ΣT^{μ} = -1112.78424

```
10  REM  CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW TE
     MPERATURE BY USING LENNARD-JONES 12-6 POTENTIAL AND READING CURVE O
     F MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
     TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "f(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =       "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N) * HH(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "   "
450 N = 1
460 P = 1
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
     0);GG(N); TAB( 44);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W + FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF     =   ";W
550  PRINT "  "
560  PRINT "   "
570  PRINT " V(R) =         "
580  PRINT "         "
590  PRINT "         "
600 B = 0.1 * W / 3
610  PRINT "         "
620  PRINT "              -   ";B
630  PRINT "         "
640 C = 4 * 22 ; .149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "          "
660  PRINT "                    ";C TAB( 30);"K"
```

Table II

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.2962[illegible]987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$V(r) = 4\varepsilon\{(r_0/r)^{12} - (r_0/r)^6\}$$

$$I^{\alpha}_{L-J} = V(r)_{L-J}\,\$(r)h(r)r^4$$

r	r^4	V(r)	\$(r)	h(r)	I^{α}_{L-J}		T^{α}
1.1	1.4641	1006377.48	5.65915894E-32	.642696629	5.35907163E-26	1	0
1.2	2.0736	352687.833	1.05920661E-20	.590786517	4.57642891E-15	4	0
1.3	2.8561	134071.796	6.87779354E-14	.54764045	1.44229962E-08	2	0
1.4	3.8416	54552.7193	1.28750209E-09	.501573034	1.35335169E-04	4	5.4E-04
1.5	5.0625	23498.109	7.50904352E-07	.455393259	.040678897	2	.08135
1.6	6.5536	10613.3432	4.92913824E-05	.384269663	1.31746545	4	5.26986
1.7	8.3521	4983.4831	9.57837263E-04	.386292135	15.4005514	2	30.8011
1.8	10.4976	2412.55946	7.14922473E-03	.351797753	63.6971581	4	254.78863
1.9	13.0321	1193.84307	.0293965263	.317191011	145.070308	2	290.14061
2	16	597.921527	.0819151058	.291235955	228.230225	4	912.9209
2.1	19.4481	299.21437	.171541438	.265280899	264.810165	2	529.62032
2.2	23.4256	146.728331	.292890665	.239438202	241.048079	4	964.19231
2.3	27.9841	68.0431978	.434142911	.216292135	178.800818	2	357.60163
2.4	33.1776	27.3877178	.57653652	.193258427	101.243249	4	404.97299
2.5	39.0625	6.63740117	.704195695	.170224719	31.0795051	2	62.15901
2.6	45.6976	-3.59186254	.814685742	.15011236	-20.0733412	4	-80.29337
2.7	53.1441	-8.24587727	.896057709	.12980764	-51.0030056	2	-102.00602
2.8	61.4656	-9.96711542	.969970965	.115505618	-68.6370150	4	-274.55127
2.9	70.7281	-10.1801769	1.00550256	.0982022472	-71.0971057	2	-142.19422
3	81	-9.65565236	1.0436787	.086741573	-70.8044825	4	-283.21793
3.1	92.352	-8.80863177	1.06193691	.0751685393	-64.9366059	2	-129.87322
3.2	104.8576	-7.85934263	1.06292311	.0635955056	-55.707595	4	-222.83038
3.3	118.5921	-6.92079309	1.06630352	.0549438202	-48.085188	2	-96.17038
3.4	133.6336	-6.04711559	1.05825658	.0462921348	-39.587867	4	-158.35148
3.5	150.0625	-5.26044309	1.04043303	.0376404495	-30.914586	2	-61.82918
3.6	167.9616	-4.56591178	1.03372775	.0319101123	-25.297175	4	-101.1887
3.7	187.4161	-3.96003174	1.0010851	.0232584269	-17.2805236	2	-34.56105
3.8	208.5136	-3.43532491	.98282038	.0175280899	-12.3398804	4	-49.35953
3.9	231.3441	-2.98285367	.98101201	.0147191011	-9.9642815	2	-19.92857
4	256	-2.59355654	.954399796	8.87640451E-03	-5.6247485	4	-22.499
4.1	282.5761	-2.25891254	.946016069	5.95505619E-03	-3.59399616	2	-7.192
4.2	311.1696	-1.97123168	.936340737	3.14606742E-03	-1.80691106	4	-7.22765
4.3	341.8801	-1.72374243	.932420832	1.34831459E-03	-.740882599	2	-1.48177
4.4	374.8096	-1.51057288	.936410392	7.86516843E-04	-.416990962	4	-1.66797
4.5	410.0625	-1.32668093	.938493631	1.1235954E-04	-.0573664297	1	-.05737

ΣT^{α} = 2016.06817

ΣT^{α} = 2016.068

```
10  REM  CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW TE
     MPERATURE BY USING LENNARD-JONES 12-6 POTENTIAL AND READING CURVE O
     F MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R)) ^ 2
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "f(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N) * HH(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "   "
450 N = 1
460 P = 1
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
     8);GG(N); TAB( 44);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W +  FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF    =  ";W
550  PRINT "  "
560  PRINT "    "
570  PRINT " V(R) =         "
580  PRINT "         "
590  PRINT "         "
600 B = 0.1 * W / 3
610  PRINT "         "
620  PRINT "              :  ";B
630  PRINT "        "
640 C = 4 * 22 * .149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "           "
660  PRINT 6"              ";C; TAB( 30);"    ! "
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - {}_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	Ω_1/ρ	f(r)	$\$^2(r)$	h(r)
1.1	.682	6.2	9.12767572E-33	0	.642696629
1.2	.6358	5.78	1.83253739E-21	0	.590786517
1.3	.5974	5.43090909	1.26641656E-14	4.73040438E-27	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.65766164E-18	.501573034
1.5	.5153	4.68454546	1.60293956E-07	5.63857745E-13	.455393259
1.6	.452	4.10909091	1.19956899E-05	2.42964038E-09	.384269663
1.7	.4538	4.12545455	2.32177382E-0	9.17452223E-07	.386292135
1.8	.4231	3.84636364	1.85869701E-0	5.11114142E-05	.351797753
1.9	.3923	3.56636363	8.2427169E-03	8.64155756E-04	.317191011
2	.3692	3.35636364	.0244059091	6.71008456E-03	.291235955
2.1	.3461	3.14636364	.0545205373	.0294264648	.265280899
2.2	.3231	2.93727273	.0997151752	.0857849414	.239438202
2.3	.3025	2.75	.15787015	.188480067	.216292135
2.4	.282	2.56363636	.224890133	.332394359	.193258427
2.5	.2615	2.37727273	.296219987	.495891578	.170224719
2.6	.2436	2.21454546	.367879441	.663712858	.15011236
2.7	.2256	2.05090909	.436907612	.802919561	.12988764
2.8	.2128	1.93454545	.501394766	.940843673	.115505618
2.9	.1974	1.79454545	.560310445	1.0110354	.0982022472
3	.1872	1.70181818	.61327274	1.08926522	.0867415573
3.1	.1769	1.60818182	.66033386	1.12770999	.0751685393
3.2	.1666	1.51454545	.701809978	1.12980554	.0635955056
3.3	.1589	1.44454545	.738158509	1.13700319	.0549438202
3.4	.1512	1.37454545	.769895661	1.11950699	.0462921348
3.5	.1435	1.30454545	.797344484	1.08250089	.0376404495
3.6	.1384	1.25818182	.821604423	1.06859305	.0319101123
3.7	.1307	1.18818182	.842535277	1.00217137	.0232584269
3.8	.1256	1.14181818	.860750333	.9659359	.0175280899
3.9	.1231	1.11909091	.87661512	.962384565	.0147191011
4	.1179	1.07181818	.890449344	.910878971	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.894946403	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.876733975	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.869408608	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.876864423	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.880770295	1.1235954E-04

(cont.)

$$V(r) = 4\varepsilon\{(r_0/r)^{12} - (r_0/r)^6\}$$

$$I^{\beta}_{L-J} = V(r)_{L-J}\$^2(r)h(r)r^4$$

r	r^4	$V(r)_{L-J}$	$\$^2(r)$	h(r)	I^{β}_{L-J}		T^{β}
1.1	1.4641	1006377.48	0	.642696629	0	1	0
1.2	2.0736	352687.833	0	.590786517	0	4	0
1.3	2.8561	134071.796	4.73040438E-27	.54764045	9.919839E-22	2	0
1.4	3.8416	54552.7193	1.65766164E-18	.501573034	1.74244313E-13	4	0
1.5	5.0625	23498.109	5.63857345E-13	.455393259	3.05459608E-08	2	0
1.6	6.5536	10613.3432	2.42964038E-09	.384269663	6.49396935E-05	4	2.5E-04
1.7	8.3521	4983.4831	9.17452223E-07	.386292135	.014751222	2	.0295
1.8	10.4976	2412.55946	5.11114142E-05	.351797753	.455385298	4	1.82154
1.9	13.0321	1193.84307	8.64155756E-04	.317191011	4.26456312	2	8.52912
2	16	597.921527	6.71008456E-03	.291235955	18.6955031	4	74.78201
2.1	19.4481	299.21437	.0294264648	.265280899	45.4259163	2	90.85183
2.2	23.4256	146.728331	.0857849414	.239438202	70.6007321	4	282.40292
2.3	27.9841	68.0431978	.188480067	.216292135	77.6251075	2	155.25021
2.4	33.1776	27.3877178	.332394359	.193258427	58.3704305	4	233.48172
2.5	39.0625	6.63740117	.495891578	.170224719	21.8860537	2	43.7721
2.6	45.6976	-3.59186254	.663712858	.15011236	-16.3534649	4	-65.41386
2.7	53.1441	-8.24587727	.802919561	.12988764	-45.7016405	2	-91.40329
2.8	61.4656	-9.96711542	.940843673	.115505618	-66.5766885	4	-266.30676
2.9	70.7281	-10.1801769	1.0110354	.0982022472	-71.4883218	2	-142.97665
3	81	-9.65565236	1.08926522	.086741573	-73.89713	4	-295.58853
3.1	92.352	-8.80863177	1.12770999	.0751685393	-68.9585784	2	-137.91716
3.2	104.8576	-7.85934263	1.12980554	.0635955056	-59.2128902	4	-236.85157
3.3	118.5921	-6.92079309	1.13700319	.0549438202	-51.2734052	2	-102.54682
3.4	133.6336	-6.04711559	1.11990699	.0462921348	-41.8941229	4	-167.5765
3.5	150.0625	-5.26044309	1.08250089	.0376404495	-32.1645565	2	-64.32912
3.6	167.9616	-4.56591178	1.06859305	.0319101123	-26.1503916	4	-104.60157
3.7	187.4161	-3.96003174	1.00217137	.0232584269	-17.2992746	2	-34.59855
3.8	208.5136	-3.43532491	.9659359	.0175280899	-12.127886	4	-48.51155
3.9	231.3441	-2.98285367	.962384565	.0147191011	-9.77507984	2	-19.55016
4	256	-2.59355654	.910878971	8.87640451E-03	-5.36825883	4	-21.47304
4.1	282.5761	-2.25891254	.894946403	5.95505619E-03	-3.40187015	2	-6.80375
4.2	311.1696	-1.97123168	.876733975	3.14606742E-03	-1.69188443	4	-6.76754
4.3	341.8801	-1.72374243	.869408608	1.34831459E-03	-.69081437	2	-1.38163
4.4	374.8096	-1.51057288	.876864423	7.86516843E-04	-.39047467	4	-1.5619
4.5	410.0625	-1.32668093	.880770295	1.1235954E-04	-.053838029	1	-.05384

ΣT^{β} = -925.29259

ΣT^{β} = -925.29259

```
10  REM    CALCULATION OF GROUND STATE ENERGY OF LIQUID HELIUM-4 AT LOW
     TEMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N); PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
     (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "        "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 > = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                         "
560  PRINT "                         "
570  PRINT " V(R)        =           "
580  PRINT "                         "
590  PRINT "                         "
600 B = 0.1 * W / 3
610  PRINT "                         "
620  PRINT "              =     ";B
630  PRINT "                         "
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$I^{\mu 1}_{M-V_{DD}} = V(r)_{M-V_{DD}} \$(r) h(r) r^2$$

r	r^2	$V(r)_{M-V_{DD}}$	$(r)	h(r)	$I^{\mu 1}_{M-V_{DD}}$		$T^{\mu 1}$
1.1	1.21	21210.7536	5.65915894E-32	.642696629	9.33467889E-28	1	0
1.2	1.44	13783.9325	1.05920661E-20	.590786517	1.24207233E-16	4	0
1.3	1.6899	8935.26525	6.87779354E-14	.54764045	5.68739129E-10	2	0
1.4	1.96	5773.9232	1.28750209E-09	.501573034	7.30817936E-06	4	2.9E-05
1.5	2.25	3716.10499	7.50904352E-07	.455393259	2.85918142E-03	2	5.718E-03
1.6	2.56	2379.36584	4.92913824E-05	.384269663	.115374089	4	.461496
1.7	2.89	1513.28796	9.57837263E-04	.386292135	1.61818069	2	3.236361
1.8	3.24	953.999441	7.14922473E-03	.351797753	7.7740108	4	31.096043
1.9	3.61	594.342312	.0293965263	.317191011	20.0060217	2	40.012043
2	4	364.308622	.0819151058	.291235955	34.7646954	4	139.058781
2.1	4.41	218.213201	.171541438	.265280899	43.7919855	2	87.58397
2.2	4.84	126.285628	.292890665	.239438202	42.8645495	4	171.458197
2.3	5.29	69.1607763	.434142911	.216292135	34.3549225	2	68.709844
2.4	5.76	34.2701827	.57653652	.193258427	21.9939972	4	87.975988
2.5	6.25	13.4796522	.704195695	.170224719	10.0989145	2	20.197828
2.6	6.76	1.54370404	.814685742	.15011236	1.27619578	4	5.104783
2.7	7.29	-4.90477677	.896057789	.12988764	-4.16150692	2	-8.323014
2.8	7.84	-8.01436195	.969970965	.115505618	-7.03958176	4	-28.158328
2.9	8.41	-9.14545591	1.00550256	.0982022472	-7.59461849	2	-15.189237
3	9	-9.15057931	1.0436787	.086741573	-7.45564483	4	-29.82258
3.1	9.6099	-8.55655183	1.06193691	.0751685393	-6.56375677	2	-13.127514
3.2	10.24	-7.68262163	1.06292311	.0635955056	-5.31786949	4	-21.271478
3.3	10.89	-6.71682587	1.06630352	.0549438202	-4.28540294	2	-8.570806
3.4	11.56	-5.765158	1.05825658	.0462921348	-3.26488008	4	-13.059521
3.5	12.25	-4.88306638	1.04043303	.0376404495	-2.34259736	2	-4.685195
3.6	12.96	-4.09776024	1.03372775	.0319101123	-1.75180617	4	-7.007225
3.7	13.69	-3.43338606	1.0010851	.0232584269	-1.09440337	2	-2.188807
3.8	14.44	-2.89177761	.98282038	.0175280899	-.719350965	4	-2.877404
3.9	15.21	-2.44761945	.98101201	.0147191011	-.537562199	2	-1.075125
4	16	-2.08132935	.954399796	8.87640451E-03	-.282116322	4	-1.128466
4.1	16.81	-1.77764996	.946016069	5.95505619E-03	-.168344269	2	-.336689
4.2	17.64	-1.52461206	.936340737	3.14606742E-03	-.0792245671	4	-.316899
4.3	18.49	-1.3127648	.932420832	1.34831459E-03	-.03051596	2	-.061032
4.4	19.36	-1.13459982	.936410392	7.86516843E-04	-.0161779062	4	-.064712
4.5	20.25	-.984116954	.938493631	1.1235954E-04	-2.10142078E-03	1	-2.102E-03

