eV/atm, and remains fairly constant up to 27,500 atm, at which point a large red shift of about 0·8 eV occurs, presumably due to the transition to the zinc blende structure. This transition resulted in a loss of most of the light available, and in only two runs could the edge be measured beyond the transition. There was no measurable tendency for the new absorption edge to shift with pressure, either increasing or decreasing, until the pressure was reduced below 10,000 atm. The sample then cleared up gradually and the absorption edge slope of the shift with pressure. The following discussion is intended to emphasize the effect of asymmetry in the crystal potential for compounds in isoelectronic sequences, for which the total number of electrons are equal, and for which the bond lengths are almost equal.

The interpretations are based on the (perhaps rash) assumption that the red shifts are due to a transition to a minimum in the (100) direction in the conduction band, as has been reasonably well established for germanium.[9]

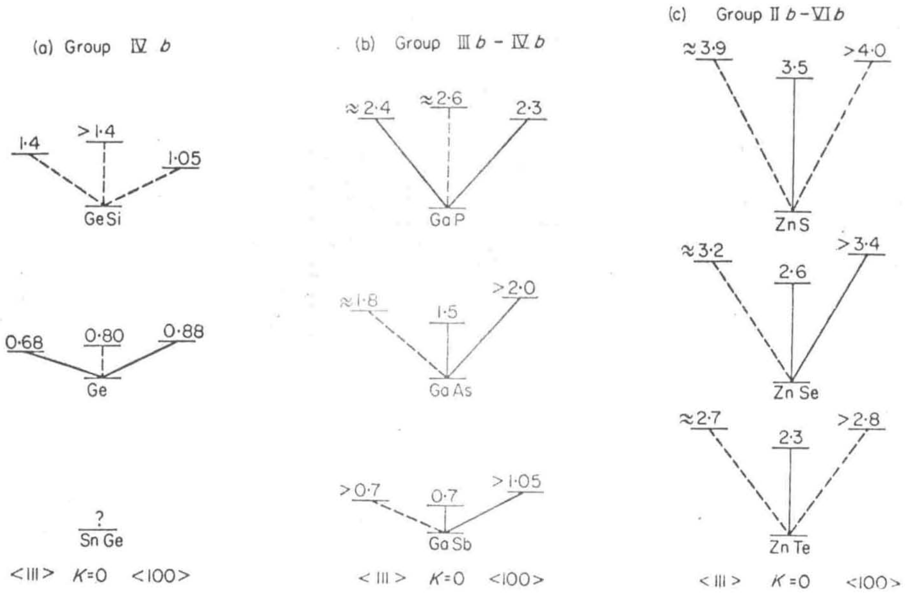

Fig. 10. Estimated conduction-band levels of semiconductors (above valence-band maximum 300°K).

shifted blue again, reaching a final value of 0·56 eV less than the original zero point. No further change was observed after the sample had remained in the bomb for several days at atmospheric pressure.

3. COMPOUNDS IN VARIOUS SEQUENCES

A speculative outline of the results of the previous sections is presented in Fig. 10, which illustrates the energy gaps that are known or can be estimated for the direct and indirect transitions at atmospheric pressure. Table 1 summarizes the effect of pressure in these transitions, with the pressure range in which each occurs and the

(a) SiGe, GaP *and* ZnS

The bond length in this sequence varies from 2·36 to 2·39 Å, and the total number of electrons is 23 per atom. The system silicon–germanium has been investigated by Johnson and Christian[7] who found a sharp break in the plot of energy gap versus composition at about 15 mole per cent silicon, indicating a difference in the band structure of these two elements. Pressure measurements by Paul and Warschauer[8] in the range 1–8000 atm on germanium–silicon alloys were consistent with Herman's[9] picture of the band structure, and the behavior of the band minima of these two elements under pressure, i.e.