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E: ISSN NO.: 2349-980X **Shrinkhla Ek Shodhparak Vaicharik Patrika**

A Polarographic Behaviour of Potassium Propan-1, 3-Di Ol Monoxanthate: An Analytical Approach

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Abstract

In the present work, the polarographic behaviour of Potassium propan-1,3-diol mono xanthate is studied in broad spectrum . The effect of ligand concentration,pH-values,Hg-column height and temperature are studied in this case. In addition to it, the mechanism of dimerization of this ligand has been proposed. On the basis of such studies important informations may be assigned to developed new methods for the estimation of xanthates

Keywords: Potassium Propan-1,3-Diol Mono Xanthate,Polarographic Cell, Gelatin, Reference Electrode.

Introduction

The utility of sulphur donor ligands specially xanthates in the fields of synthesis, biology pharmaceutical and analytical chemistry is very well known.Keeping in view the above facts the polarographic behaviours of different ligands like thiomalic acid, cysteine di thio carbamato carboxylic acid, thioglycolic acid and K-n-butyl xanthate have been studied in broad spectrum anodic depolarisation of such ligands takes place &Hg -salt of ligand is formed.

In the present study ,the effect of concentration of potassium propan-1, 3-diol monoxanthate (PPDMX), effect of pH –value,effect of Hg-column height and mechanism of xanthate dimerisation studies in detail.

Objective of the Study

The main objective of the present study is to analyse the polarographic character of Potassium propan-1, 3-diol mono xanthate.Since it will provide different information for further studies in this regards.

Review of Literature

Xanthate was first synthsised by Dentzenberg & et al.1972. Potassium propan-1, 3-diol monoxanthate was synthesised with some modification (M.N.Ansari et al.1980; Raj Kumar & et al.2006). Xanthates are sulphur donar ligands specialy used in the field of synthesis (John.J.Ritter et al.; 1952, Szymula et al.; 1996). Xanthates are used in biology (S.X.S.Lam & et al.1999; Res.Tian-Heen et al 1995 ;) pharmaceutical (J.Sos & et al.1948; A.H.Schreader&et al; 1955). The plarographic behaviour of thiomalic acid (R.S. Saxena & et al.1968)., Cysteine (R.S. Saxena & et al.1969, L.M.Kolthoff & et al.1990), di thio carbamato carboxylic acid (R.S.Sexena & et al, (!969), thioglycolic acid (R.Zahradnik 1955) and K-n-butyl xanthate (G.Sartori & et al.1950).

Experimental and Discussion

Materials and Methods

Potassium propan-1, 3-di-ol mono xanthate was synthesized, by Dentzenburg methodwith some modifications at 50^0C. The fresh solution of ligand in air free conductivity water was always used. All other chemicals used were of B.D.H.'A.R.' grade and their solutions were always prepared in conductivity water. 2 ml. of fresh solution of 0.2% gelatin was used as maximum suppressor.

Apparatus

Systronic polarograph model 1632 in conjuction with systronic recorder model 1501 was used to obtain current-voltage curves .During this experiment, saturated calomal electrode was used as reference electrode. Triple distilled mercury was used in such observations. The capillary characteristics were measured in 0.01 M KCl at E .d.e. = - 0.284 volts vs SCE. During these investigations m = 1.953 mg/sec, t = 2.08 sec. at h = 60 cm. and $m^{2/3}$ $t^{1/6}$ =1.766 $mg^{2/3}$ $sec^{1/6}$. The inert atmosphere was

maintained by purified nitrogen gas free from oxygen. pH measurements were done with the help of Toshniwal pH- meter model CL- 49.

The polarographic behaviour of ligand was studied with the help of following sets. In each set, the required volume.was made after the addition of 2 ml. of 2.0 $^{0}/_{0}$ gelatin solution and 2 ml. 2M KCl (or KNO_3) solutions.

Effect of Concentration of Ligand in 0.1 M Kcl or 0.1 M KNO_3

In this case 1.0, 2.0, 3.0, 4.0, and 5.0 ml. of 0.1M ligand and stated volume of KCl (orKNO_3) were added before making total volume 40 ml. with conductivity water (Table- 1).

Table - 1
Effect of Concentration of Ligand on Id and $E_{1/2}$ in 0.1 M Kcl (0.1MKNO_3).

Concentration of Ligand x 10^{-3} M	id(µA)	-$E_{1/2}$(V)	id/C
2.5	3.1 (2.9)	0.098 (0.104)	1.380 (1.36)
5.0	6.3 (6.1)	0.108 (0.106)	1.34 (1.31)
7.5	9.2 (9.0)	0.110 (0.107)	1.32 (1.30)
10.0	12.1 (11.9)	0.112 (0.109)	1.29 (1.28)
12.5	14.8 (14.7)	0.111 (0.098)	0.953 (1.176)

Effect of pH

In this experiment total volume is 40 ml.by the addition of 3.0 ml. of 0.1 M PPDMX solution and stated volume of gelatin and KCl along with the addtion of suitable buffers of different pH ranging from 8.15 to 9.95 (Table-2)

Table-2
Effect of pH

S.No.	pH	id(µA)	-E1/2(V)	slope(V)
1.	8.15	10.3	0.122	0.032
2.	8.55	10.1	0.121	0.034
3.	9.08	9.8	0.119	0.033
4.	9.48	9.7	0.118	0.034
5.	9.95	9.5	0.116	0.033

Effectof Hg-Column Height

In this case total volume is made 40 ml. by addition of 1.0 ml. of 0.1 M PPDMX and stated volume of KCl .

Table No. - 3
Effect of Hg Pressure.

S.No.	$h_{eff.}$ (m)	$h^{1/2}{}_{eff.}$	id(µA)	id/ $h^{1/2}{}_{eff.}$
1.	45.0	6.71	2.3	.34
2.	50.0	7.07	2.5	.35
3.	55.0	7.42	2.6	.35
4.	60.0	7.75	2.8	.36

Effect of Temperature

During this experiment total volume is made 40 ml. by mixing 1.0 ml. of 1.0M PPDMX, along with the stated volumes of KCl and gelatin. In this case, temperature range is from 25 ^{0}Cto 55 ^{0}C thermostatic bath conjuction with constructed device for polarographic cell was used.

Result and Discussion

In all polarograms of PPDMX, current was found directly proportional to the concentration (ranging from $2.5x10^{-3}$ M to$12.5x10^{-3}$ M) table -1. Logarithmic analysis of the waves in 0.1 MKCl (or KNO_3) at the stated concentrations, the average value of $E_{1/2}$ was confirmed by above evidence. A curve in between id values and temperature was found linear. The constancy in $E_{1/2}$ values also confirm the reversible nature of reaction.

Well defined anodic waves were obtained in the specific pH range from 8.0 to10.0 log id-i/ i values were plotted against –E.d.e.which showed the reversible nature of reaction with two electron transfer the constancy of $E_{1/2}$

Values were found with increasing pH values. In the case of different heights of Hg –column, well defined anodic waves were found .The diffusion controlled nature of reaction was decided by the constancy of id vs $h^{1/2}{}_{eff.}$ And the linearity of id vs $h^{1/2}{}_{eff}$ curve.On the basis of above observations,it is clear that the dimerization of potassium propan-1,3-di-ol mono xanthate take place.

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Conclusion

The polarograms of potassium propan-1,3-diol monoxanthate current was found directly proportional to the concentration.

A curve in between diffusion current and temperature was found linear. The constancy in half wave potential values confirm the reversible nature of the reaction.

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