

Synthesis and Structure of the Complex of Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate $\text{Na}(\text{Rh}(\text{C}_7\text{H}_6\text{O}_2\text{N})_2\text{Cl}_2)\cdot 5\text{H}_2\text{O}$

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Abstract- Success achieved in the investigation of the reaction between Benzohydroxamic Acid and Ruthenium (III) gave encouragement to extend this interesting work with Rhodium(III). It was considered worthwhile therefore to synthesis and structure of the Rhodium complex with Benzohydroxamic Acid.

Key words: Benzohydroxamic Acid, Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate.

Introduction

Benzohydroxamic Acid $\text{C}_6\text{H}_5\text{CONHOH}$ has been used as a complexing ligand for Ruthenium(III). The previous investigations on hydroxamic acid as metal complexing ligand shows that rhodium complexes with benzohydroxamic acid has not yet been investigated. Success achieved in the investigation of the reaction between benzohydroxamic acid and Ruthenium(III) gave encouragement to extend this interesting work with Rhodium(III). It was considered worth while therefore to synthesis and structure of the rhodium complex with benzohydroxamic acid from the stand point of its preparation, formation of complex, quantitative estimation of elements presents in the complex and to compare the theoretical values with experimental data results of these investigation are presented below.

Experimental

Reagent used

Rhodium Chloride, P^{H} Paper, Sodium Acetate, Benzohydroxamic Acid and Acetic Acid.

Procedure

An aqueous solution of Rh(III) Chloride was prepared by dissolving 1gm of Rhodium Chloride in 50 ml of water. The aqueous solution was buffered to 5-6 P^{H} by aqueous acetate solution of 60ml of benzohydroxamic acid was prepared by dissolving 3gm of the acid in 60ml of water. The two solution were mixed acidified with acetic acid. The mixture was heated 40 to 50 minutes and then for further 1 hr with a few drops of acetic acid when sufficient light chocolate colored precipitate appeared. This is Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate $\text{Na}(\text{Rh}(\text{C}_7\text{H}_6\text{O}_2\text{N})_2\text{Cl}_2)\cdot 5\text{H}_2\text{O}$. It was filtered, washed with water, alcohol and ether and dried in air. The results of quantitative estimation of elements present in the complex and solubilities in common solvent are given in these table A and B respectively.

Table A

Quantitative estimation of elements present in the complex Sodium Dichloro-Bis-(Benzohydroxamato) Rhodate(III) Pentahydrate.

%Elements	%Found	%Required	%Difference	%Error	No. of Determination
Rh	18.4	18.43	-0.03	-0.16	3

Na	4.1	4.11	-0.1	-0.24	3
C	30.81	30.6	0.21	0.68	
H	3.94	3.94	0	0	3
N	4.88	5.00	-0.12	-2.4	4
C	15.00	15.14	0.14	0.92	4
O	-	-	-	-	-
H ₂ O ⁺	-	-	-	-	3

The % amount of oxygen in the complex Na(Rh(C₇H₆O₂N)₂Cl₂).5H₂O is 22.87% as found as by difference. This need not be experimentally determined.

It contains 5H₂O molecule as water of crystallization.

Table B

Solubility of the complex Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate.

No.	Solvent	Solubility	Remarks
1.	Water	Insoluble	
2.	Benzene	Insoluble	
3	Ether	Insoluble	
4.	Acetone	Insoluble	
5.	Ethyl acetate	Insoluble	
6.	Methanol	Sparingly soluble	When freshly prepared gives light red-brown solution.
7.	Hot water	Sparingly soluble	When freshly prepared gives light red-brown solution.

Discussion

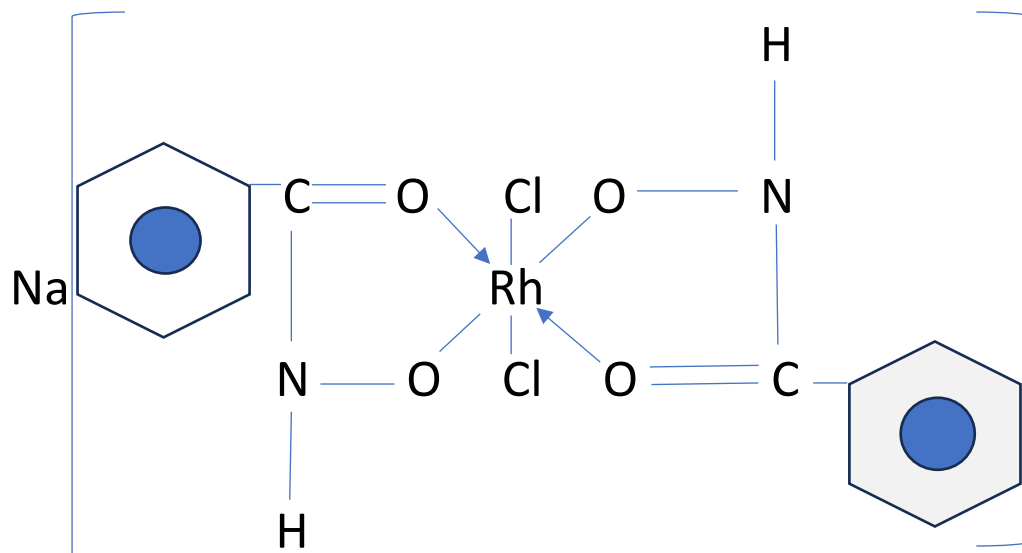
Preparation of Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate has been described.

Na(Rh(C₇H₆O₂N)₂Cl₂).5H₂O requires theoretically Rh=18.43%, Na=4.11%, C=30.6%, H=3.94%, N=5% and Cl= 14%. A glance of table A shows that these % are very nearly approached experientially. There are almost no deviation in experimental values so far. Rh, Na, H are conserved. Little difference is observed in the case of N, C and Cl which may be described to experimental errors. The maximum experimental errors comes to 0.29% in the case of Cl. Each value has been verified and found to be almost correct by repeating the experiments 3 or 4 times. The amount of oxygen in the complex Na(Rh(C₇H₆O₂N)₂Cl₂).5H₂O is 22.87% as found by difference. This need not be experimentally determined.

This complex contains 5H₂O molecules as water of crystallization. This has been checked up by repeating the experiment thrice. Water is completely lost at 126 degree Celsius and the compound is fairly stable up to 320 degree Celsius without melting.

Table B records results of solubility of the complex Na(Rh(C₇H₆O₂N)₂Cl₂).5H₂O in different solvents. The compound is insoluble in water, benzene, ether, acetone, ethyl acetate. It is sparingly soluble in methanol and in hot water.

When freshly prepared Sodium Dichloro-bis-(Benzohydroxamato) Rhodate(III) Pentahydrate gives light red brown solution. The structure aspect has been considered in detail after taking into account the magnetic properties, spin state and infrared spectrum of the complex.



Structurally the complex may be represented as above.

Conclusion: Synthesis and Structure of the Rhodium complex with benzohydroxamic acid from the stand point of its preparation, formation of complex, quantitative estimation of elements presents in the complex and to compare the theoretical values with experimental data results of these investigation.

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