SPECTROPHOTOMETRIC STUDIES ON COMPLEXATION OF Cu(II) and Mn (II) WITH URACIL

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The present communication describes spectrophotometric studies on complexation of uracil with Cu (II) and Mn (II). Complexation with uracil (2,4-dihydroy-primidine) takes place in aqueous media at pH10 and 8.5 respectively for Cu and Mn and light blue and light purple colored soluble complexes are formed with copper and manganese respectively. Molar absorptivity, stability constants and free energy of formation have been determined by Job's method of continuous variations and mole ratio method[1]. Solutions of Cu(II) and Mn (II) were prepared by the reported method.

EXPERIMENTAL AND DISCUSSION

Color Reaction:Cu(II) and Mn (II) form pink-colored soluble complexes in aqueous media at pH 10 and 8.5 respectively. Copper complex shows absorbance at 565nm and Mangnese complex at 406nm. The ligand shows no absorbance in these regions under present conditions and all measurements were carried against reagent black. Color remains stable for more than 8 hours in both cases.

Composition of the Complexs:Vosburg and Cooper's method[2] indicated the presence of only one complex in each case under the present experimental conditions. Job's method of continuous variations[3] and Yoe-Jones mole ration method[4] indicate the metal to ligand ratio as 1 : 1 in the case of these complexes.

Stability constant and free energy formation: These physio-chemical constants were calculated by Job's methods of continuous variations and mole ratio method. Results are given in Table 1.

Estimaton of Cu(II) and Mn(II):Cu (V) and Mn (II) have been estimated spectrophotometrically separately and also in presence of each other using uracil. Molar extinction coefficients of Copper and Manganese complexes were found to be 1.8 x 10^2mole^{-1}deg^{-1} and 6,5 x 10^1 mole^{-1}deg^{-1}, respectively. Beer's Law is obeyed within the range of 2.65 – 106 µg for Cu (II) and 12.8–285 µg for Mn(II). In the mixture copper should not exceed 30 and manganese 34. Fe^{3+}, V^{3+}, Al^{3+}, Mg^{2+}, Co^{3+}, and Mo^{6+} do not interfere.

Table 1.

Metal Complex	Method	Stability Constant (K)	Log K	Free energy of formation (Δ F) cal deg^{-1} mol^{-1}
Cu Complex	Job's method non-equimolar	2.34 x 10^{10}	6.14	-11624.38
	Mole ration method	4.23x 10^{10}	8.48	-13872.33
Mn Complex	Job's method non-equimolar	1.18x 10^5	5.14	-6932.76
	Mole ration method	5.88 x 10^4	4.96	-6553.61

SUMMARY

Spectrophotmetric studies have been carried out on the complexation of Cu (II) and Mn(II) with uracil. Job's method of continuous variation and mole ratio method have been applied to calculate the stability constants and free energy of formation which also indicate the composition of the complexes.

REFERENCES

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