A NEW IONOPHORETIC TECHNIQUE FOR THE STUDY OF METAL COMPLEXES
PART 2 GLUTAMATE COMPLEXES

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Application of the method to the study of glutamate complexes of Cu(II) and Fe(III) shows the existence of species CuL, CuL_2^{2-} FeL^{+} and FeL_2^{-} with stability constants (log K) 7.75, 6.56, 11.85 and 10.6 respectively at 25° C and μ = 0.1

EXPERIMENTAL

This is exactly same as in the preceeding paper[1] with glutamate in place of glycinate.

RESULTS AND DISCUSSION

The concentration of the metal used in different experiments and the results are given in Table 1. Figure 1a and b illustrate relation between absorbance differences and pH's and thus of the change of overall mobility of the metal ion species with changes in hydrogen ion status of the systems contaaining metal ion and glutamic acid. In each figure three plateaus are discernible. The first plateau corresponds to a region of pH where metal ion is uncomplexed. The second plateau corresponds to a pH region in which 1:1 metal and ligand complex is overwhelmingly formed. The third plateau corresponds to the region where 1:2 metal ligand complex, is overwhelmingly formed. The sign of E of the second plateau indicates the neutrality of 1:1 Cu(II) glutamate and positive charge on 1:1 Fe(III) glutamate complexes. The higher complexes of both the systems are negatively changed as in the case of glycinate complexes[1] and no further complexes are formed till pH 10.

TABLE 1
IONOPHORETIC MOBILITIES IN IONOPHORETIC TUBE
μ = 0.1 Temperature = 25° C

Metal ion	Conc. mM	Absorbance* A_0	A_t	$\Delta A/A_0$ A.R	A.R (FeIII) / A.R (Cu II)
Fe III	0.5	1.00	0.41	0.59	1.78
Cu II	0.02	0.80	0.53	0.33	
Fe III	0.25	0.50	0.21	0.58	
Cu II	0.01	0.40	0.27	0.325	1.78

* A^0 initial absorbance; A_t absorbance after 30 mts electrolysis. A.R is absorption ratio $\Delta A/A_0$

Stability Constant

The dissociation constants of glutamic acid cited in literature (pK_1 =2.18, pK_2 = 4.20, pK_3 = 9.59), [2] are used and the stability constants are calculated as in the case of glycinate complex[1].

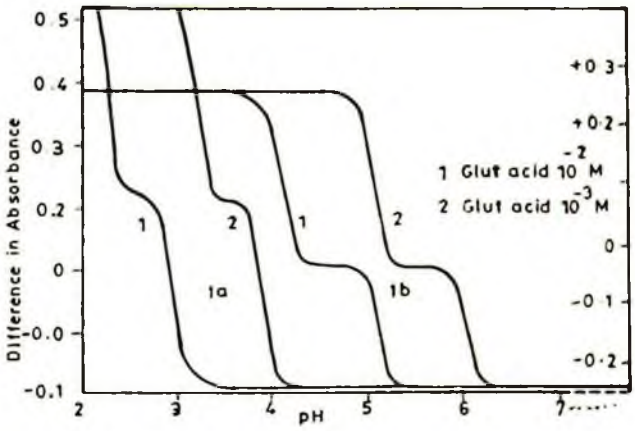


Fig. 1 a) Fe(III) - Glutamic Acid System:
b) Cu (II) - Glutamic Acid System:

TABLE 2
STABILITY CONSTANTS μ = 0.1 TEMPERATURE = 25° C

Metal ion	Glutamic acid mM	Stability constants pK_1		pK_2	
Fe III	10	11.90	11.85	10.62	10.60
Fe III	01	11.80		10.58	
Literature Value [2]		12.1 at 20°C & μ = 1.0			
Cu II	10	7.78	7.75	6.60	6.56
Cu II	01	7.71		6.52	
Literature Value [2]		7.87		6.44	

The values along with literature values are depicted in Table 2. It is to be noted that our values are in fair agreement with the literature values in case of Cu complexes. The variation in case of Fe complex can be explained as in the case of glycinate complexes [1].

The possibility of hydroxy complexes is ruled out as in the case of glycinate complexes [1].

REFERENCES

1. R.K.P. Singh and K.L. Yadava, *J. Electrochem. Soc. India* 35 (1986) p. 76

2. A.E. Martell & R.M. Smith, *Critical Stability Constants: Amino Acids* 1975 page 27.

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