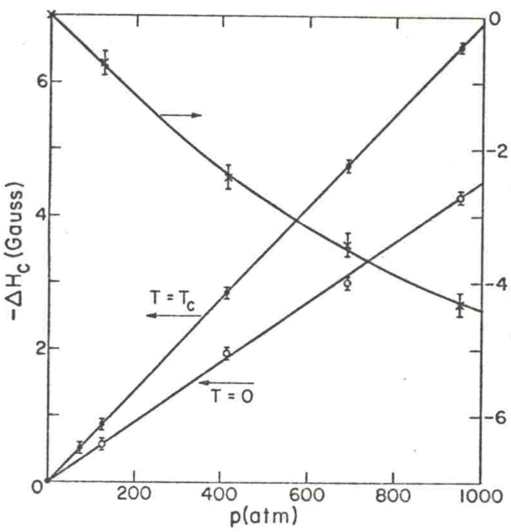

Fig. 1. Pressure dependence of $\Delta\gamma^*$ and ΔH_c. The curve through the $\Delta\gamma^*$ values represents a parabolic fit. The relative error in pressure was about 1%.

The critical field was determined from measurements of specimen magnetization versus applied field using an improved vibrating coil magnetometer [2]. The apparatus permitted isothermal comparison of two In specimens, one at $p = 0$ and one mounted in a pressure cell†. The relative accuracy in γ is about 2×10^{-4}.

In fig. 1 ΔH_c at $T = T_c$ and $T = 0$ and $\Delta\gamma^*$ ($\gamma^* = \gamma/V$) are plotted against pressure. A linear least square fit of the $\Delta\gamma^*$ values does not describe the observed behavior within the experimental errors. An excellent fit is obtained by a parabolic dependence of $\Delta\gamma^*$ versus p. Using the pressure dependent compressibility [4] one obtains:

$$\gamma(p) = 1.6720 - 1.4 \times 10^{-5} p + 34 \times 10^{-10} p^2 \qquad (2)$$

where p is in atm and γ in mJ/mole°K [2]††.

From fig. 1 $\partial H_c/\partial p$ was calculated. $(\partial H_c/\partial p)_{T_c} = -6.87 \pm 0.05$ G/10^3 atm and $(\partial H_c/\partial p)_{T=0} = -4.52 \pm 0.05$ G/10^3 atm are both higher than those of Collins et al. [6] which were derived from the change in length which occurs at the transition from the normal to the superconducting state in a magnetic field.

In recent years several values of $\mathrm{d}\ln\gamma/\mathrm{d}\ln V$ have been reported: 1.0 ± 0.5 by Rohrer [7], 2.9 ± 0.8 by Collins et al. [6], and 1.5 ± 0.3 by Berman et al. [8]. From eq. (2) we get $\mathrm{d}\ln\gamma/\mathrm{d}\ln V = 3.40 \pm 0.1$ for $p = 0$ and 1.80 ± 0.05 for $p = 1000$ atm [5]. Our value for $p = 0$ agrees fairly well with that of Collins. Berman et al. [8] extrapolated high pressure γ-values with relatively large errors. Although some of their main assumptions concerning the shape of the critical field curve for calculating γ are not valid, the difference in $\mathrm{d}\ln\gamma/\mathrm{d}\ln V$ can be explained by considering the nonlinear decrease of γ below 1000 atm.

The pressure dependence of K, a characteristic superconducting constant,

$$K = 2\pi\gamma T_c^2/VH_0^2 = 2\pi\gamma^* T_c^2/H_0^2 \qquad (3)$$

can be investigated since $(\partial H_c/\partial p)_{T\to 0}$, $\partial T_c/\partial p$, and $\partial\gamma^*/\partial p$ were measured independently. For $p \to 0$ one finds $\mathrm{d}K/\mathrm{d}p = (-0.25 \pm 0.5) \times 10^{-6}$ atm^{-1}. Going to higher pressures K increases due to the nonlinearity of $\gamma^*(p)$. At 1000 atm $\mathrm{d}K/\mathrm{d}p$ is about 3.4×10^{-6} atm^{-1}. A consequence of this is that the shape of the reduced critical field curve also changes under pressure. This was directly confirmed by temperature dependent measurements of $\partial H/\partial p$.

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† Measurements of Gubser [3] give the following values for In: $\gamma = 1.672$ mJ/mole°K^2 and $H_0 = 281.53$ gauss. These values were used to define the temperature scale in the range below 1°K.

†† The compressibility of 2.2×10^{-6} atm^{-1}, deduced from elastic constants by Chandarasekhar and Rayne [5] slightly modifies eq. (2). The revised values are: $\mathrm{d}\ln\gamma/\mathrm{d}\ln V = 3.7$ for $p = 0$ and 1.9 for $p = 1000$ atm.

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