

FIG. 13.  $\text{Log}(v/v_0)_m$  vs  $\text{log } \rho/\rho_0$ —KBr; — — —,  $v/v_0 \sim (\rho/\rho_0)^{2/3}$ .

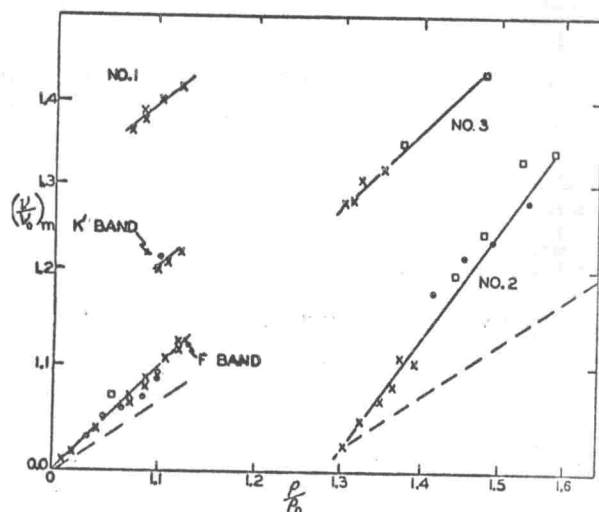


FIG. 14.  $\text{Log}(v/v_0)_m$  vs  $\text{log } \rho/\rho_0$ —KI; — — —,  $v/v_0 \sim (\rho/\rho_0)^{2/3}$ .

20 000 atm pressure. A discontinuous shift of the peak frequency to higher energies is observed at the transition (see Figs. 3–5 and 12–14). Interpretation of these data are hampered by the growth of the  $K'$  band in KBr and KI, and by further structure in KI which also was observed by Maisch and Drickamer.<sup>3</sup>

#### D. Effect of Pressure on the $M$ Center

When crystals containing  $F$  centers are irradiated with light in the  $F$ -band region at room temperature, the  $F$  band bleaches and several new bands appear on the low energy side of the  $F$  band.<sup>13</sup> The strongest of these is the  $M$  center.

The nature of this center is uncertain. Seitz<sup>14</sup> proposed that it consists of an  $F$  center plus a vacancy pair. More recent experiments<sup>15</sup> indicate that it possesses

<sup>13</sup> F. Seitz, *Revs. Modern Phys.* **26**, 7 (1954).

<sup>14</sup> F. Seitz, *Revs. Modern Phys.* **18**, 384 (1946).

<sup>15</sup> A. W. Overhauser and H. Ruchardt, *Phys. Rev.* **112**, 722 (1958).

TABLE II. Comparison of experimental and calculated values of  $f_T$ .

Compound	$f_T$ exptl.	$f_T$ calc
NaCl	2.1	2.9
NaBr	2.3	2.4
KCl	2.3	2.1
KBr	1.8	2.1
KI	1.7	2.3

TABLE III. Density of LiCl vs pressure.

$P$ (kg/cm <sup>2</sup> )	$\Delta V/V_0$
0	0.000
50 000	0.121
100 000	0.183

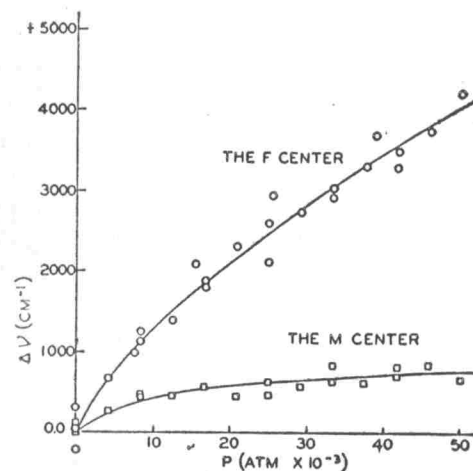


FIG. 15. Effect of pressure on the spectra of the  $F$  and  $M$  centers in LiCl.

ses a higher degree of symmetry than Seitz' model would indicate. Knox<sup>16</sup> proposed a modification of Seitz' model which possesses this higher symmetry, wherein a positive ion and an electron occupy a vacancy aggregation consisting of two negative ion vacancies and two positive ion vacancies.

The effect of pressure to 50 000 atm has been measured on the  $M$  center in LiCl. The results are compared with data for the  $F$  center in LiCl in Fig. 15. The shift with pressure for the  $M$  center is less than one-fifth that of the  $F$  center.

The low compressibility seems inconsistent with the Seitz<sup>14</sup> model. On the other hand, the Knox modification to this model<sup>16</sup> does appear to be somewhat more consistent with the data since the atom in the middle of the center might tend to oppose the compression to a greater degree than one fixed in the corner.

#### ACKNOWLEDGMENTS

R. A. Eppler would like to thank the Shell Oil Company and the Dow Chemical Company for fellowship support.

<sup>16</sup> R. S. Knox, *Phys. Rev. Letters* **2**, 87 (1959).