$\Sigma T^{\mu 1}$ = 497.634947

ΣT^{μ} = 497.634947

```
10  REM        CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 AT
     LOW TEMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF MCMIL
     LAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
225  DATA  .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.
     11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,
     .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11
     ,.11,.11,.11,.11,.11,.11,.11
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =       "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
     (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) = - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N)
410  PRINT "       "
415 N = 1
417 P = 1
420  FOR R = 11 TO 101
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 > = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA    1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,
     4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4
535  DATA  2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1
540  PRINT "TOTAL OF     -    ";W
550  PRINT "                           "
560  PRINT "                           "
570  PRINT " V(R)                      "
580  PRINT "                           "
590  PRINT "                           "
600 B = 0.1 * W / 3
610  PRINT "                           "
620  PRINT "                    ";B
630  PRINT "                           "
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r), \quad f(r) = \exp(-(2.6/r))$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641[illegible]-1	6.87779354E-14	.[illegible]476[illegible]045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04
4.6	.11	1	.943945403	.943945402	0
4.7	.11	1	.94951335	.94951335	0
4.8	.11	1	.954440974	.954440973	0
4.9	.11	1	.958810665	.958810664	0
5	.11	1	.962693299	.962693298	0
5.1	.11	1	.966149929	.966149929	0
5.2	.11	1	.969233235	.969233234	0
5.3	.11	1	.971988742	.971988742	0

(cont.)

5.5	.11	1	.976668802	.976668802	0
5.6	.11	1	.978657252	.978657252	0
5.7	.11	1	.98[illegible]417[illegible]81	.98[illegible]417[illegible]81	0
5.8	.11	1	.982060849	.982060848	0
5.9	.11	1	.983518266	.983518266	0
6	.11	1	.984836593	.984836593	0
6.1	.11	1	.986030965	.986030964	0
6.2	.11	1	.987114682	.987114682	0
6.3	.11	1	.988099453	.988099453	0
6.4	.11	1	.988995603	.988995603	0
6.5	.11	1	.98981225	.98981225	0
6.6	.11	1	.990557467	.990557467	0
6.7	.11	1	.991238405	.991238405	0
6.8	.11	1	.991861415	.991861415	0
6.9	.11	1	.992432146	.992432146	0
7	.11	1	.992955627	.992955627	0
7.1	.11	1	.993436344	.993436344	0
7.2	.11	1	.993878307	.993878307	0
7.3	.11	1	.994285102	.994285102	0
7.4	.11	1	.994659942	.994659942	0
7.5	.11	1	.995005711	.995005711	0
7.6	.11	1	.995325	.995325	0
7.7	.11	1	.995620139	.995620139	0
7.8	.11	1	.99589323	.995893229	0
7.9	.11	1	.996146165	.996146165	0
8	.11	1	.996380657	.996380657	0
8.1	.11	1	.996598254	.996598254	0
8.2	.11	1	.996800355	.996800355	0
8.3	.11	1	.996988232	.996988232	0
8.4	.11	1	.997163038	.997163038	0
8.5	.11	1	.997325819	.997325819	0
8.6	.11	1	.997477529	.997477529	0
8.7	.11	1	.997619035	.997619035	0
8.8	.11	1	.997751129	.997751129	0
8.9	.11	1	.997874531	.997874531	0
9	.11	1	.997989901	.997989902	0
9.1	.11	1	.998097843	.998097843	0
9.2	.11	1	.998198907	.998198907	0
9.3	.11	1	.998293599	.998293599	0
9.4	.11	1	.998382382	.998382382	0
9.5	.11	1	.998465682	.998465682	0
9.6	.11	1	.99854389	.99854389	0
9.7	.11	1	.998617365	.998617365	0
9.8	.11	1	.998686437	.998686437	0
9.9	.11	1	.998751411	.998751411	0
10	.11	1	.998812568	.998812568	0
10.1	.11	1	.998870167	0	0

(cont.)

$$I^{\mu\Pi}_{M-V_{DD}} = V(r)_{M-V_{DD}} \$(r) r^2$$

r	r^2	$V(r)_{M-V_{DD}}$	\$(r)	h(r)	$I^{\mu\Pi}_{M-V_{DD}}$		$T^{\mu\Pi}$
1.1	1.21	21210.7536	5.65915894E-32	.642696629	1.45242381E-27	1	0
1.2	1.44	13783.9325	1.05920661E-20	.590786517	2.10240467E-16	4	0
1.3	1.6899	8935.26525	6.87779354E-14	.54764045	1.03852652E-09	2	0
1.4	1.96	5773.9232	1.28750209E-09	.501573034	1.45705189E-05	4	5.8E-05
1.5	2.25	3716.10499	7.50904352E-07	.455393259	6.27848867E-03	2	.012556
1.6	2.56	2379.36584	4.92913824E-05	.384269663	.300242512	4	1.20097
1.7	2.89	1513.28796	9.57837263E-04	.386292135	4.1890076	2	8.378015
1.8	3.24	953.999441	7.14922473E-03	.351797753	22.0979547	4	88.391818
1.9	3.61	594.342312	.0293965263	.317191011	63.0724737	2	126.144947
2	4	364.308622	.0819151058	.291235955	119.369517	4	477.478068
2.1	4.41	218.213201	.171541438	.265280899	165.077794	2	330.155587
2.2	4.84	126.285628	.292890665	.239438202	179.021347	4	716.085387
2.3	5.29	69.1607763	.434142911	.216292135	158.835745	2	317.67149
2.4	5.76	34.2701827	.57653652	.193258427	113.806148	4	455.224593
2.5	6.25	13.4796522	.704195695	.170224719	59.3269565	2	118.653912
2.6	6.76	1.54370404	.814685742	.15011236	8.50160359	4	34.006414
2.7	7.29	-4.90477677	.896057789	.12988764	-32.0392834	2	-64.078567
2.8	7.84	-8.01436195	.969970965	.115505618	-60.9457954	4	-243.783182
2.9	8.41	-9.14545591	1.00550256	.0982022472	-77.3365041	2	-154.673009
3	9	-9.15057931	1.0436787	.086741573	-85.9523822	4	-343.809529
3.1	9.6099	-8.55655183	1.06193691	.0751685393	-87.320531	2	-174.641062
3.2	10.24	-7.68262163	1.06292311	.0635955056	-83.6202093	4	-334.480838
3.3	10.89	-6.71682587	1.06630352	.0549438202	-77.9960862	2	-155.992173
3.4	11.56	-5.765158	1.05825658	.0462921348	-70.5277494	4	-282.110998
3.5	12.25	-4.88306638	1.04043303	.0376404495	-62.2361686	2	-124.472338
3.6	12.96	-4.09776024	1.03372775	.0319101123	-54.8981511	4	-219.592605
3.7	13.69	-3.43338606	1.0010851	.0232584269	-47.0540579	2	-94.108116
3.8	14.44	-2.89177761	.98282038	.0175280899	-41.0398947	4	-164.159579
3.9	15.21	-2.44761945	.98101201	.0147191011	-36.5214014	2	-73.042803
4	16	-2.08132935	.954399796	8.87640451E-03	-31.7827248	4	-127.1309
4.1	16.81	-1.77764996	.946016069	5.95505619E-03	-28.2691319	2	-56.538264
4.2	17.64	-1.52461206	.936340737	3.14606742E-03	-25.1820945	4	-100.728379
4.3	18.49	-1.3127648	.932420832	1.34831459E-03	-22.6326707	2	-45.265342
4.4	19.36	-1.13459982	.936410392	7.86516843E-04	-20.5690525	4	-82.27621
4.5	20.25	-.984116954	.938493631	1.1235954E-04	-18.7026467	2	-37.405294
4.6	21.16	-.856494616	.943945402	0	-17.1075247	4	-68.430099
4.7	22.09	-.747837706	.94951335	0	-15.6857089	2	-31.371418
4.8	23.04	-.654983651	.954440973	0	-14.4033001	4	-57.613201
4.9	24.01	-.575352267	.958810664	0	-13.2452099	2	-26.49042
5	25	-.5068288	.962693298	0	-12.1980172	4	-48.792069
5.1	26.01	-.44767232	.966149929	0	-11.2498083	2	-22.499617
5.2	27.04	-.396443614	.969233234	0	-10.3900207	4	-41.560083
5.3	28.09	-.351948071	.971988742	0	-9.60929583	2	-19.218592
5.4	29.16	-.313190285	.974455868	0	-8.89934364	4	-35.597375

5.6	31.36	-.24969172	.978657252	0	-7.66321154	4	-30.652847
5.7	32.49	-.223663704	.980447081	0	-7.12474593	2	-14.249492
5.8	33.64	-.200756437	.982060848	0	-6.63229543	4	-26.529182
5.9	34.81	-.180548409	.983518266	0	-6.18130424	2	-12.362609
6	36	-.162681232	.984836593	0	-5.76771948	4	-23.070878
6.1	37.21	-.146849286	.986030964	0	-5.38793144	2	-10.775863
6.2	38.44	-.132791215	.987114682	0	-5.03872129	4	-20.154886
6.3	39.69	-.120282904	.988099453	0	-4.71721492	2	-9.43443
6.4	40.96	-.109131661	.988995603	0	-4.42084284	4	-17.683372
6.5	42.25	-.0991713928	.98981225	0	-4.14730477	2	-8.29461
6.6	43.56	-.0902585744	.990557467	0	-3.89453864	4	-15.578155
6.7	44.89	-.0822688921	.991238405	0	-3.66069355	2	-7.321388
6.8	46.24	-.075094419	.991861415	0	-3.44410579	4	-13.776424
6.9	47.61	-.0686412484	.992432146	0	-3.24327802	2	-6.486557
7	49	-.0628274938	.992955627	0	-3.05686076	4	-12.227444
7.1	50.41	-.0575816005	.993436344	0	-2.88363623	2	-5.767273
7.2	51.84	-.0528409158	.993878307	0	-2.72250409	4	-10.890017
7.3	53.29	-.0485504718	.994285102	0	-2.57246875	2	-5.144938
7.4	54.76	-.0446619515	.994659942	0	-2.43262835	4	-9.730514
7.5	56.25	-.0411328049	.995005711	0	-2.30216489	2	-4.60433
7.6	57.76	-.0379254919	.995325	0	-2.18033547	4	-8.721342
7.7	59.29	-.0350068362	.995620139	0	-2.06646468	2	-4.13293
7.8	60.84	-.0323474659	.995893229	0	-1.95993762	4	-7.839751
7.9	62.41	-.0299213356	.996146165	0	-1.86019394	2	-3.720388
8	64	-.0277053118	.996380657	0	-1.76672235	4	-7.06689
8.1	65.61	-.0256788146	.996598254	0	-1.67905581	2	-3.358112
8.2	67.24	-.0238235089	.996800355	0	-1.59676725	4	-6.387069
8.3	68.89	-.0221230341	.996988232	0	-1.51946571	2	-3.038932
8.4	70.56	-.020562771	.997163038	0	-1.44679295	4	-5.787172
8.5	72.25	-.0191296376	.997325819	0	-1.37842029	2	-2.756841
8.6	73.96	-.0178119113	.997477529	0	-1.31404594	4	-5.256184
8.7	75.69	-.0165990739	.997619035	0	-1.2533925	2	-2.506785
8.8	77.44	-.0154816748	.997751129	0	-1.19620473	4	-4.784819
8.9	79.21	-.0144512126	.997874531	0	-1.14224757	2	-2.284496
9	81	-.0135000294	.997989902	0	-1.09130433	4	-4.365218
9.1	82.81	-.0126212191	.998097843	0	-1.04317509	2	-2.086351
9.2	84.64	-.0118085462	.998198907	0	-.997675203	4	-3.990701
9.3	86.49	-.011056374	.998293599	0	-.954634015	2	-1.909269
9.4	88.36	-.0103596014	.998382382	0	-.91389365	4	-3.655575
9.5	90.25	-9.71360648E-03	.998465682	0	-.875307921	2	-1.750616
9.6	92.16	-9.11419763E-03	.99854389	0	-.838741373	4	-3.354966
9.7	94.09	-8.55756888E-03	.998617365	0	-.804068384	2	-1.608137
9.8	96.04	-8.04026103E-03	.998686437	0	-.771172354	4	-3.08469
9.9	98.01	-7.55912685E-03	.998751411	0	-.739944981	2	-1.47989
10	100	-7.1113E-03	.998812568	0	-.710285581	4	-2.841143
10.1	102.01	-6.69416752E-03	0	0	0	1	0

$\Sigma T^{\mu}\Pi$ = -935.467361

ΣT^{μ} = -935.467

```
10  REM   CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW T
     EMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2120,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "     "
240  PRINT "*(R) =      "
250  PRINT "     "
260  PRINT "   "
270  PRINT "H(R) =      "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
      (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "          "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 > = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
      44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
      ,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                          "
560  PRINT "                          "
570  PRINT " V(R)         =           "
580  PRINT "                          "
590  PRINT "                          "
600 B = 0.1 * W / 3
610  PRINT "                          "
620  PRINT "              =    ";B
630  PRINT "                          "
640 C = 4 * 22 * .149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "                          "
660  PRINT "                   ";C; TAB( 35);"           K"
```

$$\$(r) \quad = \quad (1/\rho_c)\Omega_1(r)f(r) \quad , \quad f(r) \quad = \quad \exp\{-(2.6/r)^5\}$$

$$h(r) \quad = \quad (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$I^{\alpha}_{M-V_{DD}} = V(r)_{M-V_{DD}}\,\$(r)\,h(r)\,r^4$$

r	r^4	$V(r)_{M-V_{DD}}$	$(r)	h(r)	$I^{\alpha}_{M-V_{DD}}$		T^{α}
1.1	1.4641	21210.7536	5.65915894E-32	.642696629	1.12949615E-27	1	0
1.2	2.0736	13783.9325	1.05920661E-20	.590786517	1.78858416E-16	4	0
1.3	2.8561	8935.26525	6.87779354E-14	.54764045	9.61226006E-10	2	0
1.4	3.8416	5773.9232	1.28750209E-09	.501573034	1.43240315E-05	4	5.7E-05
1.5	5.0625	3716.10499	7.50904352E-07	.455393259	6.43315819E-03	2	.012866
1.6	6.5536	2379.36584	4.92913824E-05	.384269663	.295357668	4	1.18143
1.7	8.3521	1513.28796	9.57837263E-04	.386292135	4.67654219	2	9.353084
1.8	10.4976	953.999441	7.14922473E-03	.351797753	25.187795	4	100.75118
1.9	13.0321	594.342312	.0293965263	.317191011	72.2217384	2	144.443476
2	16	364.308622	.0819151058	.291235955	139.058781	4	556.235125
2.1	19.4481	218.213201	.171541438	.265280899	193.122656	2	386.245311
2.2	23.4256	126.285628	.292890665	.239438202	207.464419	4	829.857677
2.3	27.9841	69.1607763	.434142911	.216292135	181.73754	2	363.475079
2.4	33.1776	34.2701827	.57653652	.193258427	126.685424	4	506.741695
2.5	39.0625	13.4796522	.704195695	.170224719	63.1182156	2	126.236431
2.6	45.6976	1.54370404	.814685742	.15011236	8.62708344	4	34.508333
2.7	53.1441	-4.90477677	.896057789	.12988764	-30.3373854	2	-60.674771
2.8	61.4656	-8.01436195	.969970965	.115505618	-55.190321	4	-220.761284
2.9	70.7281	-9.14545591	1.00550256	.0982022472	-63.8707414	2	-127.741483
3	81	-9.15057931	1.0436787	.086741573	-67.1008035	4	-268.403214
3.1	92.352	-8.55655183	1.06193691	.0751685393	-63.0782906	2	-126.156582
3.2	104.8576	-7.68262163	1.06292311	.0635955056	-54.4549836	4	-217.819935
3.3	118.5921	-6.71682587	1.06630352	.0549438202	-46.668038	2	-93.336076
3.4	133.6336	-5.765158	1.05825658	.0462921348	-37.7420138	4	-150.968056
3.5	150.0625	-4.88306638	1.04043303	.0376404495	-28.6968176	2	-57.393636
3.6	167.9616	-4.09776024	1.03372775	.0319101123	-22.7034079	4	-90.813632
3.7	187.4161	-3.43338606	1.0010851	.0232584269	-14.9823821	2	-29.964765
3.8	208.5136	-2.89177761	.98282038	.0175280899	-10.3874279	4	-41.549712
3.9	231.3441	-2.44761945	.98101201	.0147191011	-8.17632106	2	-16.352643
4	256	-2.08132935	.954399796	8.87640451E-03	-4.51386115	4	-18.055445
4.1	282.5761	-1.77764996	.946016069	5.95505619E-03	-2.82986716	2	-5.659735
4.2	311.1696	-1.52461206	.936340737	3.14606742E-03	-1.39752136	4	-5.590086
4.3	341.8801	-1.3127648	.932420832	1.34831459E-03	-.564240101	2	-1.128481
4.4	374.8096	-1.13459982	.936410392	7.86516843E-04	-.313204264	4	-1.252818
4.5	410.0625	-.984116954	.938493631	1.1235954E-04	-.0425537707	1	-.042554

ΣT^{α} = 1525.37684

ΣT^{α} = 1525.37684

```
10  REM   CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW T
     EMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R)) ^ 2
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "f(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =           "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
     (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "        "
415 N = 1
417 P = 1
420  FOR R   11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 >  = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF      =    ";W
550  PRINT "                           "
560  PRINT "                           "
570  PRINT " V(R)          =           "
580  PRINT "                           "
590  PRINT "                           "
600 B = 0.1 * W / 3
610  PRINT "                           "
620  PRINT "               =    ";B
630  PRINT "                           "
640 C = 4 * 22 * .149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "                           "
660  PRINT "               =    ";C; TAB( 35);"           K"
```

$$S(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	$S(r)$	$S^2(r)$	$h(r)$
1.1	.682	6.2	9.12767572E-33	0	.642696629
1.2	.6358	5.78	1.83253739E-21	0	.590786517
1.3	.5974	5.43090909	1.26641656E-14	4.73040438E-27	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.65766164E-18	.501573034
1.5	.5153	4.68454546	1.60293956E-07	5.63857345E-13	.455393259
1.6	.452	4.10909091	1.19956899E-05	2.42964038E-09	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.17452223E-07	.386292135
1.8	.4231	3.84636364	1.85869701E-03	5.11114142E-05	.351797753
1.9	.3923	3.56636363	8.2427169E-03	8.64155756E-04	.317191011
2	.3692	3.35636364	.0244059091	6.71008456E-03	.291235955
2.1	.3461	3.14636364	.0545205373	.0294264648	.265280899
2.2	.3231	2.93727273	.0997151752	.0857849414	.239438202
2.3	.3025	2.75	.15787015	.188480067	.216292135
2.4	.282	2.56363636	.224890133	.332394359	.193258427
2.5	.2615	2.37727273	.296219987	.495891578	.170224719
2.6	.2436	2.21454546	.367879441	.663712858	.15011236
2.7	.2256	2.05090909	.436907612	.802919561	.12988764
2.8	.2128	1.93454545	.501394766	.940843673	.115505618
2.9	.1974	1.79454545	.560310445	1.0110354	.0982022472
3	.1872	1.70181818	.61327274	1.08926522	.086741573
3.1	.1769	1.60818182	.66033386	1.12770799	.0751685393
3.2	.1666	1.51454545	.701809978	1.12980554	.0635955056
3.3	.1589	1.44454545	.738158509	1.13700319	.0549438202
3.4	.1512	1.37454545	.769895661	1.11990699	.0462921348
3.5	.1435	1.30454545	.797544484	1.08250089	.0376404495
3.6	.1384	1.25818182	.821604423	1.06859305	.0319101123
3.7	.1307	1.18818182	.842535277	1.00217137	.0232584269
3.8	.1256	1.14181818	.860750333	.9659359	.0175280899
3.9	.1231	1.11909091	.87661512	.962384565	.0147191011
4	.1179	1.07181818	.890449344	.910878971	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.894946403	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.876733975	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.869408608	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.876864423	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.880770295	1.1235954E-04

(cont.)

$$I^{\beta}_{M-V_{DD}} = V(r)_{M-V_{DD}} S^2(r) h(r) r^4$$

r	r^4	$V(r)_{M-V_{DD}}$	$S^2(r)$	h(r)	$I^{\beta}_{M-V_{DD}}$		T^{β}
1.1	1.4641	21210.7536	0	.642696629	0	1	0
1.2	2.0736	13783.9325	0	.590786517	0	4	0
1.3	2.8561	8935.26525	4.73040438E-27	.54764045	6.61111399E-23	2	0
1.4	3.8416	5773.9232	1.65766164E-18	.501573034	1.84422206E-14	4	0
1.5	5.0625	3716.10499	5.63857345E-13	.455393259	4.83068648E-09	2	0
1.6	6.5536	2379.36584	2.42964038E-09	.384269663	1.45585878E-05	4	5.8E-05
1.7	8.3521	1513.28796	9.17452223E-07	.386292135	4.47936637E-03	2	8.958E-03
1.8	10.4976	953.999441	5.11114142E-05	.351797753	.180073207	4	.720292
1.9	13.0321	594.342312	8.64155756E-04	.317191011	2.12306823	2	4.246136
2	16	364.308622	6.71008456E-03	.291235955	11.3910148	4	45.564059
2.1	19.4481	218.213201	.0294264648	.265280899	33.128538	2	66.257076
2.2	23.4256	126.285628	.0857849414	.239438202	60.7643917	4	243.057566
2.3	27.9841	69.1607763	.188480067	.216292135	78.9000647	2	157.800129
2.4	33.1776	34.2701827	.332394359	.193258427	73.0387734	4	292.155093
2.5	39.0625	13.4796522	.495891578	.170224719	44.4475758	2	88.895151
2.6	45.6976	1.54370404	.663712858	.15011236	7.02836188	4	28.113447
2.7	53.1441	-4.90477677	.802919561	.12988764	-27.1840505	2	-54.368102
2.8	61.4656	-8.01436195	.940843673	.115505618	-53.533009	4	-214.132036
2.9	70.7281	-9.14545591	1.0110354	.0982022472	-64.222194	2	-128.444388
3	81	-9.15057931	1.08926522	.086741573	-70.0316792	4	-280.126717
3.1	92.352	-8.55655183	1.12770999	.0751685393	-66.9851648	2	-133.97033
3.2	104.8576	-7.68262163	1.12980554	.0635955056	-57.8814606	4	-231.525843
3.3	118.5921	-6.71682587	1.13700319	.0549438202	-49.7622931	2	-99.524587
3.4	133.6336	-5.765158	1.11990699	.0462921348	-39.9407344	4	-159.762938
3.5	150.0625	-4.88306638	1.08250089	.0376404495	-29.8571169	2	-59.714234
3.6	167.9616	-4.09776024	1.06859305	.0319101123	-23.4691427	4	-93.876571
3.7	187.4161	-3.43338606	1.00217137	.0232584269	-14.9986394	2	-29.997279
3.8	208.5136	-2.89177761	.9639359	.0175280899	-10.2089759	4	-40.835904
3.9	231.3441	-2.44761945	.962384565	.0147191011	-8.02106917	2	-16.042139
4	256	-2.08132935	.910878971	8.87640451E-03	-4.30802817	4	-17.232113
4.1	282.5761	-1.77764996	.894946403	5.95505619E-03	-2.67709981	2	-5.3542
4.2	311.1696	-1.52461206	.876733975	3.14606742E-03	-1.30855618	4	-5.234225
4.3	341.8801	-1.3127648	.869408608	1.34831459E-03	-.526109225	2	-1.052219
4.4	374.8096	-1.13459982	.876864423	7.86516843E-04	-.293287728	4	-1.173151
4.5	410.0625	-.984116954	.880770295	1.1235954E-04	-.0399364428	1	-.039937

ΣT^{β} = -645.588948

ΣT^{β} = -645.588948

```
10  REM      CALCULATION OF GOUND STATE ENERGY  OF LIQUID HELIUM-4 AT LO
     W TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF MCMILL
     AN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) * FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10)   10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "      "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 > = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
      44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
      ,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                   "
560  PRINT "                   "
570  PRINT " V(R)        =     "
580  PRINT "                   "
590  PRINT "                   "
600 B = 0.1 * W / 3
610  PRINT "                   "
620  PRINT "            =    ";B
630  PRINT "                   "
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$I^{\mu 1}_{H-2} = V(r)\,\$(r)\,h(r)\,r^2$$

r	r^2	$V(r)_{H-2}$	$(r)	h(r)	$I^{\mu 1}_{H-2}$		$T^{\mu 1}$
1.1	1.21	41440.4979	5.65915894E-32	.642696629	1.82376236E-27	1	0
1.2	1.44	26209.1343	1.05920661E-20	.590786517	2.36170923E-16	4	0
1.3	1.6899	16496.0882	6.87779354E-14	.54764045	1.04999354E-09	2	0
1.4	1.96	10331.7554	1.28750209E-09	.501573034	1.3077126E-05	4	5E-05
1.5	2.25	6439.57688	7.50904352E-07	.455393259	4.95462818E-03	2	9.9E-03
1.6	2.56	3993.32218	4.92913824E-05	.384269663	.193633909	4	.77453
1.7	2.89	2461.92434	9.57837263E-04	.386292135	2.63257127	2	5.26514
1.8	3.24	1506.72441	7.14922473E-03	.351797753	12.2780909	4	49.11236
1.9	3.61	913.171572	.0293965263	.317191011	30.7380611	2	61.47612
2	4	545.976463	.0819151058	.291235955	52.1006209	4	208.40248
2.1	4.41	320.098299	.171541438	.265280899	64.2387352	2	128.47747
2.2	4.84	182.198784	.292890665	.239438202	61.8428947	4	247.37157
2.3	5.29	98.8826805	.434142911	.216292135	49.1189805	2	98.23796
2.4	5.76	49.2781421	.57653652	.193258427	31.6258402	4	126.50336
2.5	6.25	20.3680448	.704195695	.170224719	15.2596774	2	30.51935
2.6	6.76	4.05650366	.814685742	.15011236	3.3535527	4	13.41421
2.7	7.29	-4.6729092	.896057789	.12988764	-3.96477656	2	-7.92956
2.8	7.84	-8.91288108	.969970965	.115505618	-7.82881476	4	-31.31526
2.9	8.41	-10.5571047	1.00550256	.0982022472	-8.76688747	2	-17.53378
3	9	-10.7543406	1.0436787	.086741573	-8.76234625	4	-35.04939
3.1	9.6099	-10.1924996	1.06193691	.0751685393	-7.81869722	2	-15.6374
3.2	10.24	-9.27602777	1.06292311	.0635955056	-6.42081669	4	-25.68327
3.3	10.89	-8.23636529	1.06630352	.0549438202	-5.25488448	2	-10.50977
3.4	11.56	-7.20047415	1.05825658	.0462921348	-4.07771732	4	-16.31087
3.5	12.25	-6.23314415	1.04043303	.0376404495	-2.99028231	2	-5.98057
3.6	12.96	-5.3629368	1.03372775	.0319101123	-2.29267337	4	-9.1707
3.7	13.69	-4.59805577	1.0010851	.0232584269	-1.46564576	2	-2.9313
3.8	14.44	-3.93923396	.98282038	.0175280899	-.97991344	4	-3.91966
3.9	15.21	-3.37757744	.98101201	.0147191011	-.741805658	2	-1.48362
4	16	-2.90044415	.954399796	8.87640451E-03	-.393144236	4	-1.57258
4.1	16.81	-2.49578659	.946016069	5.95505619E-03	-.236352139	2	-.47271
4.2	17.64	-2.15270174	.936340737	3.14606742E-03	-.111862465	4	-.44745
4.3	18.49	-1.86162478	.932420832	1.34831459E-03	-.0432745205	2	-.08655
4.4	19.36	-1.61432952	.936410392	7.86516843E-04	-.023018223	4	-.09208
4.5	20.25	-1.40383162	.938493631	1.1235954E-04	-2.99765278E-03	1	-3E-03

