

ELECTRICAL CONDUCTANCE AND DIFFUSE REFLECTANCE STUDIES OF SOLID STATE INORGANIC COMPLEXES

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The diffuse reflectance and electrical conductance studies were carried out for nearly 20 complexes each having a transition metal ion as part of either the anion or the cation.

The diffuse reflectance spectra were primarily used to evaluate the band gap of the solid material and the conductance measurements were carried out to determine its semi-conducting properties.

Of the systems studied so far, $\text{Ag}(\text{SCN})$, $\text{Zn}_3(\text{Fe}(\text{CN})_6)_2$ and CuCrO_4 were found to be good semi-conducting substances.

Silver thiocyanate and copper chromate were found to be p-type semiconductors while the $\text{Zn}_3(\text{Fe}(\text{CN})_6)_2$ was found to be of the n-type.

The diffuse reflectance spectrum of $\text{Zn}_3(\text{Fe}(\text{CN})_6)_2$ showed a band at 530 nm. On drying this complex over P_2O_5 for several days, the band disappeared gradually. The occurrence of this band was not observed in other $\text{Fe}(\text{CN})_6^{3-}$ complexes. Tentatively we attribute this band to an electronic transition of the type ${}^1\text{A}_{1g} \rightarrow {}^1\text{T}_{2g}$ brought about by the presence of H_2O molecules in the vicinity of the complex.

The diffuse reflectance of the CuCrO_4 also showed a clear band at 460 nm. The inability to prepare pure CuCrO_4 devoid of traces of CuO , precluded the analysis of this spectrum.

References

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