EFFECT OF SUBSTITUTIONAL ISOMERISM IN THE MONOMER UNITS ON THE PROPERTIES OF AROMATIC POLYAMIDES*

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IN RECENT years, intensive investigations have been carried out into the synthesis, structure and properties of heat-resistant polymers. The basic principles for the structure of polymer macromolecules having an increased heat-resistance and thermal stability have been established [1]. An increase in the heat-resistance and thermal stability of polymers may be achieved, for example, by introducing aromatic rings into the chain [2]. As is the case in low molecular weight compounds, polymers made up of aromatic units may exist in isomeric forms, caused by isomerism in the positioning of the functional group of the initial monomers. We may postulate that such isomerism will exert a strong effect on the properties of isomeric aromatic polymers. However, despite the large number of polymers in the aromatic series which have been synthesized, the effect of such isomerism on the properties of the polymers has not been investigated in detail (apart from the determination of the softening or melting points). We considered it desirable to carry out a fairly broad investigation of a promising group of polymers, namely, the completely aromatic polyamides which are synthesized from isomers of phenylenediamine and the isomeric phthalic acids and which have a high heat-resistance and thermal stability [3–6]. An investigation of the properties of isomeric aromatic polyamides in dilute solutions has been carried out previously [7]. In the present work we shall consider the effect of substitutional isomerism in these monomer units on certain properties of aromatic polyamides in bulk: namely, the phase state, the softening and melting points, the ability to crystallize, and the molecular mobility. Since it is postulated that the rigidity of the macromolecules of isomeric aromatic polyamides may be caused by the presence of conjugation along the macrochains and also that the amide bond does not interrupt the chain of conjugation, these aromatic polyamides were also investigated by electron paramagnetic resonance (EPR).

This broad investigation gave rise to the possibility of establishing the effect

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