

showed in the infra-red region. (Calculated for $C_7H_{10}OS_2$: C, 48.3; H, 5.7; S, 36.8; found: C, 48.2; H, 5.8; S, 36.0.) Razuvaev *et al.*⁸ reported the preparation of V by oxidation of I with 60 per cent nitric acid.

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Helical Conformation of Poly- γ -benzyl-L-glutamate

RECENTLY, Luzzati *et al.*¹ and Spach *et al.*² have suggested that the helical form of poly- γ -benzyl-L-glutamate (PBLG) in dilute solution is that of a $3\cdot0_{10}$ helix rather than an α -helix. They reached this conclusion after performing both X-ray diffraction and hydrodynamic experiments on dilute solutions of the polymer in appropriate solvents. They further reviewed the present light-scattering data and concluded that this supported the $3\cdot0_{10}$ helical conformation and confirmed the slight flexibility of the helices. They showed that the parameter h , which is the distance between two successive residues projected on to the helix axis or the length of the equivalent rod divided by the degree of polymerization, varied with the molecular weight M and, furthermore, that h approached a value of $2\cdot0 \text{ \AA}$ as the value of M approached zero. For an α -helix $h_{M \rightarrow 0}$ should be about $1\cdot5 \text{ \AA}$. More recently, Parry and Elliott³ have repeated some of the X-ray diffraction experiments of Luzzati *et al.*, using *m*-cresol as solvent, and suggest that the conclusions reached by the latter are erroneous, not because of faulty measurements but rather because of incorrect assumptions regarding the packing of the molecule. Parry and Elliott demonstrated that the α -helix is the probable conformation of the molecule of the PBLG sample investigated.

Prior to the study of PBLG in dichloroethane by light scattering when the solution was subjected to electric fields⁴, we made conventional light scattering measurements. We evaluated our data after the method of Zimm⁵, and in order to obtain information about the polydispersity of the sample we followed the treatment devised by Reichmann⁶. Using this method, a value for the weight-average length \bar{L}_w is obtained from the slope of the high-angle asymptote of a graph of Kc/R_0^1 against $\sin^2 \theta/2$. The factor K is the usual constant prevalent in light scattering theory, c is the concentration, θ the angle between the forward direction of the incident beam and the scattered beam, and R_0^1 is the Rayleigh ratio corrected by the term $\sin \theta/(1 + \cos^2 \theta)$. The following results were obtained: weight average molecular weight $2\cdot5 \times 10^5$, weight average degree of polymerization, $\bar{N}_w = 1\cdot14 \times 10^3$, $\bar{L}_w = 980 \pm 50 \text{ \AA}$, $\bar{L}_z = 1550 \pm 80 \text{ \AA}$, $h = 1\cdot3 \text{ \AA}$ and $h^1 = 0\cdot86 \text{ \AA}$. Here \bar{L}_z is the $[Z(Z+1)]^{1/2}$ average length obtained from the Zimm plot data alone and $h = \bar{L}_z/\bar{N}_w$, whereas $h^1 = \bar{L}_w/\bar{N}_w$.

In their appraisal of the light scattering data taken from the literature, Luzzati *et al.* have given a curve of h against M (Fig. 6 of ref. 1) and have not considered poly-

dispersity to be important. Our value of h fits their curve very well but the seemingly more correct value of h^1 falls considerably below the curve and indicates that if polydispersity were taken into account it would lead to a value of $h_{M \rightarrow 0}$ more nearly equal to $1\cdot5 \text{ \AA}$ than to $2\cdot0 \text{ \AA}$. We suggest that the effect of polydispersity is much more important than Luzzati *et al.* have assumed. Our suggestion is further supported by the work of Spach *et al.*², from which, by reference to Fig. 4 of their paper, a value for $h_{M \rightarrow 0}$ of $1\cdot5 \text{ \AA}$ is indicated.

We conclude, therefore, that if due attention is given to, and allowance made for, the polydispersity of the samples studied, then both the hydrodynamic and light scattering data will give a value of $h_{M \rightarrow 0}$ for the glutamate molecule indicative of the α -helix rather than the $3\cdot0_{10}$ helix.

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A Means of Increasing the Oxidation Resistance of Diamond

IN the search for techniques by which to determine small amounts (0.01–1 per cent) of light-atom impurities in laboratory-prepared diamond¹, we have attempted to use strongly oxidizing melts and combustion in oxygen to destroy the host. Useful results for the carbon-13 distribution in undoped diamonds² have already been obtained by the direct combustion technique. However, straightforward combustion in oxygen did not produce complete oxidation of boron-doped diamonds. Microscopic examination of the incompletely burned diamonds and their behaviour toward alkali suggested that the residue was covered with a layer of boric oxide, which, being continuous and of low vapour pressure, inhibited further attack of oxygen on the diamond. Complete oxidation of the sample could be achieved only by alternately heating the sample at 800°C in oxygen and washing the residue in the platinum boat with successive portions of 1 N sodium hydroxide and water. The boric oxide that was removed from the diamond surface by these washing steps was determined by potentiometric alkalimetric titration of the borate in the combined wash solutions.

The oxidative stability of boron-doped diamonds, as disclosed by our attempts to analyse them, is illustrated by the following comparison with the oxidative stability of undoped man-made diamonds (RVG grade, commercially available from Metallurgical Products Department, General Electric Co., Detroit, Michigan) and with natural diamonds (from South West Africa). The boron-doped diamonds were prepared according to the class of conditions outlined in previous papers^{1,3}.

(1) Complete oxidation (800°C , pure oxygen) of all samples of undoped man-made diamonds and of natural diamonds was achieved within 24 h; in most cases oxidation was complete after 1 h.

(2) With one boron-doped sample a residue equal to 60 per cent of the initial sample weight still remained after an 8-h period of combustion; with another sample, 38.5 per cent of the initial sample weight remained after a 24-h period of combustion. The rate of weight loss was about 1/70 that of the RVG and less than 1/100 that of the natural diamonds.

(3) The residues from the boron-doped diamonds suffered no further weight change during a second 4-h period of combustion.