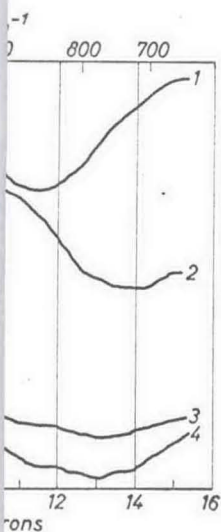
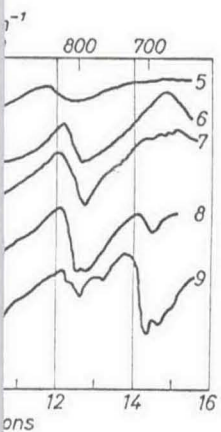


As₂SbO₄ rutile form are shown in made on the basis of these and

any coordination of the cation it being frequency. Moreover, the



2-15.5 micron region. 1. GeO₂ coesite. (Sample preparation—KBr in 0.3 g KBr.)



2-15.5 micron region. 5. SiO₂ glass; 6. SiO₂ quartz; 7. SiO₂ coesite.

ratio of the squares of the wavelengths, in the case of Ge⁴⁺ changing from four to six coordination, is 1.48, or nearly 6/4. Whether this is mere numerical coincidence or whether it reflects a simple mathematical connection between the effect of coordination on the interionic distance and hence on the force constant, cannot be adequately checked until more examples are at hand.

2. The effect of even major changes in secondary coordination (BUERGER's terminology) does not affect the main cation-anion stretching absorption band. Thus the patterns of cristobalite, tridymite, quartz and coesite are very similar although there is a 25 per cent volume spread. The coordination of Si⁴⁺ is therefore four in coesite although there may be a greater variety of Si—O distances in coesite than in quartz as indicated by the structure in the main Si—O band. The BeF₂ polymorphs bear out this hypothesis very well (Fig. 1). Hence the increase in density in going from quartz to coesite is realized only by a new packing of tetrahedra and not by increased coordination.

3. The effect of mass on absorption frequency has been known for decades in molecular spectroscopy. An inspection of the infra-red absorption spectra published by MILLER and WILKINS³ or by HUNT,

³ F. A. MILLER and C. H. WILKINS, Infra-red spectra and characteristic frequencies of inorganic ions. Anal. Chem. 24 (1952) 1253-1299.

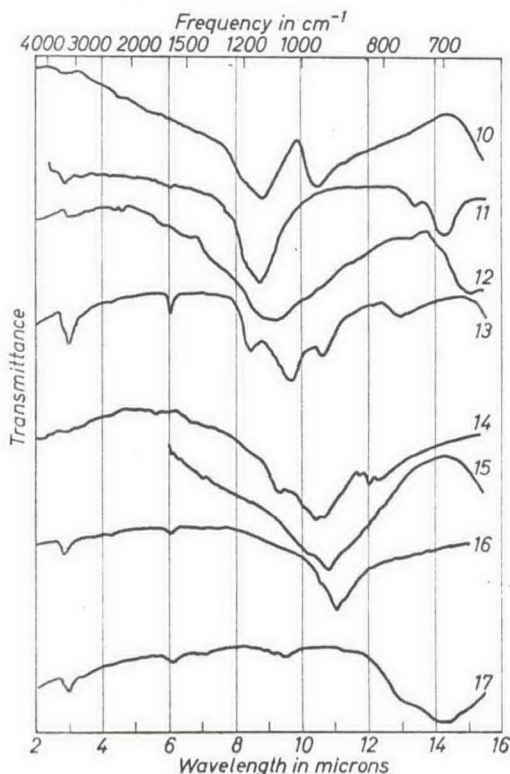


Fig. 3. Infra-red absorption spectra in the 2-15.5 micron region. 10. BPO₄ quartz; 11. AlPO₄ quartz; 12. GaPO₄ quartz; 13. FePO₄ quartz; 14. BaAsO₄ quartz; 15. AlAsO₄ quartz; 16. GaAsO₄ quartz; 17. GaSbO₄ rutile.