$\Sigma T^{\mu 1}$ = 783.434981

$\Sigma T^{\mu 1}$ = 783.434981

```
10  REM        CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 AT
     LOW TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF MCMI
     LLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
225  DATA   .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,
     .11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11
     ,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.11,.1
     1,.11,.11,.11,.11,.11,.11,.11
230  PRINT "    "
240  PRINT "$(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =       ".
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N)
410  PRINT "      "
415 N = 1
417 P = 1
420  FOR R = 11 TO 101
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 > = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,
     2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,2,4,2,4,2,4,2
535  DATA  4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1
540  PRINT "TOTAL OF    =    ";W
550  PRINT "                            "
560  PRINT "                            "
570  PRINT " V(R)                       "
580  PRINT "                            "
590  PRINT "                            "
600 B = 0.1 * W / 3
610  PRINT "                            "
620  PRINT "                    ";B
630  PRINT "                            "
```

$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$, $f(r) = \exp\{-(2.6/r)^5\}$

$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.570786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293756E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956897E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	[illegible]	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454546	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970963	.115505618
2.9	.1974	1.79454545	.560310443	1.00550256	.0982022472
3	.1872	[illegible]	.61327274	1.0436797	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809778	1.06292311	.0633955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04
4.6	.11	1	.943945403	.943945402	0
4.7	.11	1	.94951335	.94951335	0
4.8	.11	1	.954440974	.954440973	0
4.9	.11	1	.958810665	.958810664	0
5	.11	1	.962693299	.962693298	0
5.1	.11	1	.966149929	.966149929	0
5.2	.11	1	.969233235	.969233234	0
5.3	.11	1	.971988742	.971988742	0
5.4	.11	1	.974455869	.974455868	0

(cont,)

5.5	.11	1	[illegible]	[illegible]	[illegible]
5.6	.11	1	.978657252	.978657252	0
5.7	.11	1	.980447081	.980447081	0
5.8	.11	1	.982060847	.982060848	0
5.9	.11	1	.983518266	.983518266	0
6	.11	1	.984836593	.984836593	0
6.1	.11	1	.986030965	.986030964	0
6.2	.11	1	.987114682	.987114682	0
6.3	.11	1	.988099453	.988099453	0
6.4	.11	1	.988995603	.988995603	0
6.5	.11	1	.98981225	.98981225	0
6.6	.11	1	.990557467	.990557467	0
6.7	.11	1	.991238405	.991238405	0
6.8	.11	1	.991861415	.991861415	0
6.9	.11	1	.992432146	.992432146	0
7	.11	1	.992955627	.992955627	0
7.1	.11	1	.993436344	.993436344	0
7.2	.11	1	.993878307	.993878307	0
7.3	.11	1	.994285102	.994285102	0
7.4	.11	1	.994659942	.994659942	0
7.5	.11	1	.995005711	.995005711	0
7.6	.11	1	.995325	.995325	0
7.7	.11	1	.995620139	.995620139	0
7.8	.11	1	.99589323	.995893229	0
7.9	.11	1	.996146165	.996146165	0
8	.11	1	.996380657	.996380657	0
8.1	.11	1	.996598254	.996598254	0
8.2	.11	1	.996800355	.996800355	0
8.3	.11	1	.996988232	.996988232	0
8.4	.11	1	.997163038	.997163038	0
8.5	.11	1	.997325819	.997325819	0
8.6	.11	1	.997477529	.997477529	0
8.7	.11	1	.997619035	.997619035	0
8.8	.11	1	.997751129	.997751129	0
8.9	.11	1	.997874531	.997874531	0
9	.11	1	.997989901	.997989902	0
9.1	.11	1	.998097843	.998097843	0
9.2	.11	1	.998198907	.998198907	0
9.3	.11	1	.998293599	.998293599	0
9.4	.11	1	.998382382	.998382382	0
9.5	.11	1	.998465682	.998465682	0
9.6	.11	1	.99854389	.99854389	0
9.7	.11	1	.998617365	.998617365	0
9.8	.11	1	.998686437	.998686437	0
9.9	.11	1	.998751411	.998751411	0
10	.11	1	.998812568	.998812568	0
10.1	.11	1	.998870167	0	0

(cont.)

$$I^{\mu\Pi}_{H-2} = V(r)_{H-2}\,S(r)\,r^2$$

r	r^2	$V(r)_{H-2}$	S(r)	h(r)	$I^{\mu\Pi}_{H-2}$		$T^{\mu\Pi}$
1.1	1.21	41440.4979	5.65915894E-32	.642696629	2.8376722E-27	1	0
1.2	1.44	26209.1343	1.05920661E-20	.590786517	3.99756793E-16	4	0
1.3	1.6899	16496.0882	6.87779354E-14	.54764045	1.91730458E-09	2	0
1.4	1.96	10331.7554	1.28750209E-09	.501573034	2.60722271E-05	4	1E-04
1.5	2.25	6439.57688	7.50904352E-07	.455393259	.0108798892	2	.02175
1.6	2.56	3993.32218	4.92913824E-05	.384269663	.503901109	4	2.0156
1.7	2.89	2461.92434	9.57837263E-04	.386292135	6.81497508	2	13.62995
1.8	3.24	1506.72441	7.14922473E-03	.351797753	34.9009931	4	139.60397
1.9	3.61	913.171572	.0293965263	.317191011	96.9071003	2	193.8142
2	4	545.976463	.0819151058	.291235955	178.894879	4	715.57951
2.1	4.41	320.098299	.171541438	.265280899	242.153639	2	484.30727
2.2	4.84	182.198784	.292890665	.239438202	258.283323	4	1033.13329
2.3	5.29	98.8826805	.434142911	.216292135	227.095546	2	454.19109
2.4	5.76	49.2781421	.57653652	.193258427	163.645336	4	654.58134
2.5	6.25	20.3680448	.704195695	.170224719	89.6443093	2	179.28861
2.6	6.76	4.05650366	.814685742	.15011236	22.3402837	4	89.36113
2.7	7.29	-4.6729092	.896057789	.12988764	-30.5246639	2	-61.04933
2.8	7.84	-8.91288108	.969970965	.115505618	-67.7786491	4	-271.1146
2.9	8.41	-10.5571047	1.00550256	.0982022472	-89.273797	2	-178.5476
3	9	-10.7543406	1.0436787	.086741573	-101.016686	4	-404.06675
3.1	9.6099	-10.1924996	1.06193691	.0751685393	-104.015553	2	-208.03111
3.2	10.24	-9.27602777	1.06292311	.0635955056	-100.963372	4	-403.85349
3.3	10.89	-8.23636529	1.06630352	.0549438202	-95.6410469	2	-191.2821
3.4	11.56	-7.20047415	1.05825658	.0462921348	-88.0866121	4	-352.34645
3.5	12.25	-6.23314415	1.04043303	.0376404495	-79.443321	2	-158.88665
3.6	12.96	-5.3629368	1.03372775	.0319101123	-71.8478628	4	-287.39146
3.7	13.69	-4.59805577	1.0010851	.0232584269	-63.0156873	2	-126.03138
3.8	14.44	-3.93923396	.98282038	.0175280899	-55.905318	4	-223.62128
3.9	15.21	-3.37757744	.98101201	.0147191011	-50.3974838	2	-100.79497
4	16	-2.90044415	.954399796	8.87640451E-03	-44.2909329	4	-177.16374
4.1	16.81	-2.49578659	.946016069	5.95505619E-03	-39.6893213	2	-79.37865
4.2	17.64	-2.15270174	.936340737	3.14606742E-03	-35.5562835	4	-142.22514
4.3	18.49	-1.86162478	.932420832	1.34831459E-03	-32.0952698	2	-64.19054
4.4	19.36	-1.61432952	.936410392	7.86516843E-04	-29.2660268	4	-117.06411
4.5	20.25	-1.40383162	.938493631	1.1235954E-04	-26.6791124	2	-53.35823
4.6	21.16	-1.22425066	.943945402	0	-24.4530416	4	-97.81217
4.7	22.09	-1.07066169	.94951335	0	-22.4568611	2	-44.91373
4.8	23.04	-.938952548	.954440973	0	-20.647867	4	-82.59147
4.9	24.01	-.8256948	.958810664	0	-19.0083564	2	-38.01672
5	25	-.728030836	.962693298	0	-17.5217602	4	-70.08705
5.1	26.01	-.643577412	.966149929	0	-16.172817	2	-32.34564
5.2	27.04	-.570344419	.969233234	0	-14.9476246	4	-59.7905
5.3	28.09	-.506667155	.971988742	0	-13.8336163	2	-27.66724

(cont.)

5.5	30.25	-.402621221	.976668802	0	-11.8951345	2	-23.79027
5.6	31.36	-.360092658	.978657252	0	-11.0514926	4	-44.20598
5.7	32.49	-.322730598	.980447081	0	-10.2804947	2	-20.56099
5.8	33.64	-.289828905	.982060848	0	-9.57494043	4	-38.29977
5.9	34.81	-.260788035	.983518266	0	-8.92840982	2	-17.85682
6	36	-.235097572	.984836593	0	-8.33517689	4	-33.34071
6.1	37.21	-.212321805	.986030964	0	-7.79013208	2	-15.58027
6.2	38.44	-.192087817	.987114682	0	-7.28871237	4	-29.15485
6.3	39.69	-.174075603	.988099453	0	-6.82683908	2	-13.65368
6.4	40.96	-.15800986	.988995603	0	-6.4008625	4	-25.60345
6.5	42.25	-.143653161	.98981225	0	-6.00751307	2	-12.01503
6.6	43.56	-.13080024	.990557467	0	-5.64385811	4	-22.57544
6.7	44.89	-.119273225	.991238405	0	-5.30726395	2	-10.61453
6.8	46.24	-.108917626	.991861415	0	-4.99536227	4	-19.98145
6.9	47.61	-.0995989656	.992432146	0	-4.70602069	2	-9.41205
7	49	-.0911999288	.992955627	0	-4.43731664	4	-17.74927
7.1	50.41	-.0836179639	.993436344	0	-4.18751456	2	-8.37503
7.2	51.84	-.0767632393	.993878307	0	-3.95504562	4	-15.82019
7.3	53.29	-.0705569111	.994285102	0	-3.7384899	2	-7.47698
7.4	54.76	-.0649296468	.994659942	0	-3.53656063	4	-14.14625
7.5	56.25	-.0598203633	.995005711	0	-3.34809018	2	-6.69619
7.6	57.76	-.0551751498	.995325	0	-3.17201782	4	-12.68808
7.7	59.29	-.0509463407	.995620139	0	-3.0073787	2	-6.01476
7.8	60.84	-.0470917212	.995873229	0	-2.85329417	4	-11.41318
7.9	62.41	-.0435738405	.996146165	0	-2.7089631	2	-5.41793
8	64	-.0403594223	.996380657	0	-2.57365425	4	-10.29462
8.1	65.61	-.0374188518	.996598254	0	-2.44669941	2	-4.8934
8.2	67.24	-.0347257334	.996800355	0	-2.32748728	4	-9.30995001
8.3	68.89	-.0322565051	.996988232	0	-2.21545803	2	-4.43092
8.4	70.56	-.0299901037	.997163038	0	-2.11009841	4	-8.4404
8.5	72.25	-.0279076741	.997325819	0	-2.01093743	2	-4.02188
8.6	73.96	-.025992314	.997477529	0	-1.91754237	4	-7.67017
8.7	75.69	-.0242288513	.997619035	0	-1.82951535	2	-3.65904
8.8	77.44	-.0226036492	.997751129	0	-1.74649011	4	-6.98597
8.9	79.21	-.0211044353	.997874531	0	-1.66812921	2	-3.33626
9	81	-.0197201516	.997989902	0	-1.59412148	4	-6.37649
9.1	82.81	-.0184408215	.998097843	0	-1.52417967	2	-3.04836
9.2	84.64	-.017257434	.998198907	0	-1.45803842	4	-5.83216
9.3	86.49	-.0161618407	.998293599	0	-1.39545233	2	-2.79091
9.4	88.36	-.0151466645	.998382382	0	-1.33619432	4	-5.34478
9.5	90.25	-.0142052195	.998465682	0	-1.28005403	2	-2.56011
9.6	92.16	-.0133314399	.99854389	0	-1.22683649	4	-4.90735
9.7	94.09	-.012519816	.998617365	0	-1.17636076	2	-2.35273
9.8	96.04	-.0117653387	.998686437	0	-1.12845888	4	-4.51384
9.9	98.01	-.0110634491	.998751411	0	-1.08297477	2	-2.16595
10	100	-.0104099939	.998812568	0	-1.03976328	4	-4.15906
10.1	102.01	-9.80118577E-030		0	0	1	0

$\Sigma T^{\mu}\Pi = -694.90977$

```
10  REM    CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW
     TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) * FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) = INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10) ^ 10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "         "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 > = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF    =    ";W
550  PRINT "                        "
560  PRINT "                        "
570  PRINT " V(R)        =          "
580  PRINT "                        "
590  PRINT "                        "
600 B = 0.1 * W / 3
610  PRINT "                        "
620  PRINT "             =    ";B
630  PRINT "                        "
640 C = 4 * 22 * .149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "                        "
660  PRINT "             =    ";C; TAB( 35);"          K."
4425 X = R / 2.9673
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r) \quad , \quad f(r) = \exp\{-(2.6/r)^5\}$$

$$h(r) = (\rho/\rho_c)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.682	6.2	9.12767572E-33	5.65915894E-32	.642696629
1.2	.6358	5.78	1.83253739E-21	1.05920661E-20	.590786517
1.3	.5974	5.43090909	1.26641656E-14	6.87779354E-14	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.28750209E-09	.501573034
1.5	.5153	4.68454546	1.60293956E-07	7.50904352E-07	.455393259
1.6	.452	4.10909091	1.19956899E-05	4.92913824E-05	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.57837263E-04	.386292135
1.8	.4231	3.84636364	1.85869701E-03	7.14922473E-03	.351797753
1.9	.3923	3.56636363	8.2427169E-03	.0293965263	.317191011
2	.3692	3.35636364	.0244059091	.0819151058	.291235955
2.1	.3461	3.14636364	.0545205373	.171541438	.265280899
2.2	.3231	2.93727273	.0997151752	.292890665	.239438202
2.3	.3025	2.75	.15787015	.434142911	.216292135
2.4	.282	2.56363636	.224890133	.57653652	.193258427
2.5	.2615	2.37727273	.296219987	.704195695	.170224719
2.6	.2436	2.21454346	.367879441	.814685742	.15011236
2.7	.2256	2.05090909	.436907612	.896057789	.12988764
2.8	.2128	1.93454545	.501394766	.969970965	.115505618
2.9	.1974	1.79454545	.560310445	1.00550256	.0982022472
3	.1872	1.70181818	.61327274	1.0436787	.086741573
3.1	.1769	1.60818182	.66033386	1.06193691	.0751685393
3.2	.1666	1.51454545	.701809978	1.06292311	.0635955056
3.3	.1589	1.44454545	.738158509	1.06630352	.0549438202
3.4	.1512	1.37454545	.769895661	1.05825658	.0462921348
3.5	.1435	1.30454545	.797544484	1.04043303	.0376404495
3.6	.1384	1.25818182	.821604423	1.03372775	.0319101123
3.7	.1307	1.18818182	.842535277	1.0010851	.0232584269
3.8	.1256	1.14181818	.860750333	.98282038	.0175280899
3.9	.1231	1.11909091	.87661512	.98101201	.0147191011
4	.1179	1.07181818	.890449344	.954399796	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.946016069	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.936340737	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.932420832	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.936410392	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.938493631	1.1235954E-04

(cont.)

$$I^{\alpha}_{H-2} = V(r)\,\$(r)\,h(r)\,r^4$$

r	r^4	$V(r)_{H-2}$	$(r)	h(r)	I^{α}_{H-2}		T^{α}
1.1	1.4641	41440.4979	5.65915894E-32	.642696629	2.20675246E-27	1	0
1.2	2.0736	26209.1343	1.05920661E-20	.590786517	3.4008613E-16	4	0
1.3	2.8561	16496.0882	6.87779354E-14	.54764045	1.77459409E-09	2	0
1.4	3.8416	10331.7554	1.28750209E-09	.501573034	2.5631167E-05	4	1E-04
1.5	5.0625	6439.57688	7.50904352E-07	.455393259	.0111479134	2	.02229
1.6	6.5536	3993.32218	4.92913824E-05	.384269663	.495702808	4	1.98281
1.7	8.3521	2461.92434	9.57837263E-04	.386292135	7.60813098	2	15.21626
1.8	10.4976	1506.72441	7.14922473E-03	.351797753	39.7810146	4	159.12405
1.9	13.0321	913.171572	.0293965263	.317191011	110.964401	2	221.9288
2	16	545.976463	.0819151058	.291235955	208.402483	4	833.60993
2.1	19.4481	320.098299	.171541438	.265280899	283.292822	2	566.58564
2.2	23.4256	182.198784	.292890665	.239438202	299.31961	4	1197.27844
2.3	27.9841	98.8826805	.434142911	.216292135	259.839407	2	519.67881
2.4	33.1776	49.2781421	.57653652	.193258427	182.164839	4	728.65935
2.5	39.0625	20.3680448	.704195695	.170224719	95.3729837	2	190.74596
2.6	45.6976	4.05650366	.814685742	.15011236	22.6700163	4	90.68006
2.7	53.1441	-4.6729092	.896057789	.12988764	-28.9032211	2	-57.80645
2.8	61.4656	-8.91288108	.969970965	.115505618	-61.3779077	4	-245.51164
2.9	70.7281	-10.5571047	1.00550256	.0982022472	-73.7295236	2	-147.45905
3	81	-10.7543406	1.0436787	.086741573	-78.8611163	4	-315.44447
3.1	92.352	-10.1924996	1.06193691	.0751685393	-75.1383807	2	-150.27677
3.2	104.8576	-9.27602777	1.06292311	.0635955056	-65.7491629	4	-262.99666
3.3	118.5921	-8.23636529	1.06630352	.0549438202	-57.225692	2	-114.45139
3.4	133.6336	-7.20047415	1.05825658	.0462921348	-47.1384122	4	-188.55365
3.5	150.0625	-6.23314415	1.04043303	.0376404495	-36.6309583	2	-73.26192
3.6	167.9616	-5.3629368	1.03372775	.0319101123	-29.7130469	4	-118.85219
3.7	187.4161	-4.59805577	1.0010851	.0232584269	-20.0646905	2	-40.12939
3.8	208.5136	-3.93923396	.98282038	.0175280899	-14.1499501	4	-56.59981
3.9	231.3441	-3.37757744	.98101201	.0147191011	-11.2828641	2	-22.56573
4	256	-2.90044415	.954399796	8.87640451E-03	-6.29030778	4	-25.16124
4.1	282.5761	-2.49578659	.946016069	5.95505619E-03	-3.97307945	2	-7.94616
4.2	311.1696	-2.15270174	.936340737	3.14606742E-03	-1.97325388	4	-7.89302
4.3	341.8801	-1.86162478	.932420832	1.34831459E-03	-.800145885	2	-1.6003
4.4	374.8096	-1.61432952	.936410392	7.86516843E-04	-.445632797	4	-1.78254
4.5	410.0625	-1.40383162	.938493631	1.1235954E-04	-.0607024688	1	-.06071

ΣT^{α} = 2687.15941

ΣT^{α} = 2687.159

