

APPLICATION OF X-RAY DIFFRACTION IN POLYMERIC MATERILAS

1. THEORETICAL BACKGROUND

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Since X-ray was discovered by Roentgen in 1895, X-ray diffraction has been utilized as one of the most powerful tool for the structural determination of wide range of materials including synthetic polymers. Polymeric materials are in general semi-crystalline and are totally amorphous in some cases. The theoretical basis of X-ray diffraction when used for the study of polymers is, however, essentially the same as that used in the ideal crystal structure analysis.

The most popular applications in polymers are to determine the crystal structure of polymers and the spacial distribution of crystal planes or chains in fibers or films. Structural non-uniformity and its relaxation phenomenon of amorphous polymer can be studied in terms of density fluctuation and radial distribution. Morphology of polymer blend and lamella structure of the semi-crystalline polymer can also be determined by the small angle X-ray scattering.

In this presentation, theoretical background and experimental techniques in X-ray diffraction of polymeric materials will be discussed.