Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2013, 5(4):124-125

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Spectral investigation of complex ion formation in chromium (III) chloride with MCl_2 type halide

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ABSTRACT

Spectral absorbance of $CrCl_3$-MCl_2-water system was studied by dye indicator method using eosin as a dye. In this method, keeping the concentration of dye and concentration of MCl_2 type of salt is constant with increasing concentration of $CrCl_3$ solution absorbance was measured, showing corresponding complex ion formation in the ratio of 4:1, 2:1, 1:1, 2:3, 1:2.

Key words: complex, absorbance, dye indicator, spectro photo meter

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INTRODUCTION

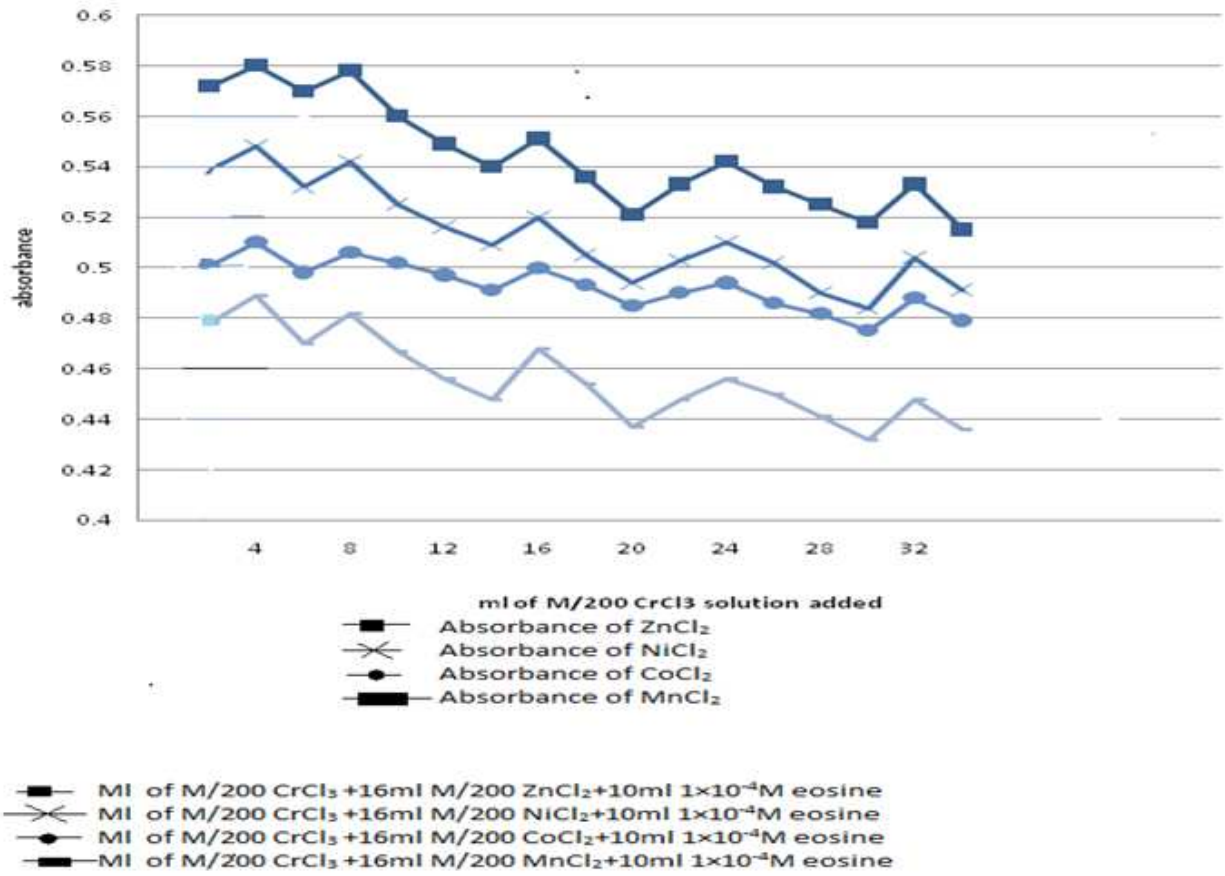
Transition metal complexes have received a great attention because of their biological activities, including anti-tumour, antibacterial, antiviral, antifungal and anticarcinogenic properties [1-5].

P.L. Farsram and co-workers[6] studied the complex ion formation in lead-alkali nitrate and mercuric-alkali nitrate system using dye indicator method. Modi and Desai have studied the complex ion formation between zinc chloride and alkali chloride[7]. Ashvin Modi and co-workers[8] studied complex ion formation between Cu-Co-Ni halide with alkali halide and showing corresponding complex ion formation in ratio of 1:2, 1:1, 2:1. Kazi and Desai[9] have studied mercuric and alkali halide system using interfacial tension method and showed seven complexes for such a system; however they have indicated that the number of complexes decrease from seven to six to three with increasing salt concentrations. The interfacial tension-concentration curve peak corresponding to complex ion formation has been explained on the basis that when interfacial tension increases reaching peak value with increasing mixed salt concentration of the variant, chemical potential value becomes minimum and vice-versa.

In the present work, the absorbance of pure dye solution taken as the standard was measured. While increasing the concentration of $CrCl_3$ as variant and keeping the concentration of MCl_2 type salt constant. Mono variation method used and dye concentration constant as per usual procedure[6,7,8]

EXPERIMENTAL SECTION

A shimadzu double beam spectrophotometer UV-150-02 was used for spectral measurements. Salts used were of AR grade and purified dye eosin was used as indicator. Here in Chromium(III) chloride-MCl_2-water system by keeping concentration of MCl_2 and dye constant with increasing concentration of Chromium(III) chloride five peaks in the ratio of 4:1, 2:1, 1:1, 2:3, 1:2 were observed.



RESULTS AND DISCUSSION

Complex ion formation between $CrCl_3$ and MCl_2 was investigated by spectral method indicating five complexes in the following proportion keeping MCl_2 concentration constant.

4:1	$4MCl_2$: $CrCl_3$	$M_4[CrCl_{11}]$
2:1	$2MCl_2$: $CrCl_3$	$M_2[CrCl_7]$
1:1	MCl_2 : $CrCl_3$	$M[CrCl_5]$
2:3	$2MCl_2$: $3CrCl_3$	$M_2[Cr_3Cl_{13}]$
1:2	MCl_2: $2CrCl_3$	$M[Cr_2Cl_8]$

Where M=Zn, Ni, Co, Mn.

Here the peaks are observed due to interaction of outer orbit electrons of one metal salt ions with another outer orbit electrons of the other metal ions to form a complex ions.

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