```
10  REM    CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LOW
     TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .11
80 HH(N) = (A(N) - .11) / .89
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R)) ^ 2
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6820,.6358,.5974,.5564,.5153,.4520,.4538,.4231,.3923,.3692,.
     3461,.3231,.3025,.2820,.2615,.2436,.2256,.2128,.1974,.1872,.1769,.1
     666,.1589,.1512,.1435,.1384,.1307,.1256,.1231,.1179,.1153,.1128,.11
     12,.1107,.1101
230  PRINT "  "
240  PRINT "F(R) =      "
250  PRINT "  "
260  PRINT "  "
270  PRINT "H(R) =      "
280  PRINT "  "
290  PRINT "  "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       ((1.37732241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)) * EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       ((1.37732241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "      "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
425 X = R / [illegible]
430  IF X / [illegible] < 1.241314 THEN V =  FN A1(X)
440  IF X / [illegible] > = 1.241314 THEN V =  FN A2(X)
470 L = FN L(R / 10)
480 M = [illegible] * JJ(P) * 100000) / 100000
490  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 29);GG(N); TAB(
      44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
495 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA  1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,1
540  PRINT "TOTAL OF          ";W
550  PRINT "                  "
560  PRINT "                  "
570  PRINT " V(R)      =      "
580  PRINT "                  "
590  PRINT "                  "
600 L = 0.1 * W / 3
610  PRINT "                  "
620  PRINT "           =      ";L
630  PRINT "                  "
640 C = [illegible]
650  PRINT "                  "
660  PRINT "                  ";C; TAB( 30);"       K"
```

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$\$^2(r)$	h(r)
1.1	.682	6.2	9.12767572E-33	0	.642696629
1.2	.6358	5.78	1.83253739E-21	0	.590786517
1.3	.5974	5.43090909	1.26641656E-14	4.73040438E-27	.54764045
1.4	.5564	5.05818182	2.54538503E-10	1.65766164E-18	.501573034
1.5	.5153	4.68454546	1.60293956E-07	5.63857345E-13	.455393259
1.6	.452	4.10909091	1.19956899E-05	2.42964038E-09	.384269663
1.7	.4538	4.12545455	2.32177382E-04	9.17452223E-07	.386292135
1.8	.4231	3.84636364	1.85869701E-03	5.11114142E-05	.351797753
1.9	.3923	3.56636363	8.2427169E-03	8.64155756E-04	.317191011
2	.3692	3.35636364	.0244059091	6.71008456E-03	.291235955
2.1	.3461	3.14636364	.0545205373	.0294264648	.265280899
2.2	.3231	2.93727273	.0997151752	.0857849414	.239438202
2.3	.3025	2.75	.15787015	.188480067	.216292135
2.4	.282	2.56363636	.224890133	.332394359	.193258427
2.5	.2615	2.37727273	.296219987	.495891578	.170224719
2.6	.2436	2.21454546	.367879441	.663712858	.15011236
2.7	.2256	2.05090909	.436907612	.802919561	.12988764
2.8	.2128	1.93454545	.501394766	.940843673	.115505618
2.9	.1974	1.79454545	.560310445	1.0110354	.0982022472
3	.1872	1.70181818	.61327274	1.08926522	.086741573
3.1	.1769	1.60818182	.66033386	1.12770999	.0751685393
3.2	.1666	1.51454545	.701809978	1.12980554	.0635955056
3.3	.1589	1.44454545	.738158509	1.13700319	.0549438202
3.4	.1512	1.37454545	.769895661	1.11990699	.0462921348
3.5	.1435	1.30454545	.797544484	1.08250089	.0376404495
3.6	.1384	1.25818182	.821604423	1.06859305	.0319101123
3.7	.1307	1.18818182	.842535277	1.00217137	.0232584269
3.8	.1256	1.14181818	.860750333	.9659359	.0175280899
3.9	.1231	1.11909091	.87661512	.962384565	.0147191011
4	.1179	1.07181818	.890449344	.910878971	8.87640451E-03
4.1	.1153	1.04818182	.902530509	.894946403	5.95505619E-03
4.2	.1128	1.02545455	.913098236	.876733975	3.14606742E-03
4.3	.1112	1.01090909	.922358737	.869408608	1.34831459E-03
4.4	.1107	1.00636364	.930489098	.876864423	7.86516843E-04
4.5	.1101	1.00090909	.937641231	.880770295	1.1235954E-04

(cont.)

$$I^{\beta} = V(r)_{H-2}\,\$^2(r)\,h(r)\,r^4$$

r	r^4	$V(r)_{H-2}$	$\$^2(r)$	h(r)	I^{β}_{H-2}		T^{β}
1.1	1.4641	41440.4979	0	.642696629	0	1	0
1.2	2.0736	26209.1343	0	.590786517	0	4	0
1.3	2.8561	16496.0882	4.73040438E-27	.54764045	1.22052917E-22	2	0
1.4	3.8416	10331.7554	1.65766164E-18	.501573034	3.30001812E-14	4	0
1.5	5.0625	6439.57688	5.63857345E-13	.455393259	8.37101669E-09	2	0
1.6	6.5536	3993.32218	2.42964038E-09	.384267663	2.44338766E-05	4	9E-05
1.7	8.3521	2461.92434	9.17452223E-07	.386292135	7.28735136E-03	2	.01457
1.8	10.4976	1506.72441	5.11114142E-05	.351797753	.284403413	4	1.13761
1.9	13.0321	913.171572	8.64155756E-04	.317191011	3.26196792	2	6.52393
2	16	545.976463	6.71008456E-03	.291235955	17.0713115	4	68.28524
2.1	19.4481	320.098299	.0294264648	.265280899	48.596458	2	97.19291
2.2	23.4256	182.198784	.0857849414	.239438202	87.6679196	4	350.67167
2.3	27.9841	98.8826805	.188480067	.216292135	112.807437	2	225.61487
2.4	33.1776	49.2781421	.332394359	.193258427	105.024683	4	420.09873
2.5	39.0625	20.3680448	.495891578	.170224719	67.1612446	2	134.32248
2.6	45.6976	4.05650366	.663712858	.15011236	18.468939	4	73.87575
2.7	53.1441	-4.6729092	.802919561	.12988764	-25.8989564	2	-51.79792
2.8	61.4656	-8.91288108	.940843673	.115505618	-59.5347884	4	-238.13916
2.9	70.7281	-10.5571047	1.0110354	.0982022472	-74.1352247	2	-148.27045
3	81	-10.7543406	1.08926522	.086741573	-82.3056671	4	-329.22267
3.1	92.352	-10.1924996	1.12770999	.0751685393	-79.7922196	2	-159.58444
3.2	104.8576	-9.27602777	1.12980554	.0635955056	-69.8863047	4	-279.54522
3.3	118.5921	-8.23636529	1.13700319	.0549438202	-61.0199567	2	-122.03992
3.4	133.6336	-7.20047415	1.11990699	.0462921348	-49.8845349	4	-199.53814
3.5	150.0625	-6.23314415	1.08250089	.0376404495	-38.1120589	2	-76.22412
3.6	167.9616	-5.3629368	1.06859305	.0319101123	-30.7152009	4	-122.86081
3.7	187.4161	-4.59805577	1.00217137	.0232584269	-20.0864626	2	-40.17293
3.8	208.5136	-3.93923396	.9659359	.0175280899	-13.9068593	4	-55.62744
3.9	231.3441	-3.37757744	.962384565	.0147191011	-11.0686252	2	-22.13726
4	256	-2.90044415	.910878971	8.87640451E-03	-6.00346847	4	-24.01388
4.1	282.5761	-2.49578659	.894946403	5.95505619E-03	-3.758597	2	-7.5172
4.2	311.1696	-2.15270174	.876733975	3.14606742E-03	-1.84763799	4	-7.39056
4.3	341.8801	-1.86162478	.869408608	1.34831459E-03	-.746072692	2	-1.49215
4.4	374.8096	-1.61432952	.876864423	7.86516843E-04	-.417295182	4	-1.66919
4.5	410.0625	-1.40383162	.880770295	1.1235954E-04	-.0569688804	1	-.05697

ΣT^{β} = -509.56258

ΣT^{β} = -509.56258

```
10  REM    CALCULATION OF GROUND STATE ENERGY OF LIQUID  HELIUM-4 AT LOW
      TEMPERATURE BY USING LENNARD JONES 12-6 POTENTIAL AND READING CURV
     E OF MCMILLAN
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3424,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     4??,.1415,.1410
230  PRINT "     "
240  PRINT "[illegible] =      "
250  PRINT "     "
260  PRINT "    "
270  PRINT "[illegible]      "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT [illegible]
320  DIM JJ([illegible])
330  FOR R = 1 TO O
340  READ [illegible]
350  NEXT R
360 N = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN [illegible](R) =  INT (R ^ 2 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN [illegible](R) = FN [illegible](R) * FN A(R) * GG(N) * HH(N)
410  DEF  FN [illegible](R) =  INT ( FN [illegible](R) * JJ(R) * 100000) / 100000
420 [illegible]
430 [illegible]
440  PRINT "    "
450 [illegible]
460 [illegible]
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN [illegible](R / 10); TAB( [illegible]); FN A(R / 10); TAB( [illegible]
     [illegible]; TAB( 44);HH(N); TAB( [illegible]); FN [illegible](R / 10); TAB( [illegible]);JJ(R); TAB(
     [illegible]; [illegible] (R / 10): PRINT
490 [illegible] FN [illegible](R / 10)
500 N = N + 1
510 [illegible]
520  NEXT R
530  DATA  [illegible],1,[illegible],4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,
     ,1,2,4, ,1,1
540  PRINT "[illegible]       ";[illegible]
550  PRINT "  "
560  PRINT "   "
570  PRINT "[illegible])       "
580  PRINT "       "
590  PRINT "       "
600 [illegible]
610  PRINT "       "
620  PRINT "          ";[illegible]
630  PRINT "       "
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701807978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\mu}1 = V(r)_{L-J}\,\$(r)\,h(r)\,r^{2}$$

r	r^2	$V(r)_{L-J}$	\$(r)	h(r)	$I^{\mu}1_{L-J}$		$I^{\mu}1$
1.1	1.21	1006377.48	4.41388318E-32	.624418605	3.35616225E-26	1	0
1.2	1.44	352687.833	8.32495559E-21	.576744186	2.43847395E-15	4	0
1.3	1.6899	134071.796	5.38227064E-14	.529069767	6.45174079E-09	2	0
1.4	1.96	54552.7193	1.01033609E-09	.483372093	5.22179618E-05	4	2E-04
1.5	2.25	23498.109	5.9308766E-07	.439534884	.0137824894	2	.02756
1.6	2.56	10613.3432	4.1436542E-05	.399534884	.449811321	4	1.79924
1.7	2.89	4983.4831	7.47611192E-04	.361395349	3.89125047	2	7.7825
1.8	3.24	2412.55946	5.57078057E-03	.325116279	14.1572143	4	56.62885
1.9	3.61	1193.84307	.0230678324	.292790698	29.1084116	2	58.21682
2	4	597.921527	.0637342883	.262325581	39.9869211	4	159.94768
2.1	4.41	299.21437	.133419545	.235581395	41.4745306	2	82.94906
2.2	4.84	146.728331	.227706725	.208953489	33.789738	4	135.15895
2.3	5.29	68.0431978	.338293178	.186046512	22.6545353	2	45.30907
2.4	5.76	27.3877178	.452832345	.165	11.7869031	4	47.14761
2.5	6.25	6.63740117	.561760046	.145930233	3.40074609	2	6.80149
2.6	6.76	-3.59186254	.65902974	.128837209	-2.0616395	4	-8.24656
2.7	7.29	-8.24587727	.736813476	.111744186	-4.94933547	2	-9.89868
2.8	7.84	-9.96711542	.80438046	.0983720931	-6.18328086	4	-24.73313
2.9	8.41	-10.1801769	.852872539	.085	-6.20660886	2	-12.41322
3	9	-9.65565236	.890121575	.0734883721	-5.68449758	4	-22.738
3.1	9.6099	-8.80863177	.912204059	.0620930232	-4.79470763	2	-9.58942
3.2	10.24	-7.85934263	.92839434	.0525581395	-3.92697961	4	-15.70792
3.3	10.89	-6.92079309	.933770512	.0431395349	-3.03598316	2	-6.07197
3.4	11.56	-6.04711559	.953220544	.0391860465	-2.61662332	4	-10.4665
3.5	12.25	-5.26044309	.952495983	.031627907	-1.94129717	2	-3.8826
3.6	12.96	-4.56591178	.933107879	.0220930233	-1.21988678	4	-4.87955
3.7	13.69	-3.96003174	.917159828	.0144186046	-.716919465	2	-1.43384
3.8	14.44	-3.43532491	.927151073	.0125581396	-.577578242	4	-2.31032
3.9	15.21	-2.98285367	.934221255	.0106976744	-.453419592	2	-.90684
4	16	-2.59355654	.938151987	8.72093028E-03	-.339509335	4	-1.35804
4.1	16.81	-2.25891254	.940565722	6.86046514E-03	-.245024684	2	-.49005
4.2	17.64	-1.97123168	.940491183	4.88372093E-03	-.15971357	4	-.63886
4.3	18.49	-1.72374243	.939488256	3.02325586E-03	-.0905264605	2	-.18106
4.4	19.36	-1.51057288	.940458624	1.7441861E-03	-.047971086	4	-.19189
4.5	20.25	-1.32668093	.944338667	1.16279072E-03	-.0294999204	1	-.0295

ΣT^{μ} = 465.60108

ΣT^{μ} = 465.60108

```
10  REM     CALCULATION OF GROUND STATE ENERGY OF LIQUID HELIUM 4 AT LOW
     TEMPERATURE BY USING LENNARD JONES 12-6 POTENTIAL AND READING CURVE
      OF HRCF SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
225  DATA   .14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,
     .14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14
     ,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.1
     4,.14,.14,.14,.14,.14,.14,.14
230  PRINT "    "
240  PRINT "F(R) =        "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =         "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 10.1 STEP .1
380  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "    "
450 N = 1
460 P = 1
470  FOR R = 11 TO 101
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 3
     0);GG(N); TAB( 44);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W + FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA    1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
535  DATA  2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1
540  PRINT "TOTAL OF         ";N
550  PRINT "   "
560  PRINT "    "
570  PRINT " V(R)          "
580  PRINT "          "
590  PRINT "          "
600 B = .1 * W / 3
610  PRINT "          "
620  PRINT "             ";B
630  PRINT "          "
```

$$f(r) = \exp\{-(2.6/r)\}$$

$$S(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$S^2(r)$	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03
4.6	.14	1	.943945403	.943945402	0
4.7	.14	1	.94951335	.94951335	0
4.8	.14	1	.954440974	.954440973	0
4.9	.14	1	.958810665	.958810664	0
5	.14	1	.962693299	.962693298	0
5.1	.14	1	.966149929	.966149929	0
5.2	.14	1	.969233235	.969233234	0
5.3	.14	1	.971988742	.971988742	0

(cont,)

5.4	.14	1	.974455868	.974455868	0
5.5	.14	1	.976668802	.976668802	0
5.6	.14	1	.978657252	.978657252	0
5.7	.14	1	.980447081	.980447081	0
5.8	.14	1	.982060849	.982060848	0
5.9	.14	1	.983518266	.983518266	0
6	.14	1	.984836593	.984836593	0
6.1	.14	1	.986030965	.986030964	0
6.2	.14	1	.987114682	.987114682	0
6.3	.14	1	.988099453	.988099453	0
6.4	.14	1	.988995603	.988995603	0
6.5	.14	1	.98981225	.98981225	0
6.6	.14	1	.990557467	.990557467	0
6.7	.14	1	.991238405	.991238405	0
6.8	.14	1	.991861415	.991861415	0
6.9	.14	1	.992432146	.992432146	0
7	.14	1	.992955627	.992955627	0
7.1	.14	1	.993436344	.993436344	0
7.2	.14	1	.993878307	.993878307	0
7.3	.14	1	.994285102	.994285102	0
7.4	.14	1	.994659942	.994659942	0
7.5	.14	1	.995005711	.995005711	0
7.6	.14	1	.995325	.995325	0
7.7	.14	1	.995620139	.995620139	0
7.8	.14	1	.99589323	.995893229	0
7.9	.14	1	.996146165	.996146165	0
8	.14	1	.996380657	.996380657	0
8.1	.14	1	.996598254	.996598254	0
8.2	.14	1	.996800355	.996800355	0
8.3	.14	1	.996988232	.996988232	0
8.4	.14	1	.997163038	.997163038	0
8.5	.14	1	.997325819	.997325819	0
8.6	.14	1	.997477529	.997477529	0
8.7	.14	1	.997619035	.997619035	0
8.8	.14	1	.997751129	.997751129	0
8.9	.14	1	.997874531	.997874531	0
9	.14	1	.997989901	.997989902	0
9.1	.14	1	.998097843	.998097843	0
9.2	.14	1	.998198907	.998198907	0
9.3	.14	1	.998293599	.998293599	0
9.4	.14	1	.998382382	.998382382	0
9.5	.14	1	.998465682	.998465682	0
9.6	.14	1	.99854389	.99854389	0
9.7	.14	1	.998617365	.998617365	0
9.8	.14	1	.998686437	.998686437	0
9.9	.14	1	.998751411	.998751411	0
10	.14	1	.998812568	.998812568	0
10.1	.14	1	.998870167	0	0

(cont.)

$$I^{\mu\pi}_{L-J} = V(r)_{L-J}\,\varsigma(r)\,r^2$$

r	r^2	$V(r)_{L-J}$	$\varsigma(r)$	h(r)	$I^{\mu\pi}_{L-J}$		$T^{\mu\pi}$
1.1	1.21	1006377.48	4.41388318E-32	.624418605	5.37485947E-26	1	0
1.2	1.44	352687.833	8.32495559E-21	.576744186	4.22799919E-15	4	0
1.3	1.6899	134071.796	5.38227064E-14	.529069767	1.21944991E-08	2	0
1.4	1.96	54552.7193	1.01033609E-09	.483372093	1.08028499E-04	4	4.3E-04
1.5	2.25	23498.109	5.9308766E-07	.439534884	.0313569866	2	.06271
1.6	2.56	10613.3432	4.1436542E-05	.399534884	1.12583742	4	4.50334
1.7	2.89	4983.4831	7.47611192E-04	.361395349	10.7672954	2	21.53459
1.8	3.24	2412.55946	5.57078057E-03	.325116279	43.5450797	4	174.18031
1.9	3.61	1193.84307	.0230678324	.292790698	99.4171326	2	198.83426
2	4	597.921527	..0637342883	.262325581	152.432412	4	609.72964
2.1	4.41	299.21437	.133419545	.235581395	176.051808	2	352.10361
2.2	4.84	146.728331	.227706725	.208953489	161.709375	4	646.83749
2.3	5.29	68.0431978	.338293178	.186046512	121.768127	2	243.53625
2.4	5.76	27.3877178	.452832345	.165	71.435776	4	285.7431
2.5	6.25	6.63740117	.561760046	.145930233	23.3039174	2	46.60783
2.6	6.76	-3.59186254	.65902974	.128837209	-16.001895	4	-64.00759
2.7	7.29	-8.24587727	.736813476	.111744186	-44.2916598	2	-88.58332
2.8	7.84	-9.96711542	.80438046	.0983720931	-62.8560466	4	-251.42419
2.9	8.41	-10.1801769	.852872539	.085	-73.0189277	2	-146.03786
3	9	-9.65565236	.890121575	.0734883721	-77.3523404	4	-309.40937
3.1	9.6099	-8.80863177	.912204059	.0620930232	-77.2181378	2	-154.43628
3.2	10.24	-7.85934263	.92839434	.0525581395	-74.7168687	4	-298.86748
3.3	10.89	-6.92079309	.933770512	.0431395349	-70.3758899	2	-140.75178
3.4	11.56	-6.04711559	.955220544	.0391860465	-66.7743638	4	-267.09746
3.5	12.25	-5.26044309	.952495983	.031627907	-61.3792487	2	-122.7585
3.6	12.96	-4.56591178	.933107879	.0220930233	-55.2159278	4	-220.86372
3.7	13.69	-3.96003174	.917159828	.0144186046	-49.721834	2	-99.44367
3.8	14.44	-3.43532491	.927151073	.0125581396	-45.9923412	4	-183.96937
3.9	15.21	-2.98285367	.934221255	.0106976744	-42.384875	2	-84.76975
4	16	-2.59355654	.938151987	8.72093028E-03	-38.9304036	4	-155.72162
4.1	16.81	-2.25891254	.940565722	6.86046514E-03	-35.7154623	2	-71.43093
4.2	17.64	-1.97123168	.940491183	4.88372093E-03	-32.7032549	4	-130.81302
4.3	18.49	-1.72374243	.939488256	3.02325586E-03	-29.9433673	2	-59.88674
4.4	19.36	-1.51057288	.940458624	1.7441861E-03	-27.5034219	4	-110.01369
4.5	20.25	-1.32668093	.944338667	1.16279072E-03	-25.369931	2	-50.73987
4.6	21.16	-1.16776382	.943945402	0	-23.3247798	4	-93.29912

(cont.)

