Computational Analysis of Electrical Conductance of Laboratory Prepared Al [III] PPA

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Abstract

There is I Science Search [1]. Why would you custom iScience Search and not Google. Most people go to Google, if they want to know more about a subject [1,2]. Most chemists use PubChem, or SciFinder,[3,4] if they want to know more about a compound. Both of these are databases and not Internet search engines[5.6.7]. Is there no Internet search engine for chemists. Furthermore These days quite a good number of electrically conducting polymers are being prepared. Polymer scientists were trying to take advantage of electrically conducting polymers. They used polymers in various fields, such as; to bond objects, seal joints, fill cavities bear loads, etc.. hese electrically conducting materials are generally complexes between metal salts and high molecular weight polymers containing solvating etheroatoms Ion conducting polymers were first studied by write and co-workers but their potentials as practical electrolyte materials in electrochemical devices were recognized by Armend and coworkers . Poly propyl Aniline complexes generally have a multiple nature ,consisting of salt rich crystalline phase and amorphous phase with dissolved salts .Therefore one of the most important characteristic of Poly propyl Aniline electrolyte is that their conductivity is a property of the amorphous elastomeric phase. Poly propyl Aniline may be converted into electro active materials using various doping methods.[8]

Keywords :Ethyl Aniline, Ethero atom, Electrochemically induced, suitable Polymer reactor, Elastomeric phase

Introduction

Polymers were used as conducting materials too. Polymer synthesis is not difficult today, because of the abundant availability of literature on the subject .thus to synthesis a few tons of polymers, all we need is the appropriate quantity of the monomer and catalyst and a suitable polymer reactor. The most common examples are complexes formed by Al (III) complexes with Poly propyl Aniline . The chemical and electrochemically induced doping process greatly modifies the conducting properties of the Poly propyl Aniline . On gradual increase of the PEG concentration the half wave potential of the metal ion likeAl (II)or Al(III) shifted to more negative value in each case and the diffusion current also decreased ,thereby indicating complex formation of the metal ions with PEG. Lingane Treatment of the observed polarographic data showed 1:1 metal :PEG complex formation in each case with formation constants for Zn(II)-PEG equal to log B=0.2787and log B=4.50,respectively. To find out the number of electrons involved in the electrode process cyclic voltammetric studies have been performed. Various sets of solutions containing varying concentrations of each of the polymers in 0.1 M potassium chloride(over all concentration) were prepared and the pH was adjusted to $8.0 \pm 0.1$and scan rate was 40mVs-1, similar sets were prepared containing various concentration of the polymer complexes[9,10] under study. Cyclic voltammograms of these sets were recorded on pulse polarograph CL-90.

Materials and Method of Preparation of Al [III] PPA

Poly propyl Aniline chloride was prepared by chemical method applying oxidant (Potassium dichromate) the polymerization of 0.4 moles of methyl aniline in 1lit. of 1M Hydrochloric acid was affected using 1g equivalent of the potassium dichromate a precipitate was separated, washed, dried and weighed as Poly propyl Aniline chloride

Poly propyl Aniline Chloride was prepared by equilibrating the Poly propyl Aniline chloride with1M HCl for about 10 hrs. The mass so obtained was separated, washed and dried and weighed as Poly propyl Aniline Chloride. An adequate quantity of the Poly propyl Aniline host and the inorganic salts of Al were separately dissolved in suitable solvent (e.g. acetonitrile). The two solutions were then mixed and after stirring the solvent evaporated slowly to finally obtain powder form of Poly propyl Aniline – Al complexes.

Table: 1 Polarographic parameters for Poly propyl Aniline

Data obtained using pulse polarograph CL-90. and analyse using computational programming

Concentration (mM)	Id (µA)	E1/2 (V vs. SCE)	Epa (V)	Epc (V)	Epc-Epa (V)
0.1	1.10	-1.08	-1.04	-1.07	-0.03
0.2	0.96	-1.10	-1.05	-1.08	-0.03
0.3	0.86	-1.10	-1.05	-1.08	-0.03

Table: 2 Polarographic parameters for complex of Poly propyl Aniline with Aluminium metal Data obtained using pulse polarograph CL-90. and analyse using computational programming

Concentration (mM)	Id (µA)	E1/2 (V vs. SCE)	Epa (V)	Epc (V)	Epc-Epa (V)
0.1	0.76	-0.64	-0.58	-0.62	-0.04
0.2	0.58	-0.66	-0.60	-0.64	-0.04
0.3	0.52	-0.66	-0.60	-0.64	-0.04

Results & Discussion

On gradual increase of the polymer concentration the half wave potential of the metal ion shifted to more negative value in each case and the diffusion current also decreased which revealed

From tables and graphs it can be conclude that in case of Poly propyl Aniline – Al complexes (Zn–PEA), the Epc-Epa i.e.cathodic and anodic peak potential values, indicating the involvement of 3, 2 and 3 electrons in the reversible electrode reduction process of the said species

respectively[5].the Ipc and Ipa values are also tabulated in tables-1.1and table 1.2 which also supports this argument. Characteristic nature of $E_{1/2}$ of metal is changed when it forms a complex with some legend. It has been observed by Lingan[1] that $E_{1/2}$ of the metal ion is shifted to more electronegative value on complex formation and its diffusion current is shortened. [11,12]

Complex formation of the Al metal ion with poly propyl aniline.

To determine the composition and stability constants of binary complex plots of $\Delta E_{1/2}$ (shift in half wave potential ,$E_{1/2} = (E_{1/2})_c - (E_{1/2})_s$ against log C_x (logarithm of the complaxation of the legend)were drawn. The plots were linear showing the formation of single complex species in solution .Lingane treatment of the observed paleographic data revealed 1: 2Al: PMA complex formation in each case with formation constant log B=13.146 forAl(II) PANI

Polarographic parameters of Zn- Poly propyl Aniline complex formation is confirmed by its shortened diffusion current. Lingane has given a method for the study of dissociation /formation constant of the complex using paleographic method. [13,14]

Q In selt[4] observed that the temperature dependence of the Poly propyl Aniline film voltammetric response in aqueous and non aqueous, only a very slight shift into the direction of more negative potentials (Ca-10 mV) and a small increase in the temperature is increased by 30^0C

Survey of literature

W.John Albery[3], et.al have used electrode

such as Poly propyl Aniline , poly pyrrol. Poly propyl Aniline and poly thiophene. They showed that the behavior of the different polymers is similar and may be explained by a chemical model involving localized redox species with two possible conformations of the polymer.

The temperature dependence of the Poly propyl Aniline film voltammetric response in aqueous and non aqueous media has been investigated by G.Inzelt[2] .He observed that only a very slight shift into the direction of more negative potentials in the peak potentials (Ca -10mv) and a small increase in the peak current as the temperature is increased by 30^0C.

Youn Chaol on Park Yong Woo studied behavior Poly propyl Aniline and found that the electrons are moving in and out changing the Poly propyl Aniline structure from one form to the another form

C. Herold 12 Yazmi, D.Billaud attempted study of sodium doped poly paraphenylene film,

John Alberry, et.al

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