TABLE III

Smoothed Thermodynamic Functions for the Ne 6 Sample as Corrected to Constant Volume, $V = 12.87\ \text{cm}^3/\text{mole}$

T, K	C_V, J/mole·K	Θ, K	U^*, J/mole	S, J/mole·K
0	0	83.05	0	0
1.0	3.398×10^{-3}	83.02	8.49×10^{-4}	1.132×10^{-3}
2.0	2.747×10^{-2}	82.73	1.367×10^{-2}	9.100
3.0	9.615	81.73	7.055	3.124×10^{-2}
4.0	2.437×10^{-1}	79.93	2.321×10^{-1}	7.672
5.0	5.147	77.86	5.992	1.575×10^{-1}
6.0	9.441	76.23	1.315×10^{0}	2.868
7.0	1.542×10^{0}	75.20	2.544	4.752
8.0	2.295	74.64	4.450	7.287
9.0	3.172	74.39	7.175	1.049×10^{0}
10.0	4.133	74.35	10.82	1.433
12.0	6.158	74.66	21.10	2.366
14.0	8.164	75.14	35.44	3.471
16.0	10.052	75.56	53.68	4.692
18.0	11.736	76.03	75.51	5.985
20.0	13.191	76.61	100.47	7.309
22.0	14.43	77.31	128.13	8.641
24.0	15.49	78.06	158.1	9.960
26.0	16.41	78.81	190.0	11.256
28.0	17.20	79.41	223.6	12.522
30.0	17.90	80.17	258.8	13.76
32.0	18.51	80.87	295.1	14.96
34.0	19.03	81.59	332.7	16.12
36.0	19.47	82.40	371.2	17.24
38.0	19.85	83.25	410.6	18.34
40.0	20.23	83.75	450.7	19.40
4.20	(20.65)	83.3	(492.)	(20.4)
43.2	(20.9)	82.9	(509.)	(20.9)

this sample actually became zero at approximately 15 K and the sample did not fill the bomb at 0 K. Hence, the above discussion applies only to the Ne 5 to Ne 8 samples.

Once the temperature dependence of the volume is obtained for a given sample, the average derivative $(\partial C_V/\partial V)_T$ can be calculated for neon as a function of temperature, and the experimental $C_V[T, V(T)]$ data can be converted to more meaningful $C_V(T, V = \text{const})$ values. The maximum adjustment of 0.4 % occurs again at the highest temperatures. Tables II through V give the resulting values of $C_V(T)$ at constant volume for each of the samples, Ne 5 through Ne 8, together with the equivalent Debye temperatures Θ (which are useful for interpolation), the internal energy $C_V = (\partial U^*/\partial T)_V$, and the entropy $C_V = T(\partial S/\partial T)_V$ for each of the samples, Ne 5 through Ne 8. Table VI contains a summary of the same functions for solid natural neon at its $T = 0$ equilibrium volume, $V_0 = 13.39\ \text{cm}^3/\text{mole}$. The actual

TABLE IV

Smoothed Thermodynamic Functions for the Ne 7 Sample as Corrected to Constant Volume, $V = 12.59\ cm^3/mole$

T, K	C_V, J/mole·K	Θ, K	U^*, J/mole	S, J/mole·K
0	0	87.63	0	0
1.0	2.894×10^{-3}	87.58	7.23×10^{-4}	9.64×10^{-4}
2.0	2.336×10^{-2}	87.33	1.163×10^{-2}	7.75×10^{-3}
3.0	8.104	86.53	5.98	2.649×10^{-2}
4.0	2.040×10^{-1}	84.81	1.955×10^{-1}	6.468
5.0	4.289	82.74	5.019	1.321×10^{-1}
6.0	7.888	80.99	1.098×10^{0}	2.399
7.0	1.298×10^{0}	79.81	2.130	3.979
8.0	1.952	79.12	3.744	6.125
9.0	2.729	78.76	6.075	8.866
10.0	3.601	78.63	9.234	1.219×10^{0}
12.0	5.492	78.80	18.31	2.043
14.0	7.412	79.25	31.22	3.037
16.0	9.247	79.73	47.90	4.153
18.0	10.918	80.25	68.10	5.348
20.0	12.404	80.79	91.45	5.987
22.0	13.70	81.37	117.6	7.844
24.0	14.82	82.02	146.2	9.101
26.0	15.78	82.73	176.8	10.344
28.0	16.61	83.48	209.2	11.565
30.0	17.34	84.15	243.2	12.76
32.0	17.97	85.02	278.5	13.92
34.0	18.53	85.79	314.9	15.05
36.0	19.03	86.41	352.6	16.15
38.0	19.48	86.92	391.1	17.22
40.0	19.87	87.47	430.4	18.16
42.0	20.22	88.08	470.3	19.27
44.0	20.54	88.59	511.3	20.25
46.0	20.85	88.83	552.6	21.20
(48.0	(21.15)	(88.9)	(595.)	(22.1)
(48.5)	(21.2)	(89.2)	(605.)	(22.3)

Ne 4 data are used for these calculations below 6 K, while the values above 6 K are obtained from the Ne 5 results by extrapolation at constant temperature.

All of the calculations, beginning with the raw data, are carried out using an IBM 360–65 digital computer. Heat-capacity and addenda results are represented in limited ranges by expressions of the form

$$C = \sum_n A_n T^n \tag{4}$$

with the choices of the n's being determined by the temperature region and the function (addenda heat capacity or neon) being represented. The resulting