

Fig. 7. Shift of absorption edges of zinc sulfide selenide, and telluride with compression ($\alpha = 65 \text{ cm}^{-1}$).

(b) Wurtzite type

The compounds ZnO and CdS are closely related to the other compounds included in this work, not only in structure, but also in many important physical and electronic properties. A transformation under pressure to the zinc blende structure from their original wurtzite form was expected, and did in fact occur in both cases.

(i) *Zinc oxide.* Single crystals of zinc oxide were obtained from Dr. A. R. HUTSON, of the Bell Telephone Laboratories. These crystals were in the form of needles about 0.25 in. long and some 0.004–0.010 in. in dia., making them most suitable for the 250,000-atm bomb. The shift of the absorption edge observed with pressure is shown in Fig. 8. A blue shift with pressure first occurs, at an increasing rate with higher pressure. The slope changes from $0.6(10^{-6}) \text{ eV/atm}$ at 1 atm to $1.9(10^{-6}) \text{ eV/atm}$ at 100,000 atm. At a pressure of about 100,000 atm, the light transmitted by the sample began to cut off, and reached

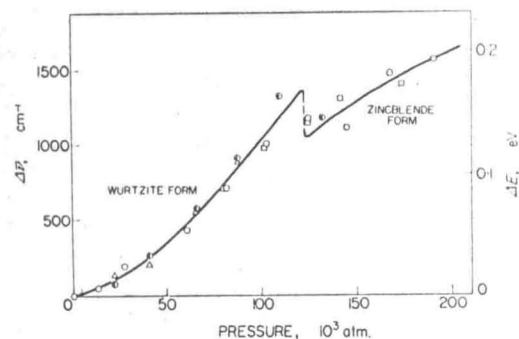


Fig. 8. Shift of zinc oxide absorption edge with pressure ($\alpha = 60 \text{ cm}^{-1}$ measured from $\nu_0 = 25,300 \text{ cm}^{-1}$).

a minimum at pressures ranging from 130,000 to 150,000 atm in different runs. The sample then cleared up somewhat, and the shift shown by the upper curve in Fig. 9 was measured. The red shift at the transition amounts to about -0.10 eV , and the initial slope of the upper curve is $1.9(10^{-6}) \text{ eV/atm}$ at 130,000 atm.

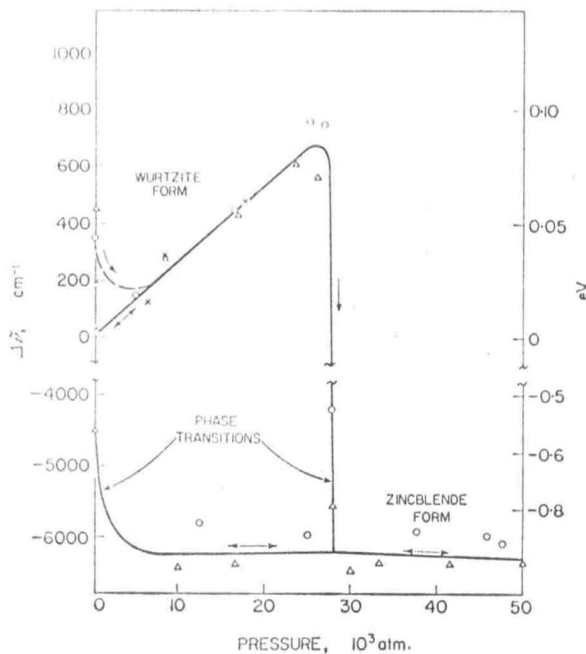


Fig. 9. Shift of cadmium sulfide absorption edge with pressure ($\nu_0 = 20,110 \text{ cm}^{-1}$, $\alpha = 64 \text{ cm}^{-1}$).

(ii) *Cadmium sulfide.* This material was obtained in the form of large crystals and polycrystalline masses in the wurtzite structure from Dr. E. C. STEWART, of the Harshaw Chemical Company. The shift of the absorption edge with pressure is shown in Fig. 9. The initial red shift up to 5000 atm is thought to be due to a partial phase change to the zinc blende form induced by shear during the fusing of the salt pellet around the sample. The shift was therefore measured from an extrapolated zero value of 2.50 eV , which is not the true energy gap at atmospheric pressure. Once the pressure exceeded 5000 atm, a reduction in pressure did give a shift down to the extrapolated zero, and the shift was reversible from 0 to 25,000 atm. The initial slope of the shift is $3.3(10^{-6})$