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THE DENSITIES OF LIQUID IRON AND NICKEL AND AN ESTIMATE OF THEIR CRITICAL TEMPERATURE

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FOR the last two years experimental density determinations were made at the Institute of a number of metals from the melting point to the normal boiling point (Sn, Pb, In, Mg, Bi, U, Cu, Sb, Ag[1]). We have also shown[2,3,4,5] that the critical temperatures of metals can be estimated by two essentially independent methods; (a) from the law of rectilinear diameter, determined by the experimental densities of the liquid metal and its saturated vapour and (b) from the theorem of corresponding states, using the experimental data on liquid mercury, which cover the whole liquid range from the melting to the critical point. The use of both methods is illustrated by the liquid range temperature diagrams of lead[6] and silver[6].

In the case of all metals investigated to date there is reasonable agreement between the two methods of calculating critical temperatures. We now wish to report *two exceptions*, namely liquid iron[7] and nickel[8] whose densities were also measured from the melting point to approximately the normal boiling point by both the Archimedean and maximum bubble methods with excellent agreement. The liquid densities are straight line functions of temperature and are expressed by the following equations:

$$D^{\mathrm{Fe}}_{(\mathrm{liq.})} = 8{\cdot}618 - 8{\cdot}83 \times 10^{-4}T$$

and

$$D^{\mathrm{Ni}}_{(\mathrm{liq.})} = 9{\cdot}908 - 11{\cdot}589 \times 10^{-4}T$$

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[1] See various contributions by A. D. KIRSHENBAUM, J. A. CAHILL, P. J. MCGONIGAL and A. V. GROSSE in *J. Inorg. Nucl. Chem.*, *J. Phys. Chem.*, *J. Amer. Chem. Soc.* and *Trans. Quarterly of* A.S.M.

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