

ABSTRACT

This dissertation deals with the occurrence of polymorphism in the isometric crystals of methylammonium alum at room temperature. By way of introduction, and for the purpose of providing a proper background, the structures of the alums in general are discussed, and special reference is made to the temperature-dependent phases of methylammonium alum.

The preliminary examination of the crystals of methylammonium alum in the α_2 -alum phase, including the preparation of the sample and the determination of the lattice parameter and space group symmetry, is described. Some of the temperature-dependent physical properties of methylammonium alum are then discussed and this is followed by a detailed discussion of disorder in cubic alum structures at room temperature.

The determination and preliminary refinement of the crystal structure of the new α_2 -alum phase of methylammonium alum is then described, and includes the determination of a scattering factor curve for the $[\text{NH}_3\text{CH}_3]^+$ ion.

The application of intensity statistics to the derivation of a scattering curve for the $[\text{NH}_3\text{CH}_3]^+$ ion is then discussed in detail and finally, the main experimental

findings are reviewed and appraised, along with the suggestions proffered for their explanation. Indications and proposals for future research arising out of these investigations are mentioned briefly.