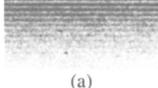
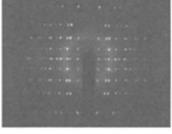
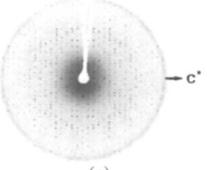
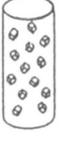
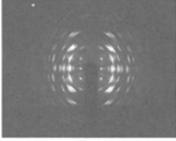
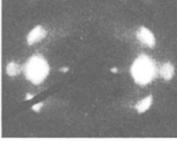
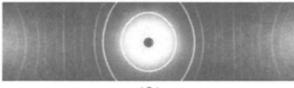
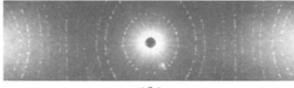
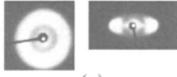


Part I

Fundamental

X-ray diffraction patterns of substances in various states are tabulated overleaf. Before going on to the analysis of these patterns, this part deals first with X-rays (Chapter 1) and X-ray diffraction by matter (Chapter 2), and then with how these patterns (except for the patterns obtained by the dynamical scattering of X-rays, which are outside the scope of this volume) are obtained by means of X-ray diffraction (Chapters 2 to 5). The essence of small-angle scattering is described in Chapter 6. Chapter 7 briefly summarizes the structure of high polymer substances.

State of specimens (diffracting matter) and X-ray diffraction patterns

Crystalline (including liquid crystal)	<p>Single crystal^{†1}</p> <p>Inorganic, Organic, Organo-metallic molecules, Metal and Macro-molecules</p>	<p>LARGE single crystal (perfect or ideal crystal)</p> <p>DYNAMICAL Scattering</p> <p><i>Pendellösung Fringe</i> and other patterns</p>  <p>(a)</p>	<p>Scattering intensity</p> <p>$I \propto F$ F : Structure factor</p> <p>Perfection of crystal</p>
	<p>SMALL single crystal (< 10 μm) (mosaic crystal)</p> 	<p>KINEMATICAL Scattering</p> <p><i>Oscillation photograph</i> <i>Precession photograph</i></p>  <p>(b₁) (Cylindrical film)</p>  <p>(c) (Flat film)</p>	<p>Scattering intensity</p> <p>$I \propto F ^2$ F : Structure factor</p> <p>Crystal structure Molecular structure</p> <p>Distortion of atomic arrangement Thermal motion, Statistical disorder, etc.</p>
Poly-crystalline	<p>Oriented</p> <p>Inorganic, Organic, Organo-metallic molecules, Metal, Macro-molecules, Liquid crystals, and Gels</p> 	<p><i>Fiber diagram.</i></p>  <p>(b₂) (Cylindrical film)</p>  <p>(d) (Flat film)</p>  <p>(e) (Cyl. film)</p>	<p>Crystal structure Molecular structure</p> <p>Preferred orientation of crystallites (type and degree)</p> <p>Size and shape and/or Imperfections of crystallites</p> <p>Higher order structure (XSAS)^{†2}</p>  <p>(j) (k₁) (k₂)</p>
	<p>Un-oriented</p> 	<p><i>Debye-Scherrer rings</i></p>  <p>(f₁) Crystallite size : moderate</p>  <p>(f₂) Crystallite size : very large</p> <p>(Cylindrical film)</p>	<p>Identification of crystals Crystal structure <i>Rietveld method. etc.</i> Size and shape and/or Imperfections of crystallites Crystallinity</p> <p>Higher order structure (XSAS)^{†2}</p>  <p>(l)</p>
Non - crystalline	<p>Solid</p> <p><i>Amorphous, and Glassy</i></p>	<p>Oriented</p> <p><i>Amorphous halo</i></p>  <p>(h) Un-oriented (Flat film)</p>  <p>(g) Oriented (Flat film)</p>	<p>Structural information Short range order <i>(Radial distribution function)</i></p> <p>Higher order structure (XSAS)^{†2}</p>  <p>(m) (n)</p>
	<p>Liquid</p> <p><i>Neat, and Solution</i></p>	<p><i>Halo</i></p>  <p>(i) (Flat film)</p>	<p>Molecular structure (Small molecule)</p> <p>Molecular shape in solution (XSAS)^{†2}</p>  <p>(o)</p>

^{†1} Lamellar crystal (so-called polymer single crystal) is not included.

^{†2} X-ray small-angle scattering