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THE EFFECT OF PRESSURE ON THE SPECTRA OF THE Tl^+ ION IN ALKALI HALIDE LATTICES*

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Abstract—The effect of pressure on the spectra of the Tl^+ ion in several alkali halide lattices has been measured to 130,000 atm (in some cases to 50,000 atm). The results can be summarized as follows:

(1) In the face-centered cubic lattice, the 'A' peak shows a red shift with increasing pressure. The magnitude of the shift is independent of the alkali halide involved.

(2) In the simple cubic lattice, the 'A' peak shifts blue at low pressures (up to 15,000 atm) and red at high pressures (above about 25,000 atm).

(3) At the phase transition in the potassium halides, KCl : Tl and KBr : Tl show a discontinuous blue shift; KI : Tl shows a red shift.

(4) The 'B' peak appears in CsI : Tl and also appears discontinuously at the transition to the simple cubic lattice in KI : Tl. It shifts blue with pressure.

The results are, in most ways, consistent with available theory.

THE absorption spectra of Tl^+ ions in alkali halide lattices have been measured as a function of pressure to about 130,000 atm (in some cases to 50,000 atm). The systems studied and the pressure range for each are shown in Table 1. The crystals used

Table 1. *Systems studied and pressure range*

System	Maximum pressure (atm)
KCl : Tl	50,000
KBr : Tl	130,000
KI : Tl	129,500
NaI : Tl	50,000
CsBr : Tl	50,000
CsI : Tl	118,000

were obtained from Harshaw Chemical Company and contained 0·1–0·2 per cent Tl^+. The pressure apparatus has been described elsewhere.[1] Each pressure run was repeated with at least two separate loadings, and several were run four or five times.

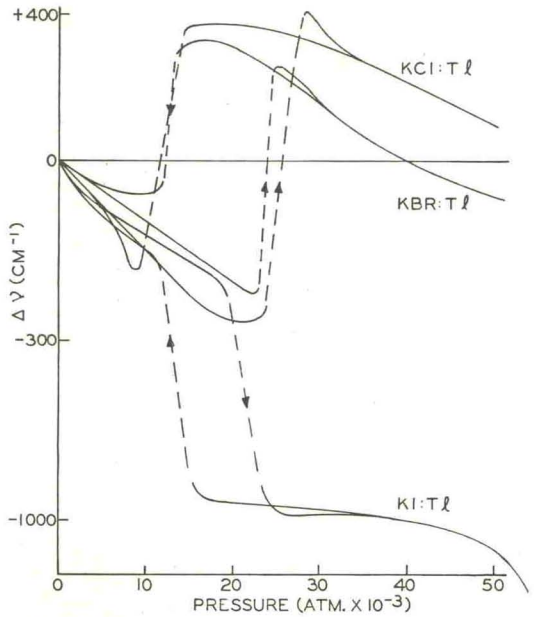

FIG. 1. 'A' peak frequency shift versus pressure to 50,000 atm—3 KX : Tl crystals.

The maximum scatter from the smoothed curves was ± 100 cm^{-1}, and the average scatter was not over one-half this value.

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