TABLE IV. Molar entropy (in joules per mole·°K) of argon at round values of pressure and temperature.

	T										
P (kilobars)	200°K	190°K	180°K	170°K	160°K	150°K	140°K	130°K	120°K	110°K	100°K
0.20	···	···	···	···	···	75.9[a]	72.8[a]	69.4[b]	65.8[b]	61.9[b]	57.7[b]
0.40	84.1[a]	82.0[a]	79.9[a]	77.5[a]	75.1[a]	72.4	69.7	66.6	63.3	59.7	55.7
0.60	80.9	79.0	77.0	74.9	72.7	70.1	67.5	64.6	61.5	58.0	54.0
0.80	78.6	76.8	75.0	73.0	70.8	68.3	65.8	63.0	59.9	56.4	
1.00	76.8	75.1	73.4	71.4	69.3	66.8	64.3	61.6	58.5	55.1	
1.20	75.2	73.6	71.9	70.1	67.9	65.5	63.0	60.3	57.3	54.0	
1.40	73.9	72.4	70.7	68.9	66.8	64.3	61.9	59.2	56.3		
1.60	72.7	71.2	69.6	67.8	65.7	63.2	60.9	58.2	55.3		
1.80	71.7	70.2	68.6	66.8	64.7	62.3	59.9	57.3			
2.00	70.7	69.2	67.7	65.9	63.8	61.4	59.0	56.4			
2.20	69.8	68.4	66.8	65.1	63.0	60.5	58.1	55.6			
2.40	68.9	67.5	66.0	64.3	62.2	59.7	57.3				
2.60	68.2	66.8	65.3	63.5	61.5	59.0	56.5				
2.80	67.4	66.0	64.5	62.8	60.8	58.2	55.8				
3.00	66.7	65.4	63.9	62.2	60.1	57.6					
3.20	66.1	64.7	63.2	61.6	59.5	56.9					
3.40	65.4	64.1	62.6	60.9	58.9						
3.60	64.8	63.5	62.0	60.4	58.3						
3.80	64.2	62.9	61.4	59.8	57.8						
4.00	63.7	62.3	60.9	59.2							
4.20	63.1	61.8	60.3	58.7							
4.40	62.6	61.2	59.8	58.2							
4.60	62.1	60.7	59.3								
4.80	61.6	60.2	58.7								
5.00	61.2	59.7	58.2								
5.20	60.7	59.2									
5.40	60.2	58.7									
5.60	59.8	58.2									
5.80	59.3										
6.00	58.9										
6.20	58.4										

[a] Obtained from Ref. 8.

[b] Obtained from Ref. 9.

THERMODYNAMIC ANALYSIS

Since the present results overlap with the lower pressure results of other workers, it is possible to use standard thermodynamic methods to calculate the entropy and energy of argon in the range covered by the present P–V–T data. The entropy can be calculated from the formula

$$S = S_0 - \int_{P_0}^{P} \frac{\partial V}{\partial T}\bigg|_P dP \tag{1}$$

or from

$$S = S_0 + \int_{V_0}^{V} \frac{\partial P}{\partial T}\bigg|_V dV, \tag{2}$$

while the energy can be calculated from the equation

$$U = U_0 + \int_{V_0}^{V} \left[T \frac{\partial P}{\partial T}\bigg|_V - P \right] dV. \tag{3}$$

The derivatives and integrals can be evaluated by standard numerical procedures, and the low-pressure values S_0 and U_0 can be obtained from earlier low-

TABLE V. Molar energy (in joules per mole) of argon at round values of pressure and temperature.

	T										
P (kilobars)	200°K	190°K	180°K	170°K	160°K	150°K	140°K	130°K	120°K	110°K	100°K
0.20	...	...	...	...	...	−2334[a]	−2748[a]	−3128[b]	−3549[b]	−3970[b]	−4387[b]
0.40	−1055[a]	−1383[a]	−1716[a]	−2055[a]	−2398[a]	−2760	−3105	−3426	−3796	−4173	−4558
0.60	−1483	−1772	−2066	−2366	−2676	−3014	−3332	−3624	−3968	−4323	−4685
0.80	−1766	−2031	−2301	−2578	−2874	−3197	−3499	−3771	−4099	−4441	
1.00	−1977	−2223	−2476	−2739	−3023	−3339	−3627	−3887	−4202	−4534	
1.20	−2146	−2377	−2614	−2864	−3141	−3450	−3730	−3980	−4286	−4610	
1.40	−2284	−2500	−2727	−2968	−3237	−3541	−3814	−4056	−4353		
1.60	−2397	−2603	−2820	−3054	−3317	−3618	−3884	−4118	−4408		
1.80	−2491	−2689	−2897	−3124	−3383	−3680	−3942	−4169			
2.00	−2572	−2762	−2964	−3184	−3440	−3736	−3994	−4213			
2.20	−2639	−2824	−3020	−3235	−3487	−3781	−4039	−4258			
2.40	−2697	−2878	−3069	−3277	−3527	−3822	−4078				
2.60	−2748	−2924	−3111	−3314	−3560	−3858	−4117				
2.80	−2790	−2965	−3147	−3346	−3588	−3888	−4152				
3.00	−2828	−2999	−3177	−3371	−3611	−3910					
3.20	−2862	−3029	−3203	−3393	−3631	−3928					
3.40	−2890	−3055	−3224	−3408	−3647						
3.60	−2916	−3075	−3242	−3422	−3653						
3.80	−2936	−3095	−3259	−3433	−3661						
4.00	−2952	−3110	−3271	−3441							
4.20	−2964	−3123	−3282	−3448							
4.40	−2976	−3135	−3292	−3455							
4.60	−2984	−3146	−3300								
4.80	−2992	−3156	−3310								
5.00	−2998	−3165	−3321								
5.20	−3005	−3171									
5.40	−3010	−3183									
5.60	−3013	−3186									
5.80	−3016										
6.00	−3016										
6.20	−3016										

[a] Obtained from Ref. 8.

[b] Obtained from Ref. 9.

pressure work.[8,9] Details of the calculational procedure used are available elsewhere[1] and will not be repeated here. The results obtained from these calculations, together with values of P and V numerically interpolated from Table II, are presented in Tables III through VIII. The entropies and energies given are "absolute" values, referenced to $S=0$ at $T=0°\mathrm{K}$ in the perfect crystal and $U=0$ at $T=0°\mathrm{K}$ in the ideal gas. The estimated accuracy of the tabulated entropies is ±0.5 J/mole·°K, while the accuracy of the tabulated values of the energy is estimated to be ±10 J/mole at temperatures above and including 140°K and as ±70 J/mole at temperatures below 140°K. The greater uncertainty in the low-temperature values for the energy is due to the greater uncertainty in the initial values U_0 at these temperatures.

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[8] A. Michels, J. M. Levelt, and G. J. Wolkers, Physica **24**, 769 (1958).

[9] F. Din, in *Thermodynamic Functions of Gases*, F. Din, Ed. (Butterworths Scientific Publications Ltd., London, 1962), Vol. 2.