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Some Binary Complexes of Cadmium(II) and Manganese(II)

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Interaction of cadmium(II) and manganese(II) with *o*-, *m*- and *p*- aminobenzoic acids has been investigated by paper electrophoresis in aqueous medium at 25 ± 1°C at a fixed ionic strength μ = 0.1 M $HClO_4$. The stability constants of Cd(II) complexes are higher than those of Mn(II) complexes which is in accordance with the Irving-Williams order.

INTRODUCTION

The uses of aminobenzoic acids in biology, medicine and manufacture of azo dyes have been known[1–4]. Binary complexes of aminobenzoic acids have been reported earlier[5]. Continuing the studies further, the interaction of cadmium(II) and manganese(II) with *o*$^-$-aminobenzoic acid (*o*-ABA), *m*-aminobenzoic acid (*m*-ABA) and *p*-aminobenzoic acid (*p*-ABA) are being reported. The studies were carried out paper electrophoretically at 25 ± 1°C in aqueous medium at a fixed ionic strength μ = 0.1 M $HClO_4$.

EXPERIMENTAL

All the reagents were of AnalaR grade. Metal perchlorates and ligand solutions were prepared as reported earlier[5]. Metal solutions were standardised[6] and the concentrations of metal and ligand solutions used were 5.0×10^{-3} M and 1.0×10^{-2} M, respectively. Electrophoresis was carried out for $\frac{1}{2}$ hr. at 200 volts with the help of Systronics paper electrophoresis equipment No. 604 (India). The temperature was maintained at 25 ± 1°C with the help of thermostated water circulated through the modified apparatus[7]. Ionic strength was maintained at 0.1 M throughout the studies.

RESULTS AND DISCUSSIONS

Stability constants of the complexes were calculated using the pH vs. mobility curve[7] and pK_a values of the ligands[8]. The values are presented in Table 1. As in

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earlier studies[5], in both the metal (II) -*o*-ABA, -*m*-ABA and *p*-ABA systems, two plateaus are observed-the first one showing the region of uncomplexed metal ion followed by decrease in mobility, thus giving another plateau and indicating formation of 1 : 1 complex. After the second plateau there is no decrease in mobility confirming the earlier conclusion that no complexation takes place thereafter.

TABLE 1
STABILITY CONSTANTS OF COMPLEXES
Temp. 25 ± 1°C, Ionic strength μ = 0.1 M ($HClO_4$)

Cations \ Ligands	*o*-ABA	*m*-ABA	*p*-ABA
Cd(II)	2.19	2.39	2.27
Mn(II)	2.01	2.21	2.10

The stability of the bivalent metal complexes follows the sequence Cd(II) > Mn(II) which finds support from the work of Irving and Williams[9].

The higher values of stability constants of *m*-ABA than *p*-ABA and *o*-ABA, and of *p*-ABA than that of *o*-ABA can be explained[5] on the basis of the ability of deprotonation of the ligands.

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