

33. X-ray Studies on the Reaction between Polyvinyl Alcohol and Congo Red

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It is known that polyvinyl alcohol is precipitated from its aqueous solution with congo red, a substantive dye, as with boric acid. According to our experiments, in 1.5% congo red solution gelatination occurs while in 3% solution syneresis takes place. Changes in X-ray diagrams also begin to be remarkable from this concentration. The most strong interference corresponds to a spacing of 4.21 Å.

By the immersion of polyvinyl alcohol films or filaments in congo red solutions of various concentrations, similar results are obtained. After the immersion, the films and the filaments are plastic and can be drawn to several times of their initial length. X-ray diagrams of such drawn filaments show three new interferences on the meridian. The spacings are 13.25, 8.80 and 6.54 Å respectively. The fiber period calculated from the above spacings is 26.4 Å. While such interferences can be found neither by pure polyvinyl alcohol nor by congo red powder, it may be assumed that these interferences belong to a complex between polyvinyl alcohol and congo red. A provisional estimation of the monoclinic unit cell of the complex is as follows: $a = 8.20 \text{ Å}$, $b = 26.4 \text{ Å}$, $c = 4.57 \text{ Å}$, $\beta = 81^\circ 30'$.

34. The Viscosity of the Deformed Rod-like Macromolecule in Solution

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The model of a rod-like macromolecule regularly crooked zigzag on the same plane was adopted.

This model is supposed to be a medium state between the rigid molecule of spherical or ellipsoidal type assumed by Einstein, Jeffery, Eisenschitz, etc. and the flexible molecule of pearnecklace type assumed by Debye-Bueche.

To calculate the frictional force of our model, it is assumed that this force is nearly equal to the total sum of frictional forces acting on each sphere alternately arranged. Following results has been obtained by the hydrodynamic method, under the condition that the velocity gradient of the flow is "q" and the rotational energy per unit volume of the macromolecule has components in three directions,