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SOME PROPERTIES OF POLYPHENYLENEIMINE*

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RECENTLY, Nikitina *et al.* [1] have obtained semi-conducting polymers containing in the main chain aromatic rings separated by imino groups. The present paper is devoted to a detailed study of the physical properties of one of them—polyphenyleneimine.

EXPERIMENTAL

The investigation was carried out with reprecipitated and non-reprecipitated samples of polyphenyleneimine $[-C_6H_4(1)-NH]_n$ and also with samples previously heated in vacuum and in air at 150–300° for two hours. The samples investigated were obtained both in the presence of an Al_2O_3 catalyst and without it. The polymer obtained without the catalyst and reprecipitated is denoted as polymer I, the non-reprecipitated material as polymer II, and that obtained in the presence of a catalyst and reprecipitated as polymer III.

The measurement of the electrical conductivity σ was carried out with a continuous current using a E6-3 teraohmmeter in vacuum at a pressure of 3×10^{-2}mm. The temperature range of the measurements was 20–270°. The samples were prepared in the form of tablets 10 mm in diameter and 0·5–1·5 mm thick under a pressure of 5000 atm. Layers of Aquadag deposited on the tablets were used as the electrodes.

The static magnetic susceptibility was investigated by Gouy's method on powders in fields of 300–5350 oe at 20–100°.

X-ray diagrams were obtained in a URS-55 apparatus by the method of irradiation with a nickel filter in a RKD cylindrical camera.

The dependence of log σ on the reciprocal of the temperature for the initial polymer I is shown in Fig. 1, these results having been obtained with measurements carried out both in vacuum and in the air. When the sample was heated from room temperature to ~120°, the electrical conductivity changed in accordance with the law $\sigma = \sigma_0 \exp(-E/kT)$. From 120° upwards the form of this relationship changes: the curve turns downwards. On cooling,

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