4.7	22.09	-1.03016371	.94951335	0	-21.6074262	2	-43.21486
4.8	23.04	-.910777767	.954440973	0	-20.0282946	4	-80.11318
4.9	24.01	-.806976484	.958810664	0	-18.5774412	2	-37.15489
5	25	-.716531804	.962693278	0	-17.2450091	4	-68.98004
5.1	26.01	-.637554915	.966149929	0	-16.0214743	2	-32.04295
5.2	27.04	-.568443086	.969233234	0	-14.8977943	4	-59.59118
5.3	28.09	-.507834631	.971988742	0	-13.8654921	2	-27.73099
5.4	29.16	-.454570898	.974455868	0	-12.9166926	4	-51.66678
5.5	30.25	-.407664327	.976668802	0	-12.0441292	2	-24.08026
5.6	31.36	-.366271665	.978657252	0	-11.2411306	4	-44.96453
5.7	32.49	-.329671474	.980447081	0	-10.501595	2	-21.0032
5.8	33.64	-.29724543	.982060848	0	-9.81995664	4	-39.27983
5.9	34.81	-.26846233	.983518266	0	-9.19114706	2	-18.3823
6	36	-.242865077	.984836593	0	-8.61056695	4	-34.44227
6.1	37.21	-.220059457	.986030964	0	-8.07402816	2	-16.14806
6.2	38.44	-.199704816	.987114682	0	-7.57773702	4	-30.31095
6.3	39.69	-.181506198	.988099453	0	-7.11824971	2	-14.2365
6.4	40.96	-.165207705	.988995603	0	-6.69244184	4	-26.76977
6.5	42.25	-.150586386	.98981225	0	-6.29747844	2	-12.59496
6.6	43.56	-.137449996	.990557467	0	-5.93078635	4	-23.72315
6.7	44.89	-.125627972	.991238405	0	-5.59002916	2	-11.18006
6.8	46.24	-.114973007	.991861415	0	-5.27308427	4	-21.09234
6.9	47.61	-.105355649	.992432146	0	-4.97802223	2	-9.95605
7	49	-.0966623117	.992955627	0	-4.70308793	4	-18.81236
7.1	50.41	-.088793157	.993436344	0	-4.44668371	2	-8.89337
7.2	51.84	-.0816602801	.993878307	0	-4.20735415	4	-16.82942
7.3	53.29	-.0751861522	.994285102	0	-3.98377234	2	-7.96755
7.4	54.76	-.0693022833	.994659942	0	-3.77472755	4	-15.09892
7.5	56.25	-.0639480704	.995005711	0	-3.57911411	2	-7.15823
7.6	57.76	-.057069804	.995325	0	-3.39592138	4	-13.58369
7.7	59.29	-.0546198126	.995620139	0	-3.22422491	2	-6.44845
7.8	60.84	-.0505557181	.995893229	0	-3.06317825	4	-12.25272
7.9	62.41	-.0468397933	.996146165	0	-2.9120057	2	-5.82402

(cont.)

8	64	-.0434384031	.996380657	0	-2.76999582	4	-11.07999
8.1	65.61	-.040321518	.996598254	0	-2.6364955	2	-5.273
8.2	67.24	-.0374622913	.996800355	0	-2.51090468	4	-10.04362
8.3	68.89	-.0348366884	.996988232	0	-2.39267152	2	-4.78535
8.4	70.56	-.032423165	.997163038	0	-2.28128818	4	-9.12516
8.5	72.25	-.0302023833	.997325819	0	-2.17628681	2	-4.35258
8.6	73.96	-.0281569648	.997477529	0	-2.0772361	4	-8.30895
8.7	75.69	-.0262712721	.997619035	0	-1.9837381	2	-3.96748
8.8	77.44	-.0245312176	.997751129	0	-1.89542532	4	-7.58171
8.9	79.21	-.0229240951	.997874531	0	-1.81195811	2	-3.62392
9	81	-.0214384308	.997989902	0	-1.73302233	4	-6.93209
9.1	82.81	-.0200638523	.998097843	0	-1.65032719	2	-3.31666
9.2	84.64	-.0187909724	.998198907	0	-1.58760332	4	-6.35042
9.3	86.49	-.0176112863	.998293599	0	-1.52060096	2	-3.04121
9.4	88.36	-.0165170805	.998382382	0	-1.45708841	4	-5.82836
9.5	90.25	-.015501352	.998465682	0	-1.39685052	2	-2.79371
9.6	92.16	-.0145577363	.99854389	0	-1.3396874	4	-5.35875
9.7	94.09	-.0136804433	.998617365	0	-1.28541319	2	-2.57083
9.8	96.04	-.0128642005	.998686437	0	-1.23385494	4	-4.93542
9.9	98.01	-.0121042022	.998751411	0	-1.18485161	2	-2.36971
10	100	-.0113760636	.998812568	0	-1.13823316	4	-4.55302
10.1	102.01	-.010735781	0	0	0	1	0

$\Sigma T^{\mu}\Pi = -1498.379$

```
10  REM       CALCULATION OF CONDENSATE FRACTION OF LIQUID  HELIUM-4 AT
     LOW TEMPERATURE BY USING LENNARD JONES 12 6 POTENTIAL AND READING C
     URVE OF HNCE SCALLING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "    "
240  PRINT "F(R) =       "
250  PRINT "     "
260  PRINT "    "
270 .PRINT "H(R) =       "
280  PRINT "     "
290  PRINT "     " .
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
390  DEF  FN A(R) =  4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N) * HH(N)
410  DEF  FN M(R) =  INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "    "
450 N = 1
460 P = 1
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
     8);GG(N); TAB( 43);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W +  FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA     1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,2,4,1
540  PRINT "TOTAL OF     =  ";W
550  PRINT "  "
560  PRINT "   "
570  PRINT " V(R) =       "
580  PRINT "         "
590  PRINT "         "
600 B = 0.1 * W / 3
610  PRINT "         "
620  PRINT "              =  ";B
630  PRINT "         "
640 C = 4 * 22 * 0.142 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "              "
660  PRINT "              ";C; TAB( 30);"        1"
```

$$S(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

$$f(r) = \exp\{-(2.6/r)^5\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	S(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997131752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\alpha}_{L-J} = V_{L-J}(r)\,\$(r)\,h(r)\,r^4$$

r	r^4	$V(r)_{L-J}$	$\$(r)$	$h(r)$	I^{α}_{L-J}		T^{α}
1.1	1.4641	1006377.48	4.41388318E-32	.624418605	4.06095632E-26	1	0
1.2	2.0736	352687.833	8.32495559E-21	.576744186	3.51140249E-15	4	0
1.3	2.8561	134071.796	5.38227064E-14	.529069767	1.09040872E-08	2	0
1.4	3.8416	54552.7193	1.01033609E-09	.483372093	1.02347205E-04	4	4E-04
1.5	5.0625	23498.109	5.9308766E-07	.439534884	.0310106013	2	.06202
1.6	6.5536	10613.3432	4.1436542E-05	.399534884	1.15151698	4	4.60606
1.7	8.3521	4983.4831	7.47611192E-04	.361395349	11.2457138	2	22.49142
1.8	10.4976	2412.55946	5.57078057E-03	.325116279	45.8693742	4	183.47749
1.9	13.0321	1193.84307	.0230678324	.292790698	105.081366	2	210.16273
2	16	597.921527	.0637342883	.262325581	159.947684	4	639.79073
2.1	19.4481	299.21437	.133419545	.235581395	182.90268	2	365.80536
2.2	23.4256	146.728331	.227706725	.208953489	163.542332	4	654.16932
2.3	27.9841	68.0431978	.338293178	.186046512	119.842492	2	239.68498
2.4	33.1776	27.3877178	.452832345	.165	67.8925616	4	271.57024
2.5	39.0625	6.63740117	.561760046	.145930233	21.2546631	2	42.50932
2.6	45.6976	-3.59186254	.65902974	.128837209	-13.936683	4	-55.74674
2.7	53.1441	-8.24387727	.736813476	.111744186	-36.0806556	2	-72.16132
2.8	61.4656	-9.96711542	.80438046	.0983720931	-48.476922	4	-193.90769
2.9	70.7281	-10.1801769	.852872339	.085	-52.1975804	2	-104.39517
3	81	-9.65565236	.890121575	.0734883721	-51.1604781	4	-204.64192
3.1	92.352	-8.80863177	.912204059	.0620930232	-46.0775698	2	-92.15514
3.2	104.8576	-7.85934263	.92839434	.0525581395	-40.2122712	4	-160.84909
3.3	118.5921	-6.92079309	.933770512	.0431395349	-33.0618566	2	-66.12372
3.4	133.6336	-6.04711559	.955220544	.0391860465	-30.2481656	4	-120.99267
3.5	150.0625	-5.26044309	.952495983	.031627907	-23.7808903	2	-47.56179
3.6	167.9616	-4.56591178	.933107879	.0220930233	-15.8097326	4	-63.23894
3.7	187.4161	-3.96003174	.917159828	.0144186046	-9.81462748	2	-19.62926
3.8	208.5136	-3.43532491	.927151073	.0125581396	-8.34022981	4	-33.36092
3.9	231.3441	-2.98285367	.934221255	.0106976744	-6.896512	2	-13.79303
4	256	-2.59355654	.938151987	8.72093028E-03	-5.43214936	4	-21.7286
4.1	282.5761	-2.25891254	.940565722	6.86046514E-03	-4.11886494	2	-8.23773
4.2	311.1696	-1.97123168	.940491183	4.88372093E-03	-2.81734738	4	-11.26939
4.3	341.8801	-1.72374243	.939488256	3.02325586E-03	-1.67383426	2	-3.34767
4.4	374.8096	-1.51057288	.940458624	1.7441861E-03	-.928720225	4	-3.71489
4.5	410.0625	-1.32668093	.944338667	1.16279072E-03	-.597373387	1	-.59738

ΣT^{α} = 1336.87701

$\Sigma T^{\alpha} = 1336.877$

```
10  REM        CALCULATION OF CONDENSATE FRACTION OF LIQUID  HF USING LEN
     NARD JONES 12-6 POTENTIAL AND READING CURVE OF HNCE SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N)   .14) / .86
90  NEXT N
100  DEF  FN F(R)    EXP ( - (2.6 / R)   5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) * FN F(R)) ^ 2
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "  "
240  PRINT "F(R) =      "
250  PRINT "  "
260  PRINT "   "
270  PRINT "H(R) =      "
280  PRINT "   "
290  PRINT "   "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  FOR R = 1.1 TO 4.5 STEP .1
380  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
390  DEF  FN A(R) = 4 * 10.22 * ((2.556 / R) ^ 12 - (2.556 / R) ^ 6)
400  DEF  FN L(R) =  FN H(R) *  FN A(R) * GG(N) * HH(N)
410  DEF  FN M(R)    INT ( FN L(R) * JJ(P) * 100000) / 100000
420 P = P + 1
430  NEXT R
440  PRINT "   "
450 N = 1
460 P = 1
470  FOR R = 11 TO 45
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15); FN A(R / 10); TAB( 2
     0);GG(N); TAB( 43);HH(N); TAB( 58); FN L(R / 10); TAB( 73);JJ(P); TAB(
     76); FN M(R / 10): PRINT
490 W = W +  FN M(R / 10)
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA     1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
     ,4,2,4,2,4,1
540  PRINT "TOTAL OF     =  ";W
550  PRINT "  "
560  PRINT "   "
570  PRINT " 9(R) .       "
580  PRINT "         "
590  PRINT "         "
600 B   0.1 * W / 
610  PRINT "         "
620  PRINT "           -   ";B
630  PRINT "         "
640 C = 4 * 22 * 0.149 * B / (3 * 7 * 1.054    2)
650  PRINT "              "
660  PRINT "             -   ";C; TAB( 35);"          I"
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$S(r) = (1/\rho_c)\Omega_1(r) f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$S^2(r)$	h(r)
1.1	.677	4.83571429	9.12767572E-33	0	.624418605
1.2	.636	4.54285714	1.83253739E-21	0	.576744186
1.3	.595	4.25	1.26641656E-14	2.89688371E-27	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.02077902E-18	.483372093
1.5	.518	3.7	1.60293956E-07	3.51752972E-13	.439534884
1.6	.4836	3.45428571	1.19956899E-05	1.71698701E-09	.399534884
1.7	.4508	3.22	2.32177382E-04	5.58922494E-07	.361395349
1.8	.4196	2.99714286	1.85869701E-03	3.10335962E-05	.325116279
1.9	.3918	2.79857143	8.2427169E-03	5.3212489E-04	.292790698
2	.3656	2.61142857	.0244059091	4.06205951E-03	.262325581
2.1	.3426	2.44714286	.0545205373	.0178007749	.235581395
2.2	.3197	2.28357143	.0997151752	.0518503527	.208953489
2.3	.3	2.14285714	.15787015	.114442274	.186046512
2.4	.2819	2.01357143	.224890133	.205057132	.165
2.5	.2655	1.89642857	.296219987	.315574349	.145930233
2.6	.2508	1.79142857	.367879441	.434320198	.128837209
2.7	.2361	1.68642857	.436907612	.542894099	.111744186
2.8	.2246	1.60428571	.501394766	.647027924	.0983720931
2.9	.2131	1.52214286	.560310445	.727391568	.085
3	.2032	1.45142857	.61327274	.792316418	.0734883721
3.1	.1934	1.38142857	.66033386	.832116245	.0620930232
3.2	.1852	1.32285714	.701809978	.861916051	.0525581395
3.3	.1771	1.265	.738158509	.871927369	.0431395349
3.4	.1737	1.24071429	.769895661	.912446288	.0391860465
3.5	.1672	1.19428571	.797544484	.907248597	.031627907
3.6	.159	1.13571429	.821604423	.870690315	.0220930233
3.7	.1524	1.08857143	.842535277	.84118215	.0144186046
3.8	.1508	1.07714286	.860750333	.859609112	.0125581396
3.9	.1492	1.06571429	.87661512	.872769354	.0106976744
4	.1475	1.05357143	.890449344	.880129151	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.884663878	6.86046514E-03
4.2	.1442	1.03	.913098236	.884523666	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.882638184	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.884462424	1.7441861E-03
4.5	.141	1.00714286	.937641231	.89177552	1.16279072E-03

(cont.)

$$I^{\beta}_{L-J} = V(r)_{L-J} \, S^2(r) h(r) r^4$$

r	r^4	$V(r)_{L-J}$	$S^2(r)$	h(r)	I^{β}_{L-J}		T^{β}
1.1	1.4641	1006377.48	0	.624418605	0	1	0
1.2	2.0736	352687.833	0	.576744186	0	4	0
1.3	2.8561	134071.796	2.89688371E-27	.529069767	5.86887479E-22	2	0
1.4	3.8416	54552.7193	1.02077702E-18	.483372093	1.03405076E-13	4	0
1.5	5.0625	23498.109	3.51752972E-13	.439534884	1.83920049E-08	2	0
1.6	6.5536	10613.3432	1.71698701E-09	.399534884	4.77148818E-05	4	1.9E-04
1.7	8.3521	4983.4831	5.58922494E-07	.361395349	8.40742153E-03	2	.01681
1.8	10.4976	2412.55946	3.10335962E-05	.325116279	.255528219	4	1.02211
1.9	13.0321	1193.84307	5.3212489E-04	.292790698	2.42399933	2	4.84799
2	16	597.921527	4.06203951E-03	.262325581	10.1941518	4	40.7766
2.1	19.4481	299.21437	.0178007749	.235581395	24.4027923	2	48.80558
2.2	23.4256	146.728331	.0518503527	.208953489	37.2396887	4	148.95875
2.3	27.9841	68.0431978	.114442274	.186046512	40.5418974	2	81.08379
2.4	33.1776	27.3877178	.205057132	.165	30.7439479	4	122.97579
2.5	39.0625	6.63740117	.315574349	.145930233	11.9400205	2	23.88004
2.6	45.6976	-3.59186254	.434320198	.128837209	-9.18468857	4	-36.73876
2.7	53.1441	-8.24587727	.542894099	.111744186	-26.5847133	2	-53.16943
2.8	61.4656	-9.96711542	.647027924	.0983720931	-38.9938880	4	-155.97556
2.9	70.7281	-10.1801769	.727391568	.085	-44.517883	2	-89.03577
3	81	-9.65565236	.792316418	.0734883721	-45.5390454	4	-182.15619
3.1	92.352	-8.80863177	.832116245	.0620930232	-42.0321462	2	-84.0643
3.2	104.8576	-7.85934263	.861916051	.0525581395	-37.332845	4	-149.33138
3.3	118.5921	-6.92079309	.871927367	.0431395349	-30.8721868	2	-61.74438
3.4	133.6336	-6.04711559	.912446288	.0391860465	-28.8936692	4	-115.57468
3.5	150.0625	-5.26044309	.907248597	.031627907	-22.6512025	2	-45.30241
3.6	167.9616	-4.56591178	.870690315	.0220930233	-14.7521861	4	-59.00875
3.7	187.4161	-3.96003174	.84118215	.0144186046	-9.00158206	2	-18.00317
3.8	208.5136	-3.43532491	.859609112	.0125581396	-7.73265302	4	-30.93062
3.9	231.3441	-2.98285367	.872769354	.0106976744	-6.4428681	2	-12.88574
4	256	-2.59355654	.880129151	8.72093028E-03	-5.09618172	4	-20.38473
4.1	282.5761	-2.25891254	.884663878	6.86046514E-03	-3.87406318	2	-7.74813
4.2	311.1696	-1.97123168	.884523666	4.88372093E-03	-2.64969037	4	-10.59877
4.3	341.8801	-1.72374243	.882638184	3.02325586E-03	-1.57254763	2	-3.1451
4.4	374.8096	-1.51057288	.884462424	1.7441861E-03	-.873422945	4	-3.4937
4.5	410.0625	-1.32668093	.89177552	1.16279072E-03	-.564122789	1	-.56413

$-\Sigma T^{\beta} = -667.48805$

$\Sigma T^{\beta} = -677.48805$

