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Editorial Note

Development Editor Note: Biomolecular Crystallography

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The fundamentals, practises and applications of protein crystallography are listed in Biomolecular Crystallography. It distils key principles to explain the practise and study of protein crystal structures and provides descriptions of molecules, complexes, and drug target structures that are biologically important. The experimental science of determining the arrangement of atoms in crystal solids is crystallography (see crystal structure). The term "crystallography" is derived from the Greek terms "cold drop, frozen drop," crystallon, with its definition applying to all solids with some degree of transparency and "to compose" graphein. Crystallographic techniques now rely on the study of a sample's diffraction patterns targeted by a beam of some kind. X-rays are most widely used; electrons or neutrons are used with some beams used. The type of beam used, as in X-ray crystallography, neutron diffraction and electron diffraction terminology, is also specifically specified by crystallographers. X-rays interfere with the electrons' spatial distribution in the sample.

Electrons are charged particles and thus interact with both the atomic nuclei and the sample's electrons' overall charge distribution. Neutrons are dispersed by intense nuclear forces by the atomic nuclei, but in addition, neutrons have a non-zero magnetic moment. With traditional imaging techniques, such as optical microscopy, it is important to gather light with a magnifying lens to obtain an image of a small object. Any optical system's resolution is constrained by the diffraction-limit of light, which depends on its wavelength.

Thus, the overall clarity of the resulting maps of crystallographic electron density depends heavily on the diffraction resolution. Visible light, for example, has a wavelength of about 4000 to 7000 ångström, which is three orders of magnitude longer than the length (approximately 1 to 2 Å) of standard atomic bonds and atoms themselves. Hence, the spatial arrangement of atoms. in a crystal cannot be resolved by a traditional optical microscope To do so, we will require much shorter wavelengths of radiation, such as X-ray or neutron beams. While several universities involved in crystallographic research have their own equipment for producing X-rays, synchrotrons are mostly used as X-ray sources due to the purer and more complete patterns that can be produced by such sources. Synchrotron sources often have a much higher X-ray beam strength, so data collection at weaker sources takes a Patterns of diffraction emerge from the positive intrusion of incident radiation (x-rays, electrons, neutrons), distributed by the sample's intermittent, repeating characteristics. Crystals diffract x-rays in a coherent way, often referred to as Bragg's reflection, because of their highly ordered and repeating atomic structure

In phase recognition, crystallography is useful. It is usually important to know what compounds and what stages are present in the material when producing or using a material, as their composition, structure and proportions can affect the properties of the material. Each stage has a distinctive arrangement of atoms..

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