

22.2-1 INVESTIGATION OF THE STRUCTURE OF CONCENTRATED AQUEOUS SOLUTIONS OF INDIUM NITRATE. M. Isabel Cabaco and M. Alves Marques, Centro de Física da Matéria Condensada (INIC Instituto de Física e Matemática, Av. Prof. Gama Pinto, 2 1699 Lisboa Codex (Portugal))

Concentrated aqueous solutions of indium nitrate were investigated by X-ray diffraction. The obtained results are interpreted by assuming the existence of (local) cubic structures of molecular aggregates coordinated by cations. The existence of different types of aggregates (without and with coordinated anions) is discussed and the contributions for the diffracted X-ray intensity from the different shells of complexed cations is examined too.

22.2-2 INVESTIGATION OF THE STRUCTURE OF CONCENTRATED AQUEOUS SOLUTIONS OF ALUMINIUM HALOGENIDES. J.M.S. de Almeida Casimiro, M. Isabel de Barros Marques and M. Alves Marques, Centro de Física da Matéria Condensada (INIC Instituto de Física e Matemática, Av. Prof. Gama Pinto, 2 1699 Lisboa Codex (Portugal))

Concentrated aqueous solutions of aluminium chloride and bromide were investigated by X-ray diffraction. The experimental intensity is interpreted by assuming an uniform (f.c.c.) distribution of molecular aggregates constituted by a central  $Al^{3+}$  surrounded by six hydration water molecules. The perturbation of this hydration shell by the neighbour anions,  $Cl^-$  or  $Br^-$ , is analysed, and the assumed hypothesis of a face centered cubic symmetry of the (local) lattice is discussed. Previous investigations (1) are reexamined.

(1) M. ALVES MARQUES and M. I. de BARROS MARQUES, Proc. K. Ned. Akad. Wetensch. Ser. B77 (1974), p. 286.

22.2-3 INNER- AND OUTER SPHERE COMPLEX FORMATION IN SOLUTION STUDIED BY DIFFRACTION METHODS. By G. Johansson M. Sandström, H. Wakita and M. Welander, Dept. of Inorganic Chemistry, Royal Institute of Technology, S-100 44 STOCKHOLM, Sweden

Radial distribution curves obtained from X-ray diffraction measurements on liquid solutions contain contributions from all intramolecular interactions and can, in principle, be used to study the structures of complexes in the solutions. The picture is complicated by the simultaneous occurrence of large contributions from intermolecular interactions and, often, by the simultaneous presence of many different complexes in the solution. These obstacles can sometimes be overcome by combining diffraction measurements with spectroscopic methods (Raman and IR) to determine concentrations and symmetries of the different complexes, by isomorphous substitution to eliminate intermolecular interactions and by selecting systems with heavy atoms which dominate the scattering. Even non-isomorphous substitution can lead to significant information on the structures of the complexes. Differences between distribution curves for perchlorate solutions, in which inner-sphere complexes are not usually formed, and solutions containing other oxoanions can be used to determine the structures of the complexes formed by these ions. Examples of structure determinations in solutions and the amount of information obtainable will be discussed for some different systems: lanthanide ions with sulfate, selenate and perchlorate, silver and thorium with nitrate and perchlorate, zinc with bromide and iodide in aqueous solution, and mercury(II) halide complexes in various solvents.

22.3-1 STRUCTURE AND CRYSTALLIZATION OF AMORPHOUS ALLOYS BASED ON FERRUM. By G.S. Zhdanov, E.E. Kamzeeva, A.A. Katsnelson, N.A. Khatanova, Faculty of Physics, Moscow State University, Moscow, USSR.

The structure of amorphous alloys  $Fe_{40}Ni_{38}Mo_4B_{18}$ ,  $Fe_{70}Cr_{10}P_{13}C_7$ ,  $Fe_{80}P_{13}C_7$ , prepared by melt spinning, was studied by means of X-ray technique and electron microscopy. The photoregistration of X-rays, scattered by the amorphous specimens, made it possible to obtain apparent inner halo besides halo, common for the amorphous alloys. The inner halo is analogous to the prepeak, obtained by neutron diffraction methods in  $Cu_{66}Ti_{34}$  alloy (Sakata, Cowlam, Davies, J. Phys. F: Metal Phys. (1981) 11, L157). The comparison of the intensities of the inner and the first halo showed the correlation between these intensities and the composition of alloys. The fact, that the occurrence of the inner halo is due to the formation of small regions with average atoms' coordination, different from the coordination observed in massive, was obtained by means of dark field electron microscopy and selected area diffraction. The processes of  $Fe_{40}Ni_{38}Mo_4B_{18}$  alloy crystallization from the liquid and amorphous phases were compared. The same metastable phases -  $\gamma$  ( $Fe, Ni, Mo$ ),  $(Fe, Ni, Mo)_3B$ ,  $(Fe, Ni, Mo)_{23}B_6$  - were shown to occur in these two cases, but the amounts of these phases are different.