International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622
International Conference on Industrial Automation and Computing (ICIAC- 12th & 13th April 2014)

RESEARCH ARTICLE OPEN ACCESS

Synthesis of Iodine Doped Co-ordination Polymer with Salicylic Acid-Biuret-Trioxane Terpolymer

S.M.Gadegone*

*(Department of Chemistry, Kamla Nehru Mahavidyalaya, Nagpur, India
Email: smgadegone@yahoo.com)

ABSTRACT
Terpolymer resin SBT have been synthesized by the condensation of salicylic acid and biuret with trioxane in 1:1:2 molar ratio. The coordination polymers of Vo(II), Cu(II) and Cr(II) with SBT (1:1:2) terpolymer have been prepared in DMF media. The qualitative doping of Iodine was carried out by exposing coordination polymers of above metals to Iodine vapours and pellets were made.

I. INTRODUCTION

The transformation of the materials from being semiconductors to conductors occur through exposure of the polymeric material to dopants that allow the material to increase their conductivity 10 to 10^{-9} fold. The structural requirement for successful doping is that the polymer chain possess what is referred to in molecular orbital terms as whole chain delocalization and in the valence bond theory such as the polymer chain acts as a conduct for electrical charge to transverse along the chain.The search for semiconductor that contain metals within coordination and condensation polymer for about 30 years focusing on polymer chain that can exhibit whole chain resonance with many of these being semiconductors[1].Recently we begin the doping polymers and study of their properties in our laboratory. The current paper deals with synthesis of iodine doped coordination polymer with SBT terpolymer.

II. EXPERIMENTAL:

Chemicals: All the chemicals used were of A.R. or chemically pure grade.

Preparation of the Ligand SBT:

The ligand used in the present study has been prepared by known method [2]. A mixture of salicylic acid 1.381g (0.01M), biuret 1.030g (0.01M), Trioxane 1.8016g (0.02M) with 2M HCl was refluxed over an oil bath at 130+-2o for 8 hours with occasional stirring. The solid product obtained was immediately removed from the flask as soon as the reaction period was over. It was washed with cold water, dried and powdered. The powder was repeatedly washed with hot water to remove unreacted monomers. The air dried ligand was extracted with either to remove salicylic acid Trioxane copolymer which might be present along with the SBT terpolymer. It was further purified by dissolving in 8% NaOH. Filtered and reprecipitated by gradual dropwise addition of 1:1 (v/v) conc. HCl/distilled water with constant and rapid stirring. The ligand SBT terpolymer so obtained was filtered, washed with hot water, dried in air, powdered and kept in vacuum over silica. The yield of this terpolymer resin was found to be 80%.

Preparation of coordination polymer:

Solutions of oxy acetyl acetone of Vo (II), acetate of Cu (II) and chloride of Cr (III) and ligand were prepared in minimum quality (50 ml) of DMF in molar ratio 1:1 for SBT terpolymer. Both the solutions were filtered and mixed in warm condition with constant stirring. Then reaction mixture was digested on boiling water bath for 1 hr. The colored product obtained were filtered, washed thoroughly first with the solvent employed for their synthesis and then with alcohol followed by acetone and dried in vacuum desiccators over calcium chloride.

DOPING OF IODINE IN COORDINATION POLYMERS OF SBT (1:1:2)

Iodine doped coordination polymer are reported to produce new class of electrically conductive materials [3-9]. In the present studies only qualitative doping of iodine in coordination polymers of SBT (1:1:2) was carried out to increase their conductivity. Doping of iodine has been undertaken as follow:

Only qualitative doping of iodine was carried out by exposing powdered coordination polymer to iodine vapor. For this purpose finely powdered coordination polymer was spread in a pretty dish and this pretty dish was kept for 24 hours in iodine saturated chamber. After 24 hours, material was removed and pelletized using pressure.

Iodinated polymers are indefinitely stable in air and iodine can only be driven off by prolonged heating above 100oC. Electrical conductivity has been measured and results of this will be published elsewhere.

III. ACKNOWLEDGEMENT:

The author SMG wishes to epress his sincere thanks to Dr. Smt. Suhasini G. Wanjari President, and Adv. Shri. Abhijit Wanjari , Amar Seva Mandal, Kamla Nehru Mahavidyalaya, Nagpur for their constant help and encouragement.

REFERENCES:

[1] Carraher C.E., Battin A.J. and Roner M.R., J. Funct. Biomaterial, 2:18-30, 2011.
[2] Pal T.K. and Kharat R.B., Die Angew Makromol. Cheme, 173, 55, 1989.
[3] Hanack M., Seeling F.F., and Sturtroble J. Z., Naturforsch., 34a, 933,1979.
[4] Lin L.S., Marks T.J., Kannewarf C.R., Lyding J.W., McClure M.S., Ratajack M.T., and Whang T.C., J. Chem. Soc. Commun., 954, 1980.
[5] Marks T.J., Webster D.F., Ruby S.L., and Schultz S., J. Chem. Soc. Commun., 444, 1976.
[6] McClure M.S., Lin L.S., Whang, Ratajack C.R., Kannewurf and Marks T.J., Bull. Am. Phys. Soc., 25, 315, 1980.
[7] Schock K.F., Kundalkar B.R., and Marks J.J., J. Am. Chem. Soc. 101, 7071, 1979.
[8] Teitelbaum R.C., Ruby S.L. and Marks T.J., J. Am. Soc. 100, 3215, 1979.
[9] Weiss M.C., Gorton G and Goedken V.L, Inorg. Chem. 16, 305,1977.