```
10  REM      CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 AT L
     OW TEMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF HNCE S
     CALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "   "
240  PRINT "*(R) =      "
250  PRINT "    "
260  PRINT "   "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
     (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26730 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "        "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 >= 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 27);GG(N); TAB(
     43);HH(N); TAB( 59);L; TAB( 74);JJ(P); TAB( 77);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA     1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,
     4,2,4,2,4,1
540  PRINT "TOTAL OF          ";W
550  PRINT "                        "
560  PRINT "                        "
570  PRINT "                        "
580  PRINT "                        "
590  PRINT "                        "
600 E = 0.1 * W / 3
610  PRINT "                        "
620  PRINT "              ";E
630  PRINT "                        "
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r) f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902774	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\mu}_{M-V_{DD}} = V(r)_{M-V_{DD}} \$(r) h(r) r^2$$

r	r^2	$V(r)_{M-VDD}$	$(r)	h(r)	$I^{\mu 1}_{M-V_{DD}}$		$T^{\mu 1}$
1.1	1.21	21210.7536	4.41388318E-32	.624418605	7.07356159E-28	1	0
1.2	1.44	13783.9325	8.32495559E-21	.576744186	9.53017291E-17	4	0
1.3	1.6899	8935.26525	5.38227064E-14	.529069767	4.2997869E-10	2	0
1.4	1.96	5773.9232	1.01033609E-09	.483372093	5.52680976E-06	4	2.2E-05
1.5	2.25	3716.10499	5.9308766E-07	.439534884	2.17962977E-03	2	4.359E-03
1.6	2.56	2379.36584	4.1436542E-05	.399534884	.100841523	4	.403366
1.7	2.89	1513.28796	7.47611192E-04	.361395349	1.18161983	2	2.363239
1.8	3.24	953.999441	5.57078057E-03	.325116279	5.59819341	4	22.392773
1.9	3.61	594.342312	.0230678324	.292790698	14.4913188	2	28.982637
2	4	364.308622	.0637342883	.262325581	24.363699	4	97.454795
2.1	4.41	218.213201	.133419545	.235581395	30.2468432	2	60.493686
2.2	4.84	126.285628	.227706725	.208953489	29.0820338	4	116.328135
2.3	5.29	69.1607763	.338293178	.186046512	23.0266258	2	46.053251
2.4	5.76	34.2701827	.452832345	.165	14.7489223	4	58.995689
2.5	6.25	13.4796522	.561760046	.145930233	6.90644926	2	13.812898
2.6	6.76	1.54370404	.65902974	.128837209	.886047608	4	3.54419
2.7	7.29	-4.90477677	.736813476	.111744186	-2.94394214	2	-5.887885
2.8	7.84	-8.01436195	.80438046	.0983720931	-4.97185482	4	-19.88742
2.9	8.41	-9.14545591	.852872539	.085	-5.57576438	2	-11.151529
3	9	-9.15057931	.890121575	.0734883721	-5.38714981	4	-21.5486
3.1	9.6099	-8.55655183	.912204059	.0620930232	-4.65749567	2	-9.314992
3.2	10.24	-7.68262163	.92839434	.0525581395	-3.83867963	4	-15.354719
3.3	10.89	-6.71682587	.933770512	.0431395349	-2.94650772	2	-5.893016
3.4	11.56	-5.765158	.955220344	.0391860465	-2.49461858	4	-9.978475
3.5	12.25	-4.88306638	.952495983	.031627907	-1.80203127	2	-3.604063
3.6	12.96	-4.09776024	.933107879	.0220930233	-1.09480949	4	-4.379238
3.7	13.69	-3.43338606	.917159828	.0144186046	-.621576153	2	-1.243153
3.8	14.44	-2.89177761	.927151073	.0125581396	-.486192099	4	-1.944769
3.9	15.21	-2.44761945	.934221255	.0106976744	-.372059356	2	-.744119
4	16	-2.08132935	.938151987	8.72093028E-03	-.27245627	4	-1.089826
4.1	16.81	-1.77764996	.940565722	6.86046514E-03	-.192822038	2	-.385645
4.2	17.64	-1.52461206	.940491183	4.88372093E-03	-.123527456	4	-.49411
4.3	18.49	-1.3127648	.939488256	3.02325586E-03	-.0689429868	2	-.137886
4.4	19.36	-1.13459982	.940458624	1.7441861E-03	-.0360313534	4	-.144126
4.5	20.25	-.984116954	.944338667	1.16279072E-03	-.0218827083	1	-.021883

$\Sigma T^{\mu 1}$ = 337.623586

$\Sigma T^{\mu 1}$= 337.623586

```
10  REM      CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 AT L
     OW TEMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF HNCE S
     CALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (GG(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP (  (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = FF(N) * FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
      .34 ,.3197,.3000,.2819,.2655,.2500,.2361,.2246,.2131,.2032,.1934,.
      1 ,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
      426,.1415,.1410
225  DATA  .14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,
      .14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14
      ,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.1
      4,.14,.14,.14,.14,.14,.14,.14
230  PRINT "     "
240  PRINT "F(R) =      "
250  PRINT "     "
260  PRINT "     "
270  PRINT "H(R) =       "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48))  - 2 *  EXP
      (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N)
410  PRINT "          "
415 N = 1
417 P = 1
420  FOR R = 11 TO 101
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 >= 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 1000000) / 1000000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 31);GG(N); TAB(
      48);L; TAB( 65);JJ(P); TAB( 69);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
      ,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2
      ,4,2,4
535  DATA  2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1
540  PRINT "TOTAL OF    =   ";W
550  PRINT "                       "
560  PRINT "                       "
570  PRINT " V(R)         =        "
580  PRINT "                       "
590  PRINT "                       "
600 B = 0.1 * W / 3
610  PRINT "                       "
620  PRINT "                   ";B
630  PRINT "                       "
```

$f(r) = \exp\{-(2.6/r)^{5}\}$, $\$(r) = (1/\rho_c)\Omega_1(r) f(r)$

$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03
4.6	.14	1	.943945403	.943945402	0
4.7	.14	1	.94951335	.94951335	0
4.8	.14	1	.954440974	.954440973	0
4.9	.14	1	.958810665	.958810664	0
5	.14	1	.962693299	.962693298	0
5.1	.14	1	.966149929	.966149929	0
5.2	.14	1	.969233235	.969233234	0
5.3	.14	1	.971988742	.971988742	0

(cont.)

5.5	.14	1	.976668802	.976668802	0
5.6	.14	1	.978657252	.978657252	0
5.7	.14	1	.980447081	.980447081	0
5.8	.14	1	.982060849	.982060848	0
5.9	.14	1	.983518266	.983518266	0
6	.14	1	.984836593	.984836593	0
6.1	.14	1	.986030965	.986030964	0
6.2	.14	1	.987114682	.987114682	0
6.3	.14	1	.988099453	.988099453	0
6.4	.14	1	.988995603	.988995603	0
6.5	.14	1	.98981225	.98981225	0
6.6	.14	1	.990557467	.990557467	0
6.7	.14	1	.991238405	.991238405	0
6.8	.14	1	.991861415	.991861415	0
6.9	.14	1	.992432146	.992432146	0
7	.14	1	.992955627	.992955627	0
7.1	.14	1	.993436344	.993436344	0
7.2	.14	1	.993878307	.993878307	0
7.3	.14	1	.994285102	.994285102	0
7.4	.14	1	.994659942	.994659942	0
7.5	.14	1	.995005711	.995005711	0
7.6	.14	1	.995325	.995325	0
7.7	.14	1	.995620139	.995620139	0
7.8	.14	1	.99589323	.995893229	0
7.9	.14	1	.996146165	.996146165	0
8	.14	1	.996380657	.996380657	0
8.1	.14	1	.996598254	.996598254	0
8.2	.14	1	.996800355	.996800355	0
8.3	.14	1	.996988232	.996988232	0
8.4	.14	1	.997163038	.997163038	0
8.5	.14	1	.997325819	.997325819	0
8.6	.14	1	.997477529	.997477529	0
8.7	.14	1	.997619035	.997619035	0
8.8	.14	1	.997751129	.997751129	0
8.9	.14	1	.997874531	.997874531	0
9	.14	1	.997989901	.997989902	0
9.1	.14	1	.998097843	.998097843	0
9.2	.14	1	.998198907	.998198907	0
9.3	.14	1	.998293599	.998293599	0
9.4	.14	1	.998382382	.998382382	0
9.5	.14	1	.998465682	.998465682	0
9.6	.14	1	.99854389	.99854389	0
9.7	.14	1	.998617365	.998617365	0
9.8	.14	1	.998686437	.998686437	0
9.9	.14	1	.998751411	.998751411	0
10	.14	1	.998812568	.998812568	0
10.1	.14	1	.998870167	0	0

(cont.)

$$I^{\mu\Pi} = V(r)_{M-V_{DD}} \$(r)\, r^2$$

r	r^2	$V(r)_{M-V_{DD}}$	\$(r)	$I^{\mu\Pi}_{M-V_{DD}}$		$T^{\mu\Pi}$
1.1	1.21	21210.7536	4.41388318E-32	1.13282364E-27	1	0
1.2	1.44	13783.9325	8.32495559E-21	1.65240901E-16	4	0
1.3	1.6899	8935.26525	5.38227064E-14	8.12706975E-10	2	0
1.4	1.96	5773.9232	1.01033609E-09	1.14338619E-05	4	4.5E-05
1.5	2.25	3716.10499	5.9308766E-07	4.95894603E-03	2	9.917E-03
1.6	2.56	2379.36584	4.1436542E-05	.252397293	4	1.009589
1.7	2.89	1513.28796	7.47611192E-04	3.26960443	2	6.539208
1.8	3.24	953.999441	5.57078057E-03	17.2190498	4	68.876199
1.9	3.61	594.342312	.0230678324	49.4937816	2	98.987563
2	4	364.308622	.0637342883	92.8758029	4	371.503211
2.1	4.41	218.213201	.133419545	128.392325	2	256.78465
2.2	4.84	126.285628	.227706725	139.17946	4	556.717841
2.3	5.29	69.1607763	.338293178	123.768113	2	247.536226
2.4	5.76	34.2701827	.452832345	89.3874076	4	357.54963
2.5	6.25	13.4796522	.561760046	47.3270626	2	94.654125
2.6	6.76	1.54370404	.65902974	6.87726483	4	27.509059
2.7	7.29	-4.90477677	.736813476	-26.345372	2	-52.690744
2.8	7.84	-8.01436195	.80438046	-50.5413138	4	-202.165256
2.9	8.41	-9.14545591	.852872539	-65.597228	2	-131.194456
3	9	-9.15057931	.890121575	-73.3061525	4	-293.224611
3.1	9.6099	-8.55655183	.912204059	-75.0083573	2	-150.016715
3.2	10.24	-7.68262163	.92839434	-73.0368249	4	-292.1473
3.3	10.89	-6.71682587	.933770512	-68.3017961	2	-136.603593
3.4	11.56	-5.765158	.955220544	-63.6608895	4	-254.643558
3.5	12.25	-4.88306638	.952495983	-56.9759887	2	-113.951978
3.6	12.96	-4.09776024	.933107879	-49.5545346	4	-198.218139
3.7	13.69	-3.43338606	.917159828	-43.109314	2	-86.2186281
3.8	14.44	-2.89177761	.927151073	-38.7152965	4	-154.861186
3.9	15.21	-2.44761945	.934221255	-34.7794616	2	-69.558924
4	16	-2.08132935	.938151987	-31.2416522	4	-124.966609
4.1	16.81	-1.77764996	.940565722	-28.1062631	2	-56.212527
4.2	17.64	-1.52461206	.940491183	-25.2937173	4	-101.17487
4.3	18.49	-1.3127648	.939488256	-22.8042184	2	-45.608437
4.4	19.36	-1.13459982	.940458624	-20.6579753	4	-82.631902
4.5	20.25	-.984116954	.944338667	-18.8191288	2	-37.638258
4.6	21.16	-.856494616	.943945402	-17.1075247	4	-68.430099
4.7	22.09	-.747837706	.94951335	-15.6857089	2	-31.371418
4.8	23.04	-.654983651	.954440973	-14.4033001	4	-57.613201
4.9	24.01	-.575352267	.958810664	-13.2452099	2	-26.49042
5	25	-.5068288	.962693298	-12.1980172	4	-48.792069
5.1	26.01	-.44767232	.966149929	-11.2498083	2	-22.499617
5.2	27.04	-.396443614	.969233234	-10.3900207	4	-41.560083
5.3	28.09	-.351948071	.971988742	-9.60929583	2	-19.218592
5.4	29.16	-.313190285	.974455868	-8.89934364	4	-35.597375

(cont.)

5.5	30.25	-.279337752	.976668802	-8.25281915	2	-16.505639
5.6	31.36	-.24969172	.978657252	-7.66321154	4	-30.652847
5.7	32.49	-.223663704	.980447081	-7.12474593	2	-14.249492
5.8	33.64	-.200756437	.982060848	-6.63229543	4	-26.529182
5.9	34.81	-.180548407	.983518266	-6.18130424	2	-12.362609
6	36	-.162681232	.984836593	-5.76771948	4	-23.070878
6.1	37.21	-.146849286	.986030964	-5.38793144	2	-10.775863
6.2	38.44	-.132791215	.987114682	-5.03872129	4	-20.154886
6.3	39.69	-.120282904	.988099453	-4.71721492	2	-9.43443
6.4	40.96	-.109131661	.988995603	-4.42084284	4	-17.683372
6.5	42.25	-.0991713928	.98981225	-4.14730477	2	-8.29461
6.6	43.56	-.0902585744	.990557467	-3.89453864	4	-15.578155
6.7	44.89	-.0822688921	.991238405	-3.66069355	2	-7.321388
6.8	46.24	-.075094419	.991861415	-3.44410579	4	-13.776424
6.9	47.61	-.0686412484	.992432146	-3.24327802	2	-6.486557
7	49	-.0628274938	.992955627	-3.05686076	4	-12.227444
7.1	50.41	-.0575816005	.993436344	-2.88363623	2	-5.767273
7.2	51.84	-.0528409158	.993878307	-2.72250409	4	-10.890017
7.3	53.29	-.0485504718	.994285102	-2.57246875	2	-5.144938
7.4	54.76	-.0446619515	.994659942	-2.43262835	4	-9.730514
7.5	56.25	-.0411328049	.995005711	-2.30216489	2	-4.60433
7.6	57.76	-.0379254919	.995325	-2.18033547	4	-8.721342
7.7	59.29	-.0350068362	.995620139	-2.06646468	2	-4.13293
7.8	60.84	-.0323474659	.995893229	-1.95993762	4	-7.839751
7.9	62.41	-.0299213356	.996146165	-1.86019394	2	-3.720388
8	64	-.0277053118	.996380657	-1.76672235	4	-7.06689
8.1	65.61	-.0256788146	.996598254	-1.67905581	2	-3.358112
8.2	67.24	-.0238235089	.996800355	-1.59676725	4	-6.387069
8.3	68.89	-.0221230341	.996988232	-1.51946571	2	-3.038932
8.4	70.56	-.020562771	.997163038	-1.44679295	4	-5.787172
8.5	72.25	-.0191296376	.997325819	-1.37842029	2	-2.756841
8.6	73.96	-.0178119113	.997477529	-1.31404594	4	-5.256184
8.7	75.69	-.0165990739	.997619035	-1.2533925	2	-2.506785
8.8	77.44	-.0154816748	.997751129	-1.19620473	4	-4.784819
8.9	79.21	-.0144512126	.997874531	-1.14224757	2	-2.284496
9	81	-.0135000294	.997989902	-1.09130433	4	-4.365218
9.1	82.81	-.0126212191	.998097843	-1.04317509	2	-2.086351
9.2	84.64	-.0118085462	.998198907	-.997675203	4	-3.990701
9.3	86.49	-.011056374	.998293599	-.954634015	2	-1.909269
9.4	88.36	-.0103596014	.998382382	-.91389365	4	-3.655575
9.5	90.25	-9.71360648E-03	.998465682	-.875307921	2	-1.750616
9.6	92.16	-9.11419763E-03	.99854309	-.838741373	4	-3.354966
9.7	94.09	-8.55756888E-03	.998617365	-.804068384	2	-1.608137
9.8	96.04	-8.04026103E-03	.998686437	-.771172354	4	-3.08469
9.9	98.01	-7.55912685E-03	.998751411	-.739944981	2	-1.47989
10	100	-7.1113E-03	.998812568	-.710285581	4	-2.841143
10.1	102.01	-6.69416752E-03	0	0	1	0

$\Sigma T^{\mu\Pi}$ = -1226.63242

$\Sigma T^{\mu\Pi}$= -1226.63242

```
10  REM      CALCULATION OF CONDENSATE FRACTION  OF LIQUID HELIUM-4 AT
     LOW TEMPERATURE BY USING MORSE POTENTIAL AND READING CURVE OF HNCE
     SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
      .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
      1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
      426,.1415,.1410
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =       "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
      (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "          "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 > = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 27);GG(N); TAB(
      42);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA    1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,
      4,2,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                         "
560  PRINT "                         "
570  PRINT " V(R)          =         "
580  PRINT "                         "
590  PRINT "                         "
600 B = 0.1 * W / 3
610  PRINT "                         "
620  PRINT "              =    ";B
630  PRINT "                         "
640 C = 4 * 22 * 0.149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "      "
660  PRINT "           :    ";C; TAB( 35);"      K"
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495539E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\alpha}_{M-V_{DD}} = V(r)_{M-V_{DD}} \$(r) h(r) r^{4}$$

r	r^4	$V(r)_{M-V_{DD}}$	\$(r)	h(r)	$I^{\alpha}_{M-V_{DD}}$		T^{α}
1.1	1.4641	21210.7536	4.41388318E-32	.624418605	8.55900953E-28	1	0
1.2	2.0736	13783.9325	8.32495539E-21	.576744186	1.3723449E-16	4	0
1.3	2.8561	8935.26525	5.38227064E-14	.529069767	7.26706987E-10	2	0
1.4	3.8416	5773.9232	1.01033609E-09	.483372093	1.08325471E-05	4	4E-05
1.5	5.0625	3716.10499	5.9308766E-07	.439534884	4.90416697E-03	2	9.8E-03
1.6	6.5536	2379.36584	4.1436542E-05	.399534884	.258154299	4	1.03261
1.7	8.3521	1513.28796	7.47611192E-04	.361395349	3.41488132	2	6.82976
1.8	10.4976	953.999441	5.57078057E-03	.325116279	18.1381466	4	72.55258
1.9	13.0321	594.342312	.0230678324	.292790698	52.3136611	2	104.62732
2	16	364.308622	.0637342883	.262325581	97.454796	4	389.81918
2.1	19.4481	218.213201	.133419545	.235581395	133.388578	2	266.77715
2.2	23.4256	126.285628	.227706725	.208953489	140.757043	4	563.02817
2.3	27.9841	69.1607763	.338293178	.186046512	121.81085	2	243.6217
2.4	33.1776	34.2701827	.452832345	.165	84.9537922	4	339.81516
2.5	39.0625	13.4796522	.561760046	.145930233	43.1653079	2	86.33061
2.6	45.6976	1.54370404	.65902974	.128837209	5.98968183	4	23.95872
2.7	53.1441	-4.90477677	.736813476	.111744186	-21.4613382	2	-42.92268
2.8	61.4656	-8.01436195	.80438046	.0983720931	-38.9793418	4	-155.91737
2.9	70.7281	-9.14545591	.852872539	.085	-46.8921784	2	-93.78436
3	81	-9.15057931	.890121575	.0734883721	-48.4843483	4	-193.9374
3.1	92.352	-8.55655183	.912204059	.0620930232	-44.7589507	2	-89.51791
3.2	104.8576	-7.68262163	.92839434	.0525581395	-39.3080794	4	-157.23232
3.3	118.5921	-6.71682587	.933770512	.0431395349	-32.0874691	2	-64.17494
3.4	133.6336	-5.765158	.955220544	.0391860465	-28.8377908	4	-115.35117
3.5	150.0625	-4.88306638	.952495983	.031627907	-22.074883	2	-44.14977
3.6	167.9616	-4.09776024	.933107879	.0220930233	-14.1887309	4	-56.75493
3.7	187.4161	-3.43338606	.917159828	.0144186046	-8.50937754	2	-17.01876
3.8	208.5136	-2.89177761	.927151073	.0125581396	-7.0206139	4	-28.08246
3.9	231.3441	-2.44761945	.934221255	.0106976744	-5.6590228	2	-11.31805
4	256	-2.08132935	.938151987	8.72093028E-03	-4.35930033	4	-17.43721
4.1	282.5761	-1.77764996	.940565722	6.86046514E-03	-3.24133846	2	-6.48268
4.2	311.1696	-1.52461206	.940491183	4.88372093E-03	-2.17902433	4	-8.7161
4.3	341.8801	-1.3127648	.939488256	3.02325586E-03	-1.27475583	2	-2.54952
4.4	374.8096	-1.13459982	.940458624	1.7441861E-03	-.697567001	4	-2.79027
4.5	410.0625	-.984116954	.944338667	1.16279072E-03	-.443124843	1	-.44313

ΣT^{α} = 989.821771

ΣT^{α} = 989.821771

