

Fig. 2.  $PV$  diagram for the rubidium halides:  $\square$ —melting point data of Clark (1959),  $\blacksquare$ —melting point data of Pistorius (1965, 1966),  $\circ$ — $Fm\bar{3}m \rightleftharpoons Pm\bar{3}m$  transition, this work.

served in KF at pressures up to 45 kb and at temperatures up to 800°C.

As in the case of most solid-solid phase transitions[21] these salts also show a hysteresis effect. The width of the hysteresis loop is, in general, less than one kilobar at temperatures greater than 200°C, and becomes larger and less reproducible at temperatures below 200°C. We have assumed that the equilibrium

transition pressure is the average of the transition pressures obtained on compression and decompression. In all cases, the equilibrium transition pressure appears, within the experimental accuracy of these data, to be a linear function of the temperature over the interval 200–700°C. These  $P_{tr}$  data were treated by method of least squares to obtain the transition pressure as a function of temperature in

the form

$$P_{tr}(kb) = a + bt \quad (1)$$

where  $P_{tr}$  is the  $Fm3m \rightleftharpoons Pm3m$  transition pressure at a given temperature  $t$  ( $^{\circ}C$ ). Data for the constants  $a$  and  $b$  are given in Table 1. The constant  $b$  is of particular significance since  $b = dP/dT$ . The values for the transition pressure at  $25^{\circ}C$  reported in Table 2 were obtained from extrapolation of the high temperature data, by the use of equation (1).

The transition volumes\* ( $\Delta V_{tr}$ ,  $Fm3m \rightarrow Pm3m$ ) for KCl, KBr and KI at temperatures between  $200$ – $800^{\circ}C$  are shown in Fig. 3. Similarly,  $\Delta V_{tr}$  for RbF, RbCl, RbBr and RbI are shown in Fig. 4. The volume change ( $\Delta V_{tr}$ ) appears to be a linear function of temperature at temperatures above  $200^{\circ}C$ . These data were also treated by method of least squares to obtain the transition volume as a function of temperature in the form

$$\Delta V_{tr}(\text{cm}^3/\text{mole}) = c + dt \quad (2)$$

where  $\Delta V_{tr}$  is the transition volume at a given temperature  $t$  ( $^{\circ}C$ ). Values for the constants  $c$  and  $d$  are given in Table 1. The transition volumes at  $25^{\circ}C$  reported in Table 3 were obtained from an extrapolation of the high tem-

\*The transition volume vs. temperature data shown in Figs. 3 and 4 are not at constant pressure (except in the special case of KCl where  $dT/dP \approx 0$ ) but are at pressures corresponding to the temperatures along the  $Fm3m \rightleftharpoons Pm3m$  phase boundary.

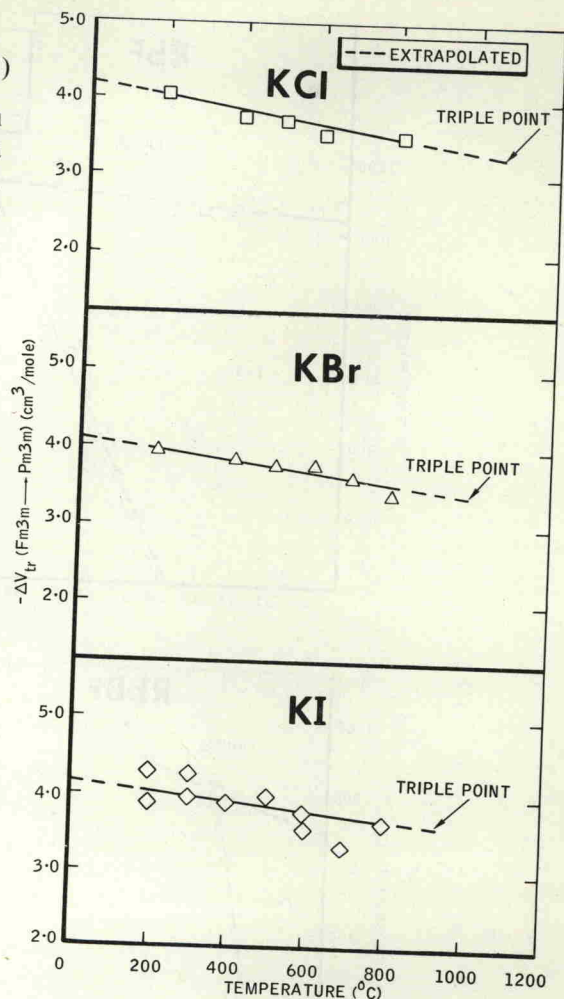


Fig. 3.  $\Delta V(Fm3m \rightarrow Pm3m)$  vs.  $T$  for KCl, KBr and KI.

Table 1. Constants for the temperature dependence of the  $Fm3m \rightleftharpoons Pm3m$  transition pressure [ $P_{tr}(kb) = a + bt$ ] and the transition volume  $Fm3m \rightarrow Pm3m$  [ $\Delta V_{tr}(\text{cm}^3/\text{mole}) = c + dt$ ] in the potassium and rubidium halides

Salt	$a$ (kb)	$b \times 10^3$ (kb/deg)	$c$ ( $\text{cm}^3/\text{mole}$ )	$d \times 10^3$ ( $\text{cm}^3/\text{mole}/\text{deg}$ )
KCl	$19.55 \pm 0.13$	$-0.015 \pm 0.256$	$-4.13 \pm 0.01$	$0.830 \pm 0.176$
KBr	$18.02 \pm 0.28$	$-1.186 \pm 0.485$	$-4.19 \pm 0.11$	$0.869 \pm 0.201$
KI	$18.35 \pm 0.20$	$-3.223 \pm 0.387$	$-4.44 \pm 0.15$	$1.211 \pm 0.295$
RbF	$34.37 \pm 0.38$	$+3.723 \pm 0.710$	$-1.84 \pm 0.29$	$0.445 \pm 0.513$
RbCl	$5.61 \pm 0.14$	$+2.800 \pm 0.296$	$-6.96 \pm 0.11$	$2.880 \pm 0.269$
RbBr	$4.88 \pm 0.06$	$+1.371 \pm 0.124$	$-7.47 \pm 0.18$	$1.597 \pm 0.366$
RbI	$3.64 \pm 0.05$	$+1.400 \pm 0.115$	$-8.15 \pm 0.10$	$1.920 \pm 0.236$