Biospectra : ISSN: 0973-7057, Vol. 18(2), September, 2023, pp. 235-238 ***Interdisciplinary Science***
An International Biannual Refereed Journal of Life Sciences

ISSN : 0973-7057

Comparative study of energetic behavior of chromium complexes with inositol in cold and hot condition in tertiary amyl alcohols (TAA)

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Received : 18th May, 2023 ; Revised : 19th June, 2023
DOI:-https://doi.org/10.5281/zenodo.12193868

Abstract- The energetic behavior of substances undergoes a sudden outburst of gases coming high pressure on its surrounding, this outburst is due to release of its potential energy. Oxidizing agent has affinity to accept oxygen or release electron in explosive reaction. For control over high energy substance requires sensitizer and stabilizer. Stabilizer means which use to protect the micro size air bubble, which play an important role in the maintaining the explosive density in energetic compounds. Authors want to develop metal complexes which act as energetic material (pyro-technique and propellant) which is not affected by water and other solvents.

Key words: Chromium complexes, tertiary amyl alcohols (TAA)

INTRODUCTION

Chromium is regarded with great interest because of its high corrosion resistance and hardness. A major development is the discovery of that steel could be made highly resistance to corrosion discoloration by adding chromium to form stainless steel although trivalent chromium (III) is regarded in trace amount for sugar and lipid metabolism few cases have been reported. When its complete removal from the diet that cause chromium deficiency. In large amount and different forms chromium can be toxic and carcinogenic. The most prominent example of toxic chromium is hexavalent chromium (VI). Chromium has no verified biological role[1-5] and has been classified as non-essential for mammals. Chromium deficiency is controversial. It has been attributed to only three people which is when a patient is fed a liquid diet through intravenous drips. In contrast, hexavalent chromium is very toxic and mutagenic when inhaled. Chromium (VI) has not been established as a carcinogen when in a solution, it may cause allergic contact dermatitis.

The use of chromium containing deity supplement is controversial owing to the absence of any verified biological role. Chromium (IV) oxide is a magnetic compound. It's ideal shape anisotropy, which imparts high coercively and remnant magnetization, made it a compound superior to gama-Fe_2O_3. Chromium (IV) oxide is used to manufacture magnetic tapes used in high performance audio tapes and standard audio cassettes. Chromates can prevent corrosion of steel under wet condition and therefore Chromates are added to drilling mud. Chromic acid is a powerful oxidizing agent and is useful compound for cleansing glass wear in laboratory of any trace of organic compound.

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METHODOLOGY

In compound A, 1.8 gm of meso-inositol was dissolved in 30 ml of water and 1 gm of Chromium trioxide was added to 1.5 ml of TAA. Then the two solutions are mixed together and put in stirring in cold condition. When the solid product was formed it is washed with water and finally with acetone. Similarly compound B was formed by adding 1.8 gm of meso- inositol in 30 ml of water and the same is boiled for 20 to 30 minutes after then we add 1 gm of chromium trioxide in TAA. Then this solution is added to aqueous solution of meso-inositol and the whole is boiled for 2 hours to get solid product.[6-12]

RESULT & DISCUSSION

In compound A the percentage composition of C, H, O, and Cr was found to be 7.56, 4.39, 69.02 and 19.03% respectively. The peak at 540.07 cm^{-1} and at 806.95 cm^{-1} shows Cr-O + C-C bonding in complex. The peak at 1055.06 cm^{-1} shows O-H bonding, peak at 1406.11 cm^{-1} shows C-O stretching at 1685.79 cm^{-1} shows –COOH stretching at 2362.80 cm^{-1} shows coordinated water in the complex and finally at 3323.35 cm^{-1} shows the presence of –OH stretching in the complex. On the bases of above group assignment, the compound A may be formulated as $(COOH)_2.\ 6H_2O.\ CrO_2$.

Temperature	Sequence Showing Change	% Loss	
		Theo	Exp.
25°C to 118°C	COOH COOH.$6H_2O.CrO_2$ ↓ $-H_2O$	6.71	6.38
118°C to 273°C	COOH COOH.$5H_2O.CrO_2$ ↓ $-3H_2O$	20.45	22.9
	COOH COOH.$2H_2O.CrO_2$	—	—

In compound B percentage composition of C, H, O and Cr was found to be 7.28, 4.77, 53.35 and 34.60 % found. The peak at 806.25 cm^{-1} shows Cr-O bonding, peak at 1400.32 cm^{-1} shows C-O stretching, peak at 1683.86 cm^{-1} shows –COOH stretching at 2889.37 cm^{-1} shows coordinated water and finally peak at 3336.85 cm^{-1} shows –OH stretching in the complex.

On the basis of above group assignment the compound was formulated as $HCOOH.3H_2O.Cr$.

Temperature	Sequence Showing Change	% Loss	
		Theo	Exp.
30°C to 170°C	$HCOOH.3H_2O.Cr$ ↓ $-2H_2O$ $HCOOH.H_2O.Cr$	23.68	20.97
170°C to 272°C	$HCOOH.H_2O.Cr$ ↓ $-H_2O$ HCOOH.Cr ↓	15.50	15.78
272°C to 308°C	Mixed oxide of chromium	25.56	—

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