calibration is not affected by pressure.

One would expect some pressure redistribution in the salt at high temperature. The pressure at high temperature is obtained as follows. The spectrum of the substance to be studied is run as a function of pressure at room temperature. A spectrum is then taken at elevated temperature and pressure, the cell quenched with an air blast, and a room temperature spectrum run. It is presumed that the high-temperature pressure distribution is quenched in, and the pressure is calculated from the room temperature data. The operation is repeated at successively higher temperatures. A new sample is loaded for each "isobar." There is a considerable pressure correction for temperatures at lower pressures, but above 100,000 to 120,000 atm this becomes negligible. In view of the rapid rise of melting point with pressure for NaCl(6) this result is not surprising.

Spectra have been obtained at 500°C and 180,000 atm. The operation is limited by the fact that the sample cannot be placed inside the heater, and by non-negligible emission from the heaters.

4. Results. It would not be possible to discuss any large fraction of the systems which have been studied optically or which are now under study. Nor could the theory behind any of these be presented in any detail in this paper. A few examples of typical optical studies are presented below under three general categories. Many of these data are discussed in detail elsewhere.

(a) Absorption Edges. One of the most fundamental properties of an insulator is the energy gap between the valence band (the highest band containing electrons) and the conduction band (the lowest empty band of allowed energies). When this gap is large compared with kT one has a normal nonconductor. When this gap is a few kT one has an intrinsic semiconductor. When the bands overlap, the material is a metal. An electron can be excited from the valence to the conduction band by electromagnetic radiation of the appropriate energy. Since this is an allowed transition the crystal will absorb this energy strongly. This steep rise in absorption is known as the "absorption edge." Its shift with pressure tells a considerable amount about the effect of interatomic distance on band structure.

In Fig. 4 is shown the shift of the absorption edge of several elements with density(7) (using Bridgman's compressibility data). It can be seen that they all follow the same pattern, and that by the time the solid is compressed 50 per cent all will be metallic. One can estimate that this will occur, e.g., for selenium at 135,000 atm, for iodine at 250,000 atm, and for sulfur by about 400,000 atm.

Figure 5 shows the effect of pressure on the edge of several substances having the zinc blende lattice.(8, 9) The band structure of these substances is rather complex and cannot be discussed in detail here. Ge, GaAs, and ZnSe are isoelectronic, but Ge is entirely a valence crystal, while ZnSe should have a significant ionic component. All show an increase in gap with pressure at low pressures. The direction of shift ultimately reverses. The magnitude of the initial shift is quite different for Ge and GaAs, and there is evidence that the transition involved in the two cases is quite different.

Ge is directly below Si in the atomic table. GaP should be intermediate in electronic structure, and the shift of the edge with pressure is indeed intermediate. These and related results are very important for our understanding of the behavior of the large class of semiconductors and phosphors having the zinc blende structure.