temperatures from the preceding section we can obtain the critical pressure by extrapolation of the logarithmic vapour-pressure line.

Our estimates⁽¹⁾ of the critical pressures are as follows:

Sodium	490 atm
Lead	850 atm
Tin	2100 atm
Tungsten	> 10000 atm

Liquid range diagrams of typical metals

We have constructed liquid range diagrams of typical metals in analogy to mercury (Fig. 1) based on the estimates of critical temperatures and pressures given in the preceding sections. In addition, experimental data on the densities of liquid metals are available. We have selected such metals for which liquid density measurements have been made over as wide a temperature range as possible. In addition to mercury, these metals are *sodium*, *gallium*, *lead* and *tin*. The available data on these metals, particularly their liquid densities, temperature coefficients and the experimental temperature ranges where they have been determined, are all given in Table 2.

TABLE 2.—EXPERIMENTAL DENSITIES OF LIQUID METALS AT VARIOUS TEMPERATURES

Metal	Reference	Melting point (°K)	Normal boiling point (°K)	D at normal boiling point (estimate) (g/cm³)	Experimental range of D-measurements (°C)	Experimental $-dD/dt$, (g/cm³ °K)	$D_{\text{crit.}}$ (estimate) (g/cm³)	$D_{\text{b.p.}}/D_{\text{crit.}}$
Hg	This paper 23	234·3	629·9	12·7374	−39–480	$28{\cdot}6\,.\,10^{-4}$	4·70	2·72
Na	24	371·0	1163	0·740	97·8–800	$2{\cdot}43\,.\,10^{-4}$	0·18	4·1
Ga	25	303·1	2510	4·55	29·9–1100	$6{\cdot}07\,.\,10^{-4}$	0·95	4·8
Pb	26	600·6	2024	8·85	327–850	$11{\cdot}62\,.\,10^{-4}$	2·1	4·2
Sn	26	505·1	2960	5·55	232–1600	$6{\cdot}05\,.\,10^{-4}$	1·3	4·3

In the case of mercury (see Fig. 1), we see that the actual vapour density *begins to differ* appreciably from the ideal gas density only above a $T_{\text{red.}} = 0{\cdot}8$, i.e., above 80 per cent of the liquid range, in contrast to most inorganic and organic compounds. Knowing the vapour-pressure of the metal we can readily calculate the ideal density of the saturated vapour as a function of temperature and correct the liquid density in line with the rectilinear diameter law, up to about $T_{\text{red.}} = 0{\cdot}8$. Thus, if the vapour density of the metal, $D_{\text{vap.}}$ is expressed as a function of the type:

$$D_{\text{vap.}} = K + aT + bT^2 + cT^3 + \ldots,$$

while the liquid density, $D^{(0)}_{\text{liq.}}$, in the range where $D_{\text{vap.}}$ is 0 or negligible, is given by:

$$D^{(0)}_{\text{liq.}} = M + nt$$

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(23) Data of THIESEN and SCHEEL, *Handbook of Chemistry and Physics*, (40th Ed.), p. 2115. (1959). *International Critical Tables*, Vol. 2 p. 456. (1928).

(24) C. E. JACKSON, *Liquid–Metals Handbook, Sodium*–NaK *Supplement*, p. 26. (Editor-in-Chief) Sponsored by The Atomic Energy Commission and The Bureau of Ships Department of the Navy, Washington, D.C. (1955).

(25) W. H. HOATHER, *Proc. Roy. Soc.* **48,** 699 (1936).

(26) DAY, SOSMAN and HOSTETTER, *Amer. J. Sci.* **37,** 1 (1914).

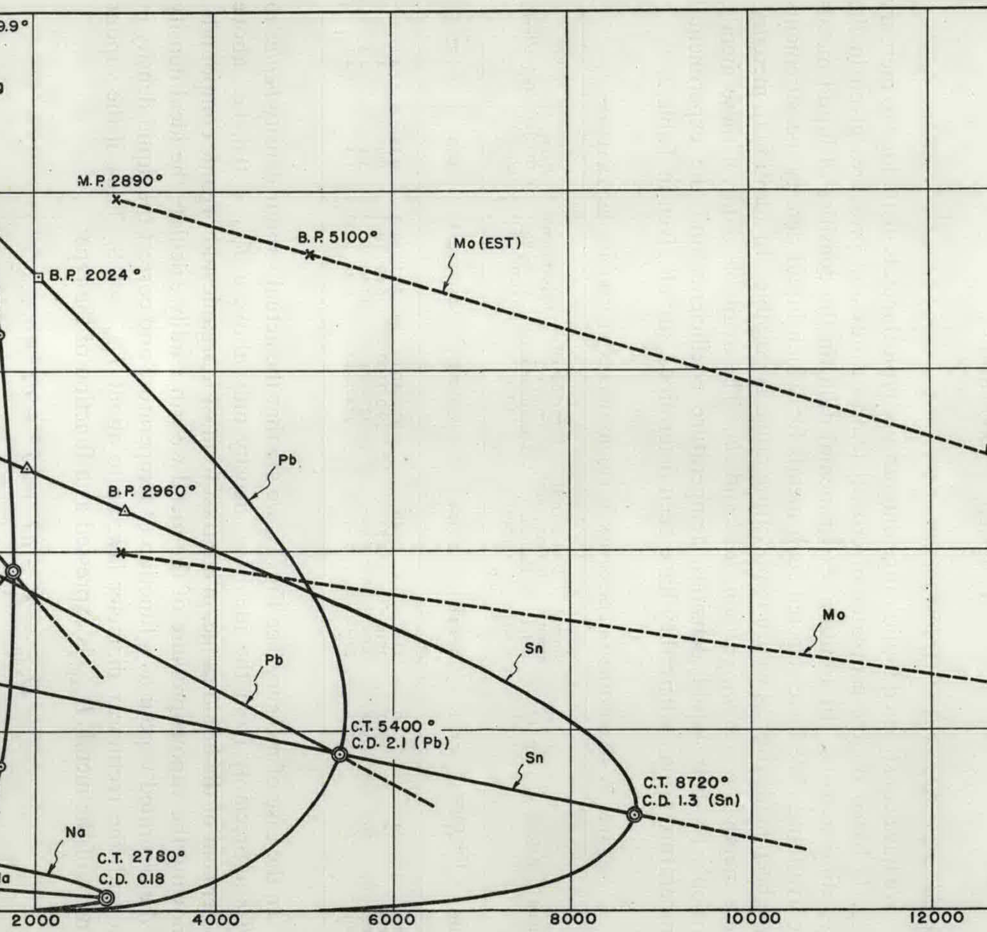
M.P. 2890°
B.P. 5100°
Mo (EST)
B.P. 2024°
Pb
B.P. 2960°
Mo
Sn
Pb
C.T. 5400°
C.D. 2.1 (Pb)
Sn
C.T. 8720°
C.D. 1.3 (Sn)
Na
C.T. 2780°
C.D. 0.18
2000
4000
6000
8000
10000
12000

FIG. 3.