POLAROGRAPHY OF Zn(II)-γ PICOLINE-NICOTINATE COMPLEXES

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Polarographic studies on some binary and ternary complexes of Zn(II) using thiocyanate, citrate, tartrate [1] as well as citraconate, [2] Nicotinate [3,4] in the form of primary or secondary ligands have already been made. Literature also reports the use of γ-picoline [5] in the preparation of solid complexes of some metal ions. In the present paper the authors have reported the results of polarographic study on the binary and ternary complexes of Zn(II) with γ-picoline and nicotinic acid.

EXPERIMENTAL

All the reagents used were of extra pure quality.

Polarographic study was made at 25° on an automatic pen recording polarograph CIC (Baroda, India) with a dme having characteristics, m = 2.37 mg, t = 3.0 s at 35 cm, effective height of mercury column. Supporting electrolyte used is 0.1 M KCl pH of the test solutions was read on an Elico-digital pH meter (model LI-120) and adjusted to 6.6 ± 0.02 with dil HCl/dil NaOH solution

RESULTS AND DISCUSSION

The log plot slope of polarographic data is found to be 30 ± 2 mV in each case indicating the reversible nature of the reduction involving two electrons.

Binary Systems

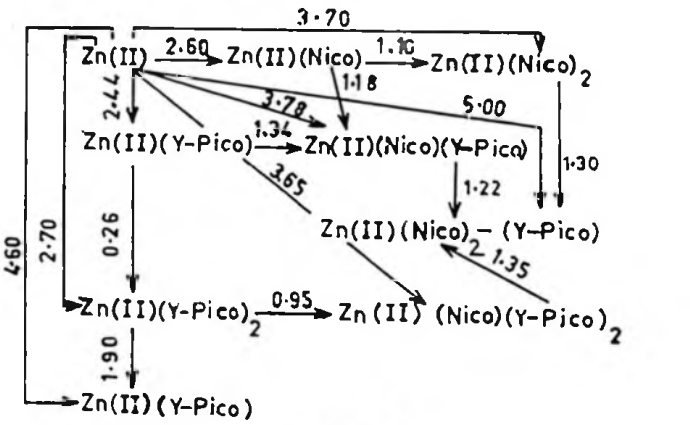
Zn(II)- γ -picoline Binary System: The $\Delta E_{1/2}$ values, when plotted against γ-picoline concentration yielded a smooth curve, indicating the formation of sucessive complexes. Deford and Hume's [6] method was applied and the results are presented in Table 1. The data are given in the scheme 1.

Zn(II)-Nicotinate Binary System: The same procedure as above was repeated with nicotinic acid. The data are given in the Table 1 and Scheme 1.

TABLE 1

DATA AND DEFORD AND HUMES FUNCTIONS OF BINARY COMPLEXES Zn(II) = 1.0 mM, μ = 0.1 M [KCl], pH=6.6 ± 0.02, Temp. 25 ± 0.5 C

Ligand (mM)	-E V vs SCE	i (div)	F [X]	F [X]	F [X]	F [X]
Zinc γ-picoline system						
0	1.10	48	-	-	-	-
10	1.112	46	2.662	166	-	-
20	1.124	43	7.268	313	16.7	-
30	1.132	40	14.59	453	57.7	1.75
40	1.140	40	27.25	656	94.0	2.22
50	1.148	39	52.18	1023	148.7	2.87
$\log \beta_1 = 2.44$			$\log \beta_2 = 2.70$		$\log \beta_3 = 4.60$	
Zinc = nicotinate system						
10	1.120	44	4.52	352	-	-
20	1.130	42	11.89	544	-	-
30	1.140	39	27.95	898	166	-
40	1.144	38	39.19	954	138	-
50	1.150	37	64.30	1266	173	-
$\log \beta_1 = 2.60$			$\log \beta_2 = 3.78$			



Scheme 1

Zn(II)-Nicotinate-γ-Picoline Mixed System

For this study fixed concentration of γ-picoline (0.1 M or 0.2 M) and varying concentration of nicotinate ion were used in test solutions. It was observed that shift in $E_{1/2}$ values was more in case of ternary complexation as compared to those obtained in binary systems indicating mixed legation in solution. Schaap and Mc-masters [10] and Laden's [8] extrapolation methods were used to calculate polarographic functions and constants A, B, C and D. Results have been tabulated (Table 2 and also the scheme). The values of the mixing

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