than in the solid range. This is probably due to the fact that in the liquid range the high-pressure capillaries connected to the calorimeter are filled with fluid up to a certain point beyond the adiabatic shield and this point will be temperature-dependent. It is therefore possible that a heat and mass transport through convection currents within the capillaries takes place. The volume of the capillaries up to the point where they are thermally anchored to the liquid helium can is about $0.005 \, \mathrm{cm^3}$ as compared to $1.46 \, \mathrm{cm^3}$ of the high pressure cell. It appears therefore that a mass transport alone would not seriously distort the results. The accompanying heat transport, however, could have such an effect. The accuracy can probably be estimated from the experimental scatter which is about 4%.

TABLE 5. SPECIFIC HEAT OF FLUID ^{3}He AT ROUNDED VALUES OF TEMPERATURE

T (°K)	$V =$ 17·02 C_v	16·87 C_v	15·72 C_v	14·98 C_v	14·16 C_v	14·11 C_v	13·56 C_v	13·33 C_v	12·57 C_v
6	1·38	1·40	—	—	—	—	—	—	—
7	1·56	1·55	—	—	—	—	—	—	—
8	1·72	1·70	1·62	—	—	—	—	—	—
9	1·86	1·84	1·75	—	—	—	—	—	—
10	1·99	1·97	1·88	1·83	—	—	—	—	—
11	2·11	2·09	2·00	1·94	1·90	1·90	—	—	—
12	2·22	2·20	2·11	2·04	1·99	1·99	—	—	—
13	2·31	2·30	2·21	2·14	2·08	2·07	2·04	—	—
14	2·40	2·38	2·30	2·23	2·16	2·16	2·12	2·09	—
15	2·48	2·46	2·38	2·32	2·24	2·24	2·19	2·17	—
16	2·55	2·54	2·45	2·40	2·32	2·32	2·27	2·26	—
17	2·61	2·61	2·53	2·47	2·40	2·40	2·34	2·34	2·28
18	2·66	2·67	2·60	2·54	2·46	2·47	2·41	2·41	2·34
19	2·72	2·72	2·66	2·61	2·53	2·54	2·48	2·48	2·40
21	2·82	2·81	2·77	2·72	2·65	2·66	2·61	2·61	2·51
23	2·90	2·89	2·86	2·81	2·76	2·76	2·72	2·72	2·62
25	2·98	2·94	2·92	2·88	2·85	2·84	2·81	2·80	2·73
27	—	2·99	2·98	2·93	2·92	2·90	2·89	2·87	2·82
29	—	3·03	3·03	2·97	2·97	2·97	2·95	2·93	2·90

Units: V (cm³/mole); C_v (cal mole⁻¹ deg⁻¹).

Units: V (cm^3/mole); C_v (cal mole^{-1} deg^{-1}).

3·5. The thermal energy and entropy

The thermal internal energy, $U - U_0$, and the lattice entropy, S, were calculated from the smoothed experimental data by means of the relation

$$U - U_0 = \int_0^T C_v \, \mathrm{d}T \tag{5}$$

$$S = \int_0^T \frac{C_v}{T} \, \mathrm{d}T. \tag{6}\dagger$$

Here U_0 is the internal energy of the solid at 0 °K at the specified volume.

Values of $U - U_0$ and S for the solid at rounded values of temperatures are included in tables 1 and 2. Diagrams of the entropy over the whole temperature range investigated are given in figures 9 and 10. The melting entropy (at constant temperature), S_m, can be obtained from these figures and is plotted separately in figures 11 and 12. A comparison is made with the data of the melting entropy given by Grilly & Mills (1959) (obtained from

† In ^{3}He we are assuming that the nuclear spins are completely random in orientation so that for all the temperatures and densities considered here there is an additional constant term in the entropy of ^{3}He of magnitude $R \ln 2$ (cf. discussion on p. 11).