

REFERENCE MATERIALS FOR THE STUDY OF POLYMORPHISM AND CRYSTALLINITY IN CELLULOSICS

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Cellulose is the world's most abundant natural material. The commercial applications of celluloses are enormous as an energy source, source for clothing and fabrics, an additive in pharmaceuticals, building insulation, and a prime ingredient in adhesives and thickening agents. While the formulae of cellulosics are often simple, the chemistry and structure of these materials display an amazing diversity in crystallinity, polymorphic form and morphology. Cellulose has been studied by scientists for centuries, however, unraveling the secrets of its structural chemistry continues today in many laboratories around the globe. In the past decade some of the world's most sophisticated analytical tools have been used to elucidate the structural details of cellulosics. These tools include synchrotron x-ray studies both diffraction and scattering, advanced microscopy and imaging techniques, solid state nmr, neutron diffraction, and neutron scattering. From these studies more details are emerging of the atomic structure of these materials. In the field of x-ray diffraction, the combined analytical data are providing insight into the often complex diffraction characteristics, both coherent and incoherent scattering, seen in these materials.

The International Centre for Diffraction Data has used a team of member scientists to develop new reference materials that can be used for the study of polymorphism and crystallinity in cellulose. This publication details the initial results of a multiyear effort to build a new set of cellulose references and specifically describes work performed on 8 new reference materials published in the last 5 years and some new reference materials being currently worked on.