to the point when the transformation is starting, at the hottest point when the temperature is rising. The temperature at this hottest point must be the transformation temperature, which is observed at the maximum a little later in the curve. The observed temperature at s from the centered thermocouple is lower than the transformation temperature and from these two values we know precisely the temperature gradient within the cell. Similar reasoning can be employed to determine the gradient to point e at the end of the transformation.

The temperature gradients from s to e within the cells for the runs 419 and 483 were calculated to be in the range 23-40°, and 37–70°C, respectively. The gradients varied irregularly with pressure, probably because of the changes in thermal conductivity of the various cell components and changes in the heater characteristics with pressure.

Data on the absolute thermal conductivities of $\alpha$ and $\gamma$ iron were lacking when this work was done. However, such data are now about to be published by Cody, Abeles, and Beers.[5] This work indicates a 7% decrease in the thermal conductivity from approximately 0.305 to 0.283 joules/cm°C through the $\alpha \rightarrow \gamma$ transformation.

One may calculate from the DTCA method the relative values of the thermal conductivities of $\alpha$ to $\gamma$ iron at the transformation temperature. When the peak $\Delta T$ is reached on the Speedomax curve, half the length of the iron would be transformed. On assuming ideal heat flow, the quantity $K$ (= thermal conductivity) multiplied by the temperature gradient for each iron half-segment would be equal to each other. If $T_{gr}$ is the temperature gradient (s-e) across the entire iron sample, the gradient across each part, $\alpha$ and $\gamma$, becomes $[(T_{gr}/2)-\Delta T]$ and $[(T_{gr}/2)+\Delta T]$, respectively. Hence,

$$K_\alpha\left(\frac{T_{gr}}{2}-\Delta T\right)=K_\gamma\left(\frac{T_{gr}}{2}+\Delta T\right).$$

Then,

$$\frac{K_\alpha}{K_\gamma}=1+\frac{4\Delta T}{T_{gr}-2\Delta T}.$$

At 9000 atm, the ratio of the thermal conductivities were calculated to be 1.21, 1.10, and 1.13, which corresponds to about a 15% decrease for $\alpha \rightarrow \gamma$. This may indicate the crude nature of the calculation, which may be refined by further work.

[5] G. C. Cody, B. Abeles, and D. S. Beers, to be published in Acta Met. (Received February 8, 1960).

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