AC CONDUCTIVIY OF NICKEL PHTHALOCYANINE

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The dielectric properties of nickel phthalocyanine are studied in the frequency range 10 to 10^5 Hz and within the temperature range 298-393 K. The Cole-Cole diagrams have been used to estimate the molecular relaxation time τ. The temperarure dependence of τ is expressed by thermally activated process. The frequency dependence in the complex plane of the impedence shows semicircles. The AC data are interpreted in terms of hopping mechanism

Introduction:

Investigations on organic semiconductors like phthalocyanines continue with high activity. Remarkable progress is seen in using these compounds such as the material choice in solar energy /1/, gas detectors /2/ and electro-optical devices /3/. This is mainly due to their high chemical, and thermal stabilities as well as the planarity of their molecules and similarity of their molecular structure to those of chlorophyll and hemin. The aim of this paper is to study the dielectric properties of nickel phthalocyanine (NiPc) as a function of both temperature and frequency.

Experimental:

The nickel phtholocyanine (NiPc) used in these measurements was obtained from Dastman Kodak Ltd. New York. The starting material was carefully purified by a method previously described /4/. The purified material was compressed in a die under the pressure of 9.8 x 10^8 Pa to form discs of diameter 10.5 mm and thickness 1 to 3 mm. Aluminum electrodes were vacuum deposited directly onto the major faces of each pellet. The specimens were then mounted onto electrically heated copper disc, the temperatures of which could be held constant within 1K over the range 298-393K. Temperature were measured using a chromel/alumel thermo- couple attached to the substrate near the specimen.

The temperarure dependence of the dielectric properties was measured using a Lock-in amplifier Stanford SR 850. The measurements were performed in the frequency range $1 \rightarrow 10^5$ Hz and the temperature ranfe 298-393 K.