

TABLE I. Preparation of color centers in alkali halides.

Study of	Starting material	Source	Preparation	Maximum pressure (atm)
<i>F</i> center in NaCl	Single crystal NaCl	Harshaw Chemical Company	x irradiation	166 000
<i>F</i> center in NaBr	Single crystal NaBr	Single Crystal Corporation	x irradiation	150 500
<i>F</i> center in KCl	Single crystal KCl	Harshaw Chemical Company	x irradiation	137 500
<i>F</i> center in KBr	Single crystal KBr	Harshaw Chemical Company	x irradiation	152 000
<i>F</i> center in KI	Single crystal KI	Harshaw Chemical Company	x irradiation	104 000
<i>F</i> center in LiCl	Single crystal LiCl	Semi-Elements Inc.	x irradiation	106 000
<i>M</i> center in LiCl	Single crystal LiCl	Semi-Elements, Inc.	x irradiation; bleaching	50 000

Bridgman.¹⁰ Figures 10 to 14 are plots of $\log(\nu/\nu_0)_m$ vs $\log(\rho/\rho_0)$. If the compressibility in the neighborhood of the *F* center were the same as the bulk compressibility one should obtain a slope of $\frac{2}{3}$ (or 0.613 assuming the Ivey relation). Actually the slope is at least twice this at low pressures, but decreases rapidly with pressure in the low pressure region. At higher pressures the slope is constant at a value somewhat above $\frac{2}{3}$. The situation in KBr and KI is complicated by the presence of the *K'* and other bands. The results are generally quite consistent with the vacancy mechanism since the absence of the nuclear repulsive force should lead to a greater local compressibility than is exhibited by the bulk crystal.

The data also permit the evaluation of Jacob's function $f_T = \partial \ln R / \partial \ln A$ where *R* is the lattice constant in the neighborhood of the *F* center, if one accepts

the validity of the Ivey relation as applied to the *F* center. By using this assumption, $\partial \ln R / \partial P$ can be calculated from the experimental data (Figs. 10-14) and converted to $\partial \ln R / \partial A$ using Bridgman's data. The values of f_T shown are based on the data in the region 0-20 000 atm. Table II compares the experimental values with Jacob's calculations.

The agreement is reasonably good considering the simplicity of the model.

The effect of pressure on the density of LiCl has not been measured directly. It can be estimated from the effect of pressure on the *F* center ν_m and the atmospheric lattice constant, assuming ν_m has a density dependence similar to the other chlorides. Results are listed in Table III.

B. Growth of the *K'* Band

Maisch and Drickamer³ found that in KBr, KI, CsCl, CsBr a new band appeared on the high energy

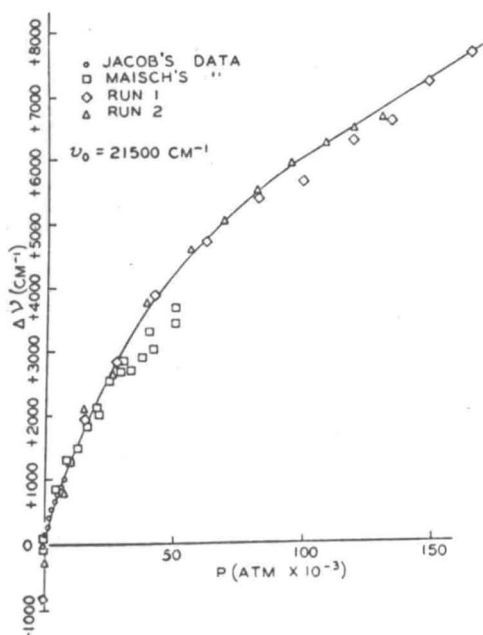


FIG. 1. Effect of pressure on the spectra of the *F* band in NaCl.

¹⁰ P. W. Bridgman, Proc. Am. Acad. Arts Sci. 76, 1 (1945).

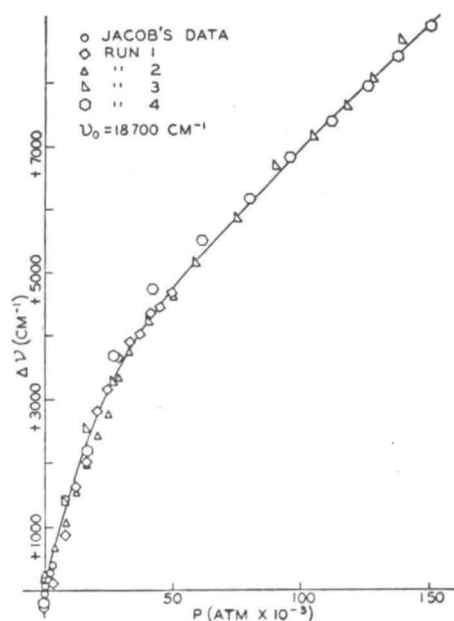


FIG. 2. Effect of pressure on the spectra of the *F* band in NaBr.