```
10  REM       CALCULATION OF CONDENSATE FRACTION  OF LIQUID HELIUM-4 AT
     LOW TEMPERATURE BY USING MORSE POTENTIAL  AND READING CURVE OF HNCE
     SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) = EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R)) ^ 2
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6720,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "     "
240  PRINT "F(R) =       "
250  PRINT "     "
260  PRINT "    "
270  PRINT "H(R) =        "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR F = 1 TO O
340  READ JJ(F)
350  NEXT F
360 F = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(R) = 9.25 * ( EXP (2 * 6.205 * (1 - R / 29.48)) - 2 *  EXP
      (6.205 * (1 - R / 29.48)))
390  DEF  FN A2(R) =  - 6842 / (R / 10) ^ 6 - 26930 / (R / 10) ^ 8
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "            "
415 N = 1
417 F = 1
420  FOR R = 11 TO 45
430  IF R / 10 < 3.6 THEN V =  FN A1(R)
440  IF R / 10 > = 3.6 THEN V =  FN A2(R)
450 L = V *  FN L(R / 10)
460 M = INT (L * JJ(F) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 27);GG(N); TAB(
      42);HH(N); TAB( 58);L; TAB( 73);JJ(F); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 F = F + 1
520  NEXT R
530  DATA    1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,
      4,2,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                              "
560  PRINT "                              "
570  PRINT " V(R)         =               "
580  PRINT "                              "
590  PRINT "                              "
600 B = 0.1 * W / 3
610  PRINT "                              "
620  PRINT "              =    ";B
630  PRINT "                              "
640 C = 4 * 22 * 0.149 * B / (3 * 7 * 1.054 ^ 2)
650  PRINT "            "
660  PRINT "                   ";C; TAB( 35);"      . "
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	0	.624418605
1.2	.636	4.54285714	1.83253739E-21	0	.576744186
1.3	.595	4.25	1.26641656E-14	2.89688371E-27	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.02077902E-18	.483372093
1.5	.518	3.7	1.60293956E-07	3.51752972E-13	.439534884
1.6	.4836	3.45428571	1.19956899E-05	1.71698701E-09	.399534884
1.7	.4508	3.22	2.32177382E-04	5.58922494E-07	.361395349
1.8	.4196	2.99714286	1.85869701E-03	3.10335962E-05	.325116279
1.9	.3918	2.79857143	8.2427169E-03	5.3212489E-04	.292790698
2	.3656	2.61142857	.0244059091	4.06205951E-03	.262325581
2.1	.3426	2.44714286	.0545205373	.0178007749	.235581395
2.2	.3197	2.28357143	.0997151752	.0518503527	.208953489
2.3	.3	2.14285714	.15787015	.114442274	.186046512
2.4	.2819	2.01357143	.224890133	.205057132	.165
2.5	.2655	1.89642857	.296219987	.315574349	.145930233
2.6	.2508	1.79142857	.367879441	.434320198	.128837209
2.7	.2361	1.68642857	.436907612	.542894099	.111744186
2.8	.2246	1.60428571	.501394766	.647027924	.0983720931
2.9	.2131	1.52214286	.560310445	.727391568	.085
3	.2032	1.45142857	.61327274	.792316418	.0734883721
3.1	.1934	1.38142857	.66033386	.832116245	.0620930232
3.2	.1852	1.32285714	.701809978	.861916051	.0525581395
3.3	.1771	1.265	.738158509	.871927369	.0431395349
3.4	.1737	1.24071429	.769895661	.912446288	.0391860465
3.5	.1672	1.19428571	.797544484	.907248597	.031627907
3.6	.159	1.13571429	.821604423	.870690315	.0220930233
3.7	.1524	1.08857143	.842535277	.84118215	.0144186046
3.8	.1508	1.07714286	.860750333	.859609112	.0125581396
3.9	.1492	1.06571429	.87661512	.872769354	.0106976744
4	.1475	1.05357143	.890449344	.880129151	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.884663878	6.86046514E-03
4.2	.1442	1.03	.913098236	.884523666	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.882638184	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.884462424	1.7441861E-03
4.5	.141	1.00714286	.937641231	.89177552	1.16279072E-03

(cont.)

$$I^{\beta}_{M\text{-}V_{DD}} = V(r)\, S^2(r)\, h(r)\, r^4$$

r	r^4	$V(r)_{M\text{-}V_{DD}}$	$S^2(r)$	h(r)	$I^{\beta}_{M\text{-}V_{DD}}$		T^{β}
1.1	1.4641	21210.7536	0	.624418605	0	1	0
1.2	2.0736	13783.9325	0	.576744186	0	4	0
1.3	2.8561	8935.26525	2.89688371E-27	.529069767	3.91133367E-23	2	0
1.4	3.8416	5773.9232	1.02077902E-18	.483372093	1.09445134E-14	4	0
1.5	5.0625	3716.10499	3.51752972E-13	.439534884	2.90860091E-09	2	0
1.6	6.5536	2379.36584	1.71698701E-09	.399534884	1.06970214E-05	4	4E-05
1.7	8.3521	1513.28796	5.58922494E-07	.361395349	2.55300349E-03	2	5.1E-03
1.8	10.4976	953.999441	3.10335962E-05	.325116279	.101043635	4	.40417
1.9	13.0321	594.342312	5.3212489E-04	.292790698	1.20676276	2	2.41352
2	16	364.308622	4.06205951E-03	.262325581	6.21121207	4	24.84484
2.1	19.4481	218.213201	.0178007749	.235581395	17.7966434	2	35.59328
2.2	23.4256	126.285628	.0518503527	.208953489	32.0513254	4	128.2053
2.3	27.9841	69.1607763	.114442274	.186046512	41.2077796	2	82.41555
2.4	33.1776	34.2701827	.205057132	.165	38.469825	4	153.87929
2.5	39.0625	13.4796522	.315574349	.145930233	24.2485453	2	48.49709
2.6	45.6976	1.54370404	.434320198	.128837209	3.94737846	4	15.78951
2.7	53.1441	-4.90477677	.542894099	.111744186	-15.8130032	2	-31.62601
2.8	61.4656	-8.01436195	.647027924	.0983720931	-31.3542209	4	-125.41689
2.9	70.7281	-9.14545591	.727391568	.085	-39.9930513	2	-79.98611
3	81	-9.15057931	.792316418	.0734883721	-43.1569645	4	-172.62786
3.1	92.352	-8.55655183	.832116245	.0620930232	-40.8292965	2	-81.6586
3.2	104.8576	-7.68262163	.861916051	.0525581395	-36.4933985	4	-145.9736
3.3	118.5921	-6.71682587	.871927369	.0431395349	-29.9623324	2	-59.92467
3.4	133.6336	-5.765158	.912446288	.0391860465	-27.5464502	4	-110.18581
3.5	150.0625	-4.88306638	.907248597	.031627907	-21.0262374	2	-42.05248
3.6	167.9616	-4.09776024	.870690315	.0220930233	-13.2396166	4	-52.95847
3.7	187.4161	-3.43338606	.84118215	.0144186046	-7.80445924	2	-15.60892
3.8	208.5136	-2.89177761	.859609112	.0125581396	-6.50916971	4	-26.03668
3.9	231.3441	-2.44761945	.872769354	.0106976744	-5.28677939	2	-10.57356
4	256	-2.08132935	.880129151	8.72093028E-03	-4.08968626	4	-16.35875
4.1	282.5761	-1.77764996	.884663878	6.86046514E-03	-3.04869185	2	-6.09739
4.2	311.1696	-1.52461206	.884523666	4.88372093E-03	-2.04935317	4	-8.19742
4.3	341.8801	-1.3127648	.882638184	3.02325586E-03	-1.19761813	2	-2.39524
4.4	374.8096	-1.13459982	.884462424	1.7441861E-03	-.656032903	4	-2.62414
4.5	410.0625	-.984116954	.89177552	1.16279072E-03	-.418459924	1	-.41846

ΣT^{β} = -498.67337

ΣT^{β} = -498.67337

```
10  REM        CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 AT
      LOW TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF HNC
     E SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
      .3426,.3177,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
      1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
      426,.1415,.1410
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =      "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 [illegible] = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       ((1.[illegible]241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10) ^ 10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       (1.[illegible]241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
      (X / 10) ^ 10)))
400  DEF  FN [illegible](R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "     "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
425 [illegible]
430  IF [illegible] 1.241314 THEN V =  FN A1(X)
440  IF X [illegible] = 1.241314 THEN V =  FN A2(X)
450 [illegible] V * [illegible](R / 10)
460 [illegible] JJ(P) * 100000) / 100000
480  [illegible]; TAB( 6); FN H(R / 10); TAB( [illegible]);V; TAB( [illegible]; TAB(
      [illegible]; TAB( 58);L; TAB( 7[illegible]);JJ(P); TAB( 75);[illegible]: PRINT
490 [illegible] + [illegible]
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   [illegible],4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
      ,[illegible]
540  PRINT "[illegible]   ";[illegible]
550  PRINT "                    "
560  PRINT "                    "
570  PRINT " V(R)               "
580  PRINT "                    "
590  PRINT "                    "
600 [illegible]
610  PRINT "                    "
620  PRINT "              ";[illegible]
630 [illegible] "                    "
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$\$(r)$	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310443	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\mu 1}_{H-2} = V(r)_{H-2}\,\$(r)\,h(r)\,r^2$$

r	r^2	$V(r)_{H-2}$	$(r)	h(r)	$I^{\mu 1}_{H-2}$		$T^{\mu 1}$
1.1	1.21	41440.4979	4.41388318E-32	.624418605	1.38199669E-27	1	0
1.2	1.44	26209.1343	8.32495559E-21	.576744186	1.81209232E-16	4	0
1.3	1.6899	16496.0882	5.38227064E-14	.529069767	7.93817103E-10	2	0
1.4	1.96	10331.7554	1.01033609E-09	.483372093	9.889575E-06	4	3E-05
1.5	2.25	6439.57688	5.9308766E-07	.439534884	3.77704437E-03	2	7.55E-03
1.6	2.56	3993.32218	4.1436542E-05	.399534884	.169243705	4	.67697
1.7	2.89	2461.92434	7.47611192E-04	.361395349	1.92234307	2	3.84468
1.8	3.24	1506.72441	5.57078057E-03	.325116279	8.84165579	4	35.36662
1.9	3.61	913.171572	.0230678324	.292790698	22.2650485	2	44.53009
2	4	545.976463	.0637342883	.262325581	36.5130151	4	146.05206
2.1	4.41	320.098299	.133419545	.235581395	44.3692819	2	88.73856
2.2	4.84	182.198784	.227706725	.208953489	41.9581489	4	167.83259
2.3	5.29	98.8826805	.338293178	.186046512	32.9223383	2	65.84467
2.4	5.76	49.2781421	.452832345	.165	21.2079257	4	84.8317
2.5	6.25	20.3680448	.561760046	.145930233	10.4357936	2	20.87158
2.6	6.76	4.05650366	.65902974	.128837209	2.32833191	4	9.31332
2.7	7.29	-4.6729092	.736813476	.111744186	-2.80477074	2	-5.60955
2.8	7.84	-8.91288108	.80438046	.0983720931	-5.52926746	4	-22.11707
2.9	8.41	-10.5571047	.852872539	.085	-6.4364127	2	-12.87283
3	9	-10.7543406	.890121575	.0734883721	-6.33131983	4	-25.32528
3.1	9.6099	-10.1924976	.912204059	.0620930232	-5.54797347	2	-11.09595
3.2	10.24	-9.27602777	.92839434	.0525581395	-4.63483699	4	-18.53935
3.3	10.89	-8.23636529	.933770512	.0431395349	-3.61309261	2	-7.22619
3.4	11.56	-7.20047415	.955220544	.0391860465	-3.11568851	4	-12.46276
3.5	12.25	-6.23314415	.952495983	.031627907	-2.30025967	2	-4.60052
3.6	12.96	-5.3629368	.933107879	.0220930233	-1.43283007	4	-5.73133
3.7	13.69	-4.59805577	.917159828	.0144186046	-.832426581	2	-1.66486
3.8	14.44	-3.93923396	.927151073	.0125581396	-.662300039	4	-2.64921
3.9	15.21	-3.37757744	.934221255	.0106976744	-.513421025	2	-1.02685
4	16	-2.90044415	.938151987	8.72093028E-03	-.379682436	4	-1.51873
4.1	16.81	-2.49578659	.940565722	6.86046514E-03	-.270718459	2	-.54144
4.2	17.64	-2.15270174	.940491183	4.88372093E-03	-.174416677	4	-.69767
4.3	18.49	-1.86162478	.939488256	3.02325586E-03	-.0977676827	2	-.19554
4.4	19.36	-1.61432952	.940458624	1.7441861E-03	-.0512660733	4	-.20507
4.5	20.25	-1.40383162	.944338667	1.16279072E-03	-.0312154339	1	-.03122

$\Sigma T^{\mu} = 533.799001$

$\Sigma T^{\mu} = 533.799$

```
10  REM        CALCULATION OF GROUND STATE ENERGY  OF LIQUID HELIUM-4 A
    T LOW TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF HN
    S SCALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 10.1 STEP .1
130 GG(N) = (FF(N) * FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "   "
170 N = 1
180  FOR R = 11 TO 101
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
     TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA  .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3398,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1115,.1410
225  DATA   .14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14
     ,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.1
     4,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.14,.
     14,.14,.14,.14,.14,.14,.14,.14
230  PRINT "     "
240  PRINT "R (A) -      "
250  PRINT "     "
260  PRINT "     "
270  PRINT "H(R) -       "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT U
320  DIM JJ(U)
330  FOR P = 1 TO U
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 2 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
     - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
     - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N)
410  PRINT "      "
415 N = 1
417 P = 1
420  FOR R = 11 TO 101
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 > = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     44);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,
     2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,2,4,2,4,2,4,2
535  DATA  4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,1
540  PRINT "TOTAL OF     =   ";W
550  PRINT "                          "
560  PRINT "                          "
570  PRINT " V(R)                     "
580  PRINT "                          "
590  PRINT "                          "
600 B = 0.1 * W / 3
610  PRINT "                          "
620  PRINT "                 ";B
630  PRINT "                          "
```

$f(r) = \exp\{-(2.6/r)^5\}$

$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$, $h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244039091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03
4.6	.14	1	.943945403	.943945402	0
4.7	.14	1	.94951335	.94951335	0
4.8	.14	1	.954440974	.954440973	0
4.9	.14	1	.958810665	.958810664	0
5	.14	1	.962693299	.962693298	0
5.1	.14	1	.966149929	.966149929	0
5.2	.14	1	.969233235	.969233234	0
5.3	.14	1	.971988742	.971988742	0

(cont.)

5.4	.14	1	.974455868	.974455868	0
5.5	.14	1	.976668802	.976668802	0
5.6	.14	1	.978657252	.978657252	0
5.7	.14	1	.980447081	.980447081	0
5.8	.14	1	.982060849	.982060848	0
5.9	.14	1	.983518266	.983518266	0
6	.14	1	.984836593	.984836593	0
6.1	.14	1	.986030965	.986030964	0
6.2	.14	1	.987114682	.987114682	0
6.3	.14	1	.988097453	.988097453	0
6.4	.14	1	.988995603	.988995603	0
6.5	.14	1	.98981225	.98981225	0
6.6	.14	1	.990557467	.990557467	0
6.7	.14	1	.991238405	.991238405	0
6.8	.14	1	.991861415	.991861415	0
6.9	.14	1	.992432146	.992432146	0
7	.14	1	.992955627	.992955627	0
7.1	.14	1	.993436344	.993436344	0
7.2	.14	1	.993878307	.993878307	0
7.3	.14	1	.994285102	.994285102	0
7.4	.14	1	.994659942	.994659942	0
7.5	.14	1	.995005711	.995005711	0
7.6	.14	1	.995325	.995325	0
7.7	.14	1	.995620139	.995620139	0
7.8	.14	1	.99589323	.995893229	0
7.9	.14	1	.996146165	.996146165	0
8	.14	1	.996380657	.996380657	0
8.1	.14	1	.996598254	.996598254	0
8.2	.14	1	.996800355	.996800355	0
8.3	.14	1	.996988232	.996988232	0
8.4	.14	1	.997163038	.997163038	0
8.5	.14	1	.997325819	.997325819	0
8.6	.14	1	.997477529	.997477529	0
8.7	.14	1	.997619035	.997619035	0
8.8	.14	1	.997751129	.997751129	0
8.9	.14	1	.997874531	.997874531	0
9	.14	1	.997989901	.997989902	0
9.1	.14	1	.998097843	.998097843	0
9.2	.14	1	.998198907	.998198907	0
9.3	.14	1	.998293599	.998293599	0
9.4	.14	1	.998382382	.998382382	0
9.5	.14	1	.998465682	.998465682	0
9.6	.14	1	.99854389	.99854389	0
9.7	.14	1	.998617365	.998617365	0
9.8	.14	1	.998686437	.998686437	0
9.9	.14	1	.998751411	.998751411	0
10	.14	1	.998812568	.998812568	0
10.1	.14	1	.998870167	0	0

(cont,)

$$I^{\mu\Pi} = V(r)S(r)r^2$$

r	r^2	$V(r)_{H-2}$	S(r)	h(r)	$I^{\mu\Pi}_{H-2}$		$T^{\mu\Pi}$
1.1	1.21	41440.4979	4.41388318E-32	.624418605	2.21325355E-27	1	0
1.2	1.44	26209.1343	8.32495559E-21	.576744186	3.14193426E-16	4	0
1.3	1.6899	16496.0882	5.38227064E-14	.529069767	1.50040156E-09	2	0
1.4	1.96	10331.7554	1.01033609E-09	.483372093	2.04595489E-05	4	8E-05
1.5	2.25	6439.57688	5.9308766E-07	.439534884	8.59327556E-03	2	.01718
1.6	2.56	3993.32218	4.1436542E-05	.399534884	.423601823	4	1.6944
1.7	2.89	2461.92434	7.47611192E-04	.361395349	5.31922472	2	10.63844
1.8	3.24	1506.72441	5.57078057E-03	.325116279	27.1953648	4	108.78145
1.9	3.61	913.171572	.0230678324	.292790698	76.0442484	2	152.08849
2	4	545.976463	.0637342883	.262325581	139.189683	4	556.75874
2.1	4.41	320.098299	.133419545	.235581395	188.339499	2	376.67899
2.2	4.84	182.198784	.227706725	.208953489	200.80138	4	803.20552
2.3	5.29	98.8826805	.338293178	.186046512	176.957568	2	353.91513
2.4	5.76	49.2781421	.452832345	.165	128.532883	4	514.13153
2.5	6.25	20.3680448	.561760046	.145930233	71.5122113	2	143.02442
2.6	6.76	4.05650366	.65902974	.128837209	18.0718903	4	72.38756
2.7	7.29	-4.6729092	.736813476	.111744186	-25.0999254	2	-50.19986
2.8	7.84	-8.91288108	.80438046	.0983720931	-56.2076834	4	-224.83074
2.9	8.41	-10.5571047	.852872539	.085	-75.7225023	2	-151.44501
3	9	-10.7543406	.890121575	.0734883721	-86.1540357	4	-344.61615
3.1	9.6099	-10.1924996	.912204059	.0620930232	-89.3493855	2	-178.69878
3.2	10.24	-9.27602777	.92839434	.0525581395	-88.1849516	4	-352.73981
3.3	10.89	-8.23636529	.933770512	.0431395349	-83.7536292	2	-167.50726
3.4	11.56	-7.20047415	.955220544	.0391860465	-79.510152	4	-318.04061
3.5	12.25	-6.23314415	.952495983	.031627907	-72.7287984	2	-145.4576
3.6	12.96	-5.3629368	.933107879	.0220930233	-64.8544137	4	-259.41766
3.7	13.69	-4.59805577	.917159828	.0144186046	-57.7328113	2	-115.46563
3.8	14.44	-3.93923396	.927151073	.0125581396	-52.7387064	4	-210.95483
3.9	15.21	-3.37757744	.934221255	.0106976744	-47.9937045	2	-95.98741
4	16	-2.90044415	.938151987	8.72093028E-03	-43.5369191	4	-174.14768
4.1	16.81	-2.49578659	.940565722	6.86046514E-03	-39.4606566	2	-78.92132
4.2	17.64	-2.15270174	.940491183	4.88372093E-03	-35.7138911	4	-142.85557
4.3	18.49	-1.86162478	.939488256	3.02325586E-03	-32.3385408	2	-64.67709
4.4	19.36	-1.61432952	.940458624	1.7441861E-03	-29.3925479	4	-117.5702
4.5	20.25	-1.40383162	.944338667	1.16279072E-03	-26.8452726	2	-53.69055
4.6	21.16	-1.22425066	.943945402	0	-24.4530416	4	-97.81217
4.7	22.09	-1.07066169	.94951335	0	-22.4568611	2	-44.91373
4.8	23.04	-.938952548	.954440973	0	-20.647867	4	-82.59147
4.9	24.01	-.8256948	.958810664	0	-19.0083564	2	-38.01672
5	25	-.728030836	.962693298	0	-17.5217602	4	-70.08705
5.1	26.01	-.643577412	.966149929	0	-16.172817	2	-32.34564
5.2	27.04	-.570344419	.969233234	0	-14.9476246	4	-59.7905
5.3	28.09	-.506667155	.971988742	0	-13.8336163	2	-27.66724
5.4	29.16	-.451150222	.974455868	0	-12.8194936	4	-51.27798
5.5	30.25	-.402621221	.976668802	0	-11.8951345	2	-23.79027

(cont

5.6	31.36	-.360092658	.978657252	0	-11.0514926	4	-44.20598
5.7	32.49	-.322730598	.980447081	0	-10.2804947	2	-20.56099
5.8	33.64	-.289828905	.982060848	0	-9.57494043	4	-38.29977
5.9	34.81	-.260788035	.983518266	0	-8.92840982	2	-17.85682
6	36	-.235097572	.984836593	0	-8.33517689	4	-33.34071
6.1	37.21	-.212321805	.986030964	0	-7.79013208	2	-15.58027
6.2	38.44	-.192087817	.987114682	0	-7.28871237	4	-29.15485
6.3	39.69	-.174075603	.988099453	0	-6.82683908	2	-13.65368
6.4	40.96	-.15800986	.988995603	0	-6.4008625	4	-25.60345
6.5	42.25	-.143653161	.98981225	0	-6.00751307	2	-12.01503
6.6	43.56	-.13080024	.990557467	0	-5.64385811	4	-22.57544
6.7	44.89	-.119273225	.991238405	0	-5.30726395	2	-10.61453
6.8	46.24	-.108917626	.991861413	0	-4.99536227	4	-19.98145
6.9	47.61	-.0995989656	.992432146	0	-4.70602069	2	-9.41205
7	49	-.0911999288	.992955627	0	-4.43731664	4	-17.74927
7.1	50.41	-.0836179639	.993436344	0	-4.18751456	2	-8.37503
7.2	51.84	-.0767632393	.993878307	0	-3.95504562	4	-15.82019
7.3	53.29	-.0705569111	.994285102	0	-3.7384899	2	-7.47698
7.4	54.76	-.0649296468	.994659942	0	-3.53656063	4	-14.14625
7.5	56.25	-.0598203633	.995005711	0	-3.34809018	2	-6.69619
7.6	57.76	-.0551751498	.995325	0	-3.17201782	4	-12.68808
7.7	59.29	-.0509463407	.995620139	0	-3.0073787	2	-6.01476
7.8	60.84	-.0470917212	.995893229	0	-2.85329417	4	-11.41318
7.9	62.41	-.0435738405	.996146165	0	-2.7089631	2	-5.41793
8	64	-.0403594223	.996380657	0	-2.57365425	4	-10.29462
8.1	65.61	-.0374188518	.996598254	0	-2.44669941	2	-4.8934
8.2	67.24	-.0347257334	.996800355	0	-2.32748728	4	-9.30995001
8.3	68.89	-.0322565051	.996988232	0	-2.21545803	2	-4.43092
8.4	70.56	-.0299901037	.997163038	0	-2.11009841	4	-8.4404
8.5	72.25	-.0279076741	.997325819	0	-2.01093743	2	-4.02188
8.6	73.96	-.025992314	.997477529	0	-1.91754237	4	-7.67017
8.7	75.69	-.0242288513	.997619035	0	-1.82951535	2	-3.65904
8.8	77.44	-.0226036492	.997751129	0	-1.74649011	4	-6.98597
8.9	79.21	-.0211044353	.997874531	0	-1.66812921	2	-3.33626
9	81	-.0197201516	.997989902	0	-1.59412148	4	-6.37649
9.1	82.81	-.0184408215	.998097843	0	-1.52417967	2	-3.04836
9.2	84.64	-.017257434	.998198907	0	-1.45803842	4	-5.83216
9.3	86.49	-.0161618407	.998293599	0	-1.39545233	2	-2.79091
9.4	88.36	-.0151466645	.998382382	0	-1.33619432	4	-5.34478
9.5	90.25	-.0142052195	.998465682	0	-1.28005403	2	-2.56011
9.6	92.16	-.0133314399	.99854389	0	-1.22683649	4	-4.90735
9.7	94.09	-.012519816	.998617365	0	-1.17636076	2	-2.35273
9.8	96.04	-.0117653387	.998686437	0	-1.12845888	4	-4.51384
9.9	98.01	-.0110634491	.998751411	0	-1.08297477	2	-2.16595
10	100	-.0104099939	.998812568	0	-1.03976328	4	-4.15906
10.1	102.01	-9.80118577E-030		0	0	1	0

$\Sigma T^{\mu\Pi}$ = -1208.04183

$\Sigma T^{\mu\Pi}$= -1208.0

