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KRAUT-KENNEDY MELTING RELATIONSHIP AT HIGH PRESSURES EXTENDED TO CERTAIN PHASE TRANSFORMATIONS *

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Kraut and Kennedy [1]) have presented data which suggest that if a solid is compressed isothermally at room temperature and then heated at constant pressure until it melts, the additional energy required to melt the solid at higher pressure depends *linearly* on the amount by which the solid was compressed. A natural extension of this law for melting points would seem to apply to some phase transformations involving volume increases.

In a preliminary examination, experimental data for the alpha to beta transformation in plutonium [2, 3]) and for the alpha to beta transformation in uranium [4, 5]) were plotted with the results as shown in fig. 1. Reasonable linearity is noted in both cases.

Thus one might use the transformation temperature formulas:

$$T_{\mathrm{Pu}\,\alpha\to\beta}\,(^{\circ}\mathrm{C}) = 120\,(1 + 49.3\,\Delta V/V_0), \qquad (1)$$

and

$$T_{\mathrm{U}\,\alpha\to\beta}\,(^{\circ}\mathrm{C}) = 660\,(1 + 7.8\,\Delta V/V_0), \qquad (2)$$

where $\Delta V/V_0$ is the isothermal compression at room temperature.

The limit of (1) is uncertain at present, and (2) holds only to 40 kbar where a triple point [5]) has been found.

More experimental pressure-temperature data are needed on other systems for further verification of the Kraut-Kennedy relationship.

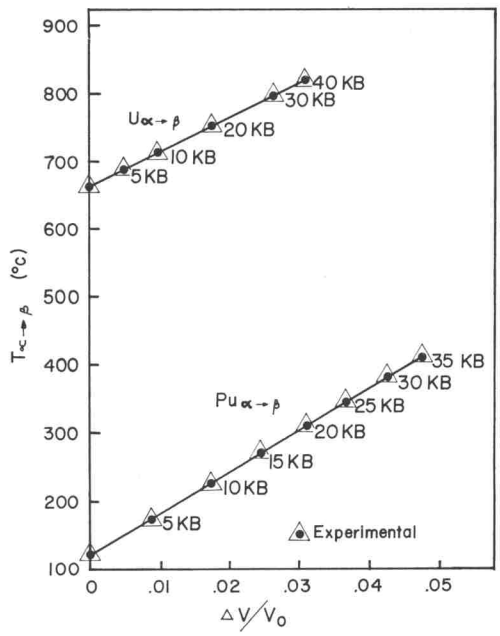

Fig. 1

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