```
10  REM      CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM-4 AT LO
     W TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF HNCL S
     CALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP ( - (2.6 / R) ^ 5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N) = (FF(N) *  FN F(R))
140 N = N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
     TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "    "
260  PRINT "    "
270  PRINT "H(R) =        "
280  PRINT "    "
290  PRINT "    "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P = 1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
      - ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10) ^ 10)))
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "        "
415 N = 1
417 P = 1
420  FOR R = 11 TO 45
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 > = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
     43);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N = N + 1
510 P = P + 1
520  NEXT R
530  DATA   1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                        "
560  PRINT "                        "
570  PRINT " V(R)        =          "
580  PRINT "                        "
590  PRINT "                        "
600 B = 0.1 * W / 3
610  PRINT "                        "
620  PRINT "             =     ";B
630  PRINT "                        "
640 [illegible] 0.149 * B [illegible] 1.045 [illegible]
650  PRINT "                        "
660  PRINT "                  ";[illegible]
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\{\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	\$(r)	h(r)
1.1	.677	4.83571429	9.12767572E-33	4.41388318E-32	.624418605
1.2	.636	4.54285714	1.83253739E-21	8.32495559E-21	.576744186
1.3	.595	4.25	1.26641656E-14	5.38227064E-14	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.01033609E-09	.483372093
1.5	.518	3.7	1.60293956E-07	5.9308766E-07	.439534884
1.6	.4836	3.45428571	1.19956899E-05	4.1436542E-05	.399534884
1.7	.4508	3.22	2.32177382E-04	7.47611192E-04	.361395349
1.8	.4196	2.99714286	1.85869701E-03	5.57078057E-03	.325116279
1.9	.3918	2.79857143	8.2427169E-03	.0230678324	.292790698
2	.3656	2.61142857	.0244059091	.0637342883	.262325581
2.1	.3426	2.44714286	.0545205373	.133419545	.235581395
2.2	.3197	2.28357143	.0997151752	.227706725	.208953489
2.3	.3	2.14285714	.15787015	.338293178	.186046512
2.4	.2819	2.01357143	.224890133	.452832345	.165
2.5	.2655	1.89642857	.296219987	.561760046	.145930233
2.6	.2508	1.79142857	.367879441	.65902974	.128837209
2.7	.2361	1.68642857	.436907612	.736813476	.111744186
2.8	.2246	1.60428571	.501394766	.80438046	.0983720931
2.9	.2131	1.52214286	.560310445	.852872539	.085
3	.2032	1.45142857	.61327274	.890121575	.0734883721
3.1	.1934	1.38142857	.66033386	.912204059	.0620930232
3.2	.1852	1.32285714	.701809978	.92839434	.0525581395
3.3	.1771	1.265	.738158509	.933770512	.0431395349
3.4	.1737	1.24071429	.769895661	.955220544	.0391860465
3.5	.1672	1.19428571	.797544484	.952495983	.031627907
3.6	.159	1.13571429	.821604423	.933107879	.0220930233
3.7	.1524	1.08857143	.842535277	.917159828	.0144186046
3.8	.1508	1.07714286	.860750333	.927151073	.0125581396
3.9	.1492	1.06571429	.87661512	.934221255	.0106976744
4	.1475	1.05357143	.890449344	.938151987	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.940565722	6.86046514E-03
4.2	.1442	1.03	.913098236	.940491183	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.939488256	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.940458624	1.7441861E-03
4.5	.141	1.00714286	.937641231	.944338667	1.16279072E-03

(cont.)

$$I^{\alpha}_{H-2} = V(r)_{H-2}\,\$(r)\,h(r)\,r^4$$

r	r^4	$V(r)_{H-2}$	$(r)	h(r)	I^{α}_{H-2}		T^{α}
1.1	1.4641	41440.4979	4.41388318E-32	.624418605	1.672216E-27	1	0
1.2	2.0736	26707.1343	8.32495359E-21	.576744186	2.60941294E-16	4	0
1.3	2.8561	16496.0882	5.38227064E-14	.529069767	1.34163029E-09	2	0
1.4	3.8416	10331.7554	1.01033609E-09	.483372093	1.9383567E-05	4	7E-05
1.5	5.0625	6439.57688	5.9308766E-07	.439534884	8.49834983E-03	2	.01699
1.6	6.5536	3993.32218	4.1436542E-05	.399534884	.433263885	4	1.73305
1.7	8.3521	2461.92434	7.47611192E-04	.361395349	5.55557148	2	11.11114
1.8	10.4976	1506.72441	5.57078057E-03	.325116279	28.6469648	4	114.58785
1.9	13.0321	913.171572	.0230678324	.292790698	80.3768252	2	160.75365
2	16	545.976463	.0637342883	.262325581	146.05206	4	584.20824
2.1	19.4481	320.098299	.133419545	.235581395	195.668533	2	391.33706
2.2	23.4256	182.198784	.227706725	.208953489	203.077441	4	812.30976
2.3	27.9841	98.8826805	.338293178	.186046512	174.15917	2	348.31833
2.4	33.1776	49.2781421	.452832345	.165	122.157652	4	488.6306
2.5	39.0625	20.3680448	.561760046	.145930233	65.2237102	2	130.44742
2.6	45.6976	4.05650366	.65902974	.128837209	15.7395237	4	62.95809
2.7	53.1441	-4.6729092	.736813476	.111744186	-20.4467787	2	-40.89356
2.8	61.4656	-8.91288108	.80438046	.0983720931	-43.3494569	4	-173.39783
2.9	70.7281	-10.5571047	.852872539	.085	-54.1302308	2	-108.26047
3	81	-10.7543406	.890121575	.0734883721	-56.9818785	4	-227.92752
3.1	92.352	-10.1924996	.912204059	.0620930232	-53.3165221	2	-106.63305
3.2	104.8576	-9.27602777	.92839434	.0525581395	-47.4607307	4	-189.84293
3.3	118.5921	-8.23636529	.933770512	.0431395349	-39.3465785	2	-78.69316
3.4	133.6336	-7.20047415	.955220544	.0391860465	-36.0173593	4	-144.06944
3.5	150.0625	-6.23314415	.952495983	.031627907	-28.1781809	2	-56.35637
3.6	167.9616	-5.3629368	.933107879	.0220930233	-18.5694777	4	-74.27792
3.7	187.4161	-4.59805577	.917159828	.0144186046	-11.3959199	2	-22.79184
3.8	208.5136	-3.93923396	.927151073	.0125581396	-9.56361256	4	-38.25446
3.9	231.3441	-3.37757744	.934221255	.0106976744	-7.8091338	2	-15.61827
4	256	-2.90044415	.938151987	8.72093028E-03	-6.07491897	4	-24.29968
4.1	282.5761	-2.49578659	.940565722	6.86046514E-03	-4.55077729	2	-9.10156
4.2	311.1696	-2.15270174	.940491183	4.88372093E-03	-3.07671019	4	-12.30685
4.3	341.8801	-1.86162478	.939488256	3.02325586E-03	-1.80772445	2	-3.61545
4.4	374.8096	-1.61432952	.940458624	1.7441861E-03	-.99251118	4	-3.97005
4.5	410.0625	-1.40383162	.944338667	1.16279072E-03	-.632112536	1	-.63212

ΣT^{α} = 1775.46972

ΣT^{α} = 1775.46972

```
1?  REM      CALCULATION OF CONDENSATE FRACTION OF LIQUID HELIUM 4 AT LO
     W TEMPERATURE BY USING HFDHE2 POTENTIAL AND READING CURVE OF HNCE S
     CALING
20  PRINT "NUMBER OF CONSTANT"
30  INPUT I
35  HOME
40  DIM A(I),FF(I),GG(I),HH(I)
50  FOR N = 1 TO I
60  READ A(N)
70 FF(N) = A(N) / .14
80 HH(N) = (A(N) - .14) / .86
90  NEXT N
100  DEF  FN F(R) =  EXP (   (2.6 / R)    5)
110 N = 1
120  FOR R = 1.1 TO 4.5 STEP .1
130 GG(N)    (FF(N) *  FN F(R)) ^ 2
140 N    N + 1
150  NEXT R
160  PRINT "  "
170 N = 1
180  FOR R = 11 TO 45
190  PRINT R / 10; TAB( 9);A(N); TAB( 19);FF(N); TAB( 34); FN F(R / 10);
      TAB( 52);GG(N); TAB( 70);HH(N): PRINT
200 N = N + 1
210  NEXT R
220  DATA   .6770,.6360,.5950,.5557,.5180,.4836,.4508,.4196,.3918,.3656,
     .3426,.3197,.3000,.2819,.2655,.2508,.2361,.2246,.2131,.2032,.1934,.
     1852,.1771,.1737,.1672,.1590,.1524,.1508,.1492,.1475,.1459,.1442,.1
     426,.1415,.1410
230  PRINT "    "
240  PRINT "F(R) =      "
250  PRINT "     "
260  PRINT "    "
270  PRINT "H(R) =         "
280  PRINT "     "
290  PRINT "     "
300  REM  THIS IS MY SECOND  PROGRAM
310  INPUT O
320  DIM JJ(O)
330  FOR P    1 TO O
340  READ JJ(P)
350  NEXT P
360 P = 1
370  DEF  FN H(R) =  INT (R ^ 4 * 10000) / 10000
380  DEF  FN A1(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10)    10)) *  EXP ( - ((1.241314 / (X / 10) - 1) ^ 2)))
390  DEF  FN A2(X) = 10.8 * (.5448504E6 *  EXP ( - 13.353384 * (X / 10))
       ((1.373241 / (X / 10) ^ 6) + (.425378 / (X / 10) ^ 8) + (.1781 /
     (X / 10)    10)))
400  DEF  FN L(R) =  FN H(R) * GG(N) * HH(N)
410  PRINT "          "
415 N    1
417 I    1
420  FOR R    11 TO 45
425 X = R / 2.9673
430  IF X / 10 < 1.241314 THEN V =  FN A1(X)
440  IF X / 10 >  = 1.241314 THEN V =  FN A2(X)
450 L = V *  FN L(R / 10)
460 M =  INT (L * JJ(P) * 100000) / 100000
480  PRINT R / 10; TAB( 6); FN H(R / 10); TAB( 15);V; TAB( 28);GG(N); TAB(
      43);HH(N); TAB( 58);L; TAB( 73);JJ(P); TAB( 76);M: PRINT
490 W = W + M
500 N    N + 1
510 P    P + 1
520  NEXT R
530  DATA    1,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4,2,4
     ,2,4,2,4,1
540  PRINT "TOTAL OF     =    ";W
550  PRINT "                        "
560  PRINT "                        "
570  PRINT " V(R)       =           "
580  PRINT "                        "
590  PRINT "                        "
600 I    . I - W / "
610  PRINT "                        "
620  PRINT "                 ";P
630  PRINT "                        "
640 ...  1.045   2)
650  PRINT "                        "
660  PRINT "                 ";P; TAB( ...);"  I"
```

$$f(r) = \exp\{-(2.6/r)^5\}$$

$$\$(r) = (1/\rho_c)\Omega_1(r)f(r)$$

$$h(r) = (\rho/\rho_d)\Omega_1(r)/\rho - \rho_c/\rho\}$$

r	$\Omega_1(r)$	$\Omega_1(r)/\rho_c$	f(r)	$\$^2(r)$	h(r)
1.1	.677	4.83571429	9.12767572E-33	0	.624418605
1.2	.636	4.54285714	1.83253739E-21	0	.576744186
1.3	.595	4.25	1.26641656E-14	2.89688371E-27	.529069767
1.4	.5557	3.96928571	2.54538503E-10	1.02077902E-18	.483372093
1.5	.518	3.7	1.60293956E-07	3.51752972E-13	.439534884
1.6	.4836	3.45428571	1.19956899E-05	1.71698701E-09	.399534884
1.7	.4508	3.22	2.32177382E-04	5.58922494E-07	.361395349
1.8	.4196	2.99714286	1.85869701E-03	3.10335962E-05	.325116279
1.9	.3918	2.79857143	8.2427169E-03	5.3212489E-04	.292790698
2	.3656	2.61142857	.0244059091	4.06205951E-03	.262325581
2.1	.3426	2.44714286	.0545205373	.0178007749	.235581395
2.2	.3197	2.28357143	.0997151752	.0518503527	.208953489
2.3	.3	2.14285714	.15787015	.114442274	.186046512
2.4	.2819	2.01357143	.224890133	.205057132	.165
2.5	.2655	1.89642857	.296219987	.315574349	.145930233
2.6	.2508	1.79142857	.367879441	.434320198	.128837209
2.7	.2361	1.68642857	.436907612	.542894099	.111744186
2.8	.2246	1.60428571	.501394766	.647027924	.0983720931
2.9	.2131	1.52214286	.560310445	.727391568	.085
3	.2032	1.45142857	.61327274	.792316418	.0734883721
3.1	.1934	1.38142857	.66033386	.832116245	.0620930232
3.2	.1852	1.32285714	.701809978	.861916051	.0525581395
3.3	.1771	1.265	.738158509	.871927369	.0431395349
3.4	.1737	1.24071429	.769895661	.912446288	.0391860465
3.5	.1672	1.19428571	.797544484	.907248597	.031627907
3.6	.159	1.13571429	.821604423	.870690315	.0220930233
3.7	.1524	1.08857143	.842535277	.84118215	.0144186046
3.8	.1508	1.07714286	.860750333	.859609112	.0125581396
3.9	.1492	1.06571429	.87661512	.872769354	.0106976744
4	.1475	1.05357143	.890449344	.880129151	8.72093028E-03
4.1	.1459	1.04214286	.902530509	.884663878	6.86046514E-03
4.2	.1442	1.03	.913098236	.884523666	4.88372093E-03
4.3	.1426	1.01857143	.922358737	.882638184	3.02325586E-03
4.4	.1415	1.01071429	.930489098	.884462424	1.7441861E-03
4.5	.141	1.00714286	.937641231	.89177552	1.16279072E-03

(cont.)

$$I^{\beta}_{H-2} = V(r)\$^{2}(r)h(r)r^{4}$$

r	r^4	$V(r)_{H-2}$	$\$^2(r)$	h(r)	I^{β}_{H-2}		T^{β}
1.1	1.4641	41440.4979	0	.624418605	0	1	0
1.2	2.0736	26209.1343	0	.576744186	0	4	0
1.3	2.8561	16496.0882	2.89688371E-27	.529069767	7.22101729E-23	2	0
1.4	3.8416	10331.7554	1.02077902E-18	.483372093	1.95839174E-14	4	0
1.5	5.0625	6439.57688	3.51752972E-13	.439534884	5.04026641E-09	2	0
1.6	6.5536	3993.32218	1.71698701E-09	.399534884	1.79329572E-05	4	7E-05
1.7	8.3521	2461.92434	5.58922494E-07	.361395349	4.15340741E-03	2	8.3E-03
1.8	10.4976	1506.72441	3.10335962E-05	.325116279	.159585955	4	.63834
1.9	13.0321	913.171572	5.3212489E-04	.292790698	1.85411913	2	3.70823
2	16	545.976463	4.06205951E-03	.262325581	9.30852413	4	37.23409
2.1	19.4481	320.098299	.0178007749	.235581395	26.1060066	2	52.21201
2.2	23.4256	182.198784	.0518503527	.208953489	46.242099	4	184.96839
2.3	27.9841	98.8826805	.114442274	.186046512	58.916859	2	117.83371
2.4	33.1776	49.2781421	.205057132	.165	55.316936	4	221.26774
2.5	39.0625	20.3680448	.315574349	.145930233	36.6400744	2	73.28014
2.6	45.6976	4.05650366	.434320198	.128837209	10.3728142	4	41.49125
2.7	53.1441	-4.6729092	.542894099	.111744186	-15.0654621	2	-30.13093
2.8	61.4656	-8.91288108	.647027924	.0983720931	-34.8694561	4	-139.47783
2.9	70.7281	-10.5571047	.727391568	.085	-46.1661874	2	-92.33238
3	81	-10.7543406	.792316418	.0734883721	-50.7207994	4	-202.8832
3.1	92.352	-10.1924996	.832116245	.0620930232	-48.6355479	2	-97.2711
3.2	104.8576	-9.27602777	.861916051	.0525581395	-44.0622738	4	-176.2491
3.3	118.5921	-8.23636529	.871927369	.0431395349	-36.7406748	2	-73.4813501
3.4	133.6336	-7.20047415	.912446288	.0391860465	-34.4045215	4	-137.61809
3.5	150.0625	-6.23314415	.907248597	.031627907	-26.8396041	2	-53.67921
3.6	167.9616	-5.3629368	.870690315	.0220930233	-17.327326	4	-69.30931
3.7	187.4161	-4.59805577	.84118215	.0144186046	-10.4518799	2	-20.90376
3.8	208.5136	-3.93923396	.859609112	.0125581396	-8.86691364	4	-35.46766
3.9	231.3441	-3.37757744	.872769354	.0106976744	-7.29545878	2	-14.59092
4	256	-2.90044415	.880129151	8.72093028E-03	-5.69919731	4	-22.79679
4.1	282.5761	-2.49578659	.884663878	6.86046514E-03	-4.28030513	2	-8.56062
4.2	311.1696	-2.15270174	.884523666	4.88372093E-03	-2.89361881	4	-11.57448
4.3	341.8801	-1.86162478	.882638184	3.02325586E-03	-1.6983359	2	-3.39668
4.4	374.8096	-1.61432952	.884462424	1.7441861E-03	-.933415699	4	-3.73367
4.5	410.0625	-1.40383162	.89177552	1.16279072E-03	-.596928311	1	-.59693

$\Sigma T^{\beta} = -461.4117$

$\Sigma T^{\beta} = -461.41174$

VITA

Name Mr. Puckanai Thongthiumporn

Born April 15, 1951

Degree B.Sc. in Physics, March, 1975

Chiengmai University

Chiengmai, Thailand