

## NOTE

## Studies on Aluminium(III) Complexes of Some Chelating Organic Compounds

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Aluminium(III) complexes of some chelating organic compounds, viz., *o*-amino phenol, anthranilic acid, vanilline, salicylaldehyde or salicylic acid, have been synthesized and characterised.

Aluminium is the third most abundant element in the earth's crust. It finds varied applications in food and pharmaceuticals industries. Studies in its coordination chemistry would be of applied value. As a part of our studies<sup>1-5</sup> on non-transition metal complexes we have presently synthesized and characterised aluminium(III) complexes of general formula  $[ML_3]$ , where  $M = Al^{3+}$ ,  $L =$  deprotonated *o*-amino phenol (OAP), anthranilic acid (Anth), vanilline (Van), salicylaldehyde (Sald) or salicylic acid (Sal).

Complexes have been found to be stable when stored under dry condition. Physical and analytical data are shown in Table-1. Analytical results suggest a 1 : 3 mole ratio between metal and ligand. Following scheme of reaction is indicated:

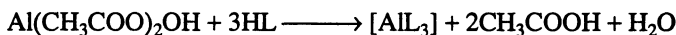


TABLE-1  
PHYSICAL AND ANALYTICAL DATA OF ALUMINIUM(III) COMPLEXES

Compound (Colour)	Decomposition temp. (°C)	Analysis % Found/(Calcd.)			
		Al	C	H	N
[Al(OAP) <sub>3</sub> ] (Brown)	280	7.48 (7.69)	62.14 (61.54)	4.86 (5.13)	10.91 (11.96)
[Al(Anth) <sub>3</sub> ] (Light grey)	275	6.08 (6.21)	58.32 (57.93)	4.31 (4.14)	9.48 (9.65)
[Al(Ven) <sub>3</sub> ] (Light yellow)	180	5.51 (5.62)	59.12 (60.00)	4.23 (4.37)	– –
[Al(Sald) <sub>3</sub> ] (Grey)	220	6.23 (6.92)	65.18 (64.61)	3.98 (3.85)	– –
[Al(Sal) <sub>3</sub> ] (White)	240	5.52 (6.16)	58.13 (57.53)	3.64 (3.42)	– –

Infrared spectra of *o*-aminophenol shows bands at 3375 and 3303  $\text{cm}^{-1}$  which may be assigned to  $\nu(\text{OH})$  and  $\nu(\text{NH})$  respectively. Upon complexation with aluminium the  $\nu(\text{OH})$  band disappears and the  $\nu(\text{NH})$  band shifts down to ca. 3000  $\text{cm}^{-1}$  suggesting deprotonations of phenolic-OH and coordination of NH to the metal. The  $\nu(\text{NH})$  of anthranilic acid appears as a sharp band at 3373  $\text{cm}^{-1}$  which splits into two upon complexation, showing at 3375 and 3145  $\text{cm}^{-1}$ . This suggests  $\text{NH}_2$  coordination to the metal. In the spectra of vanilline the bands at 3530, 1650, 1260 and 1040  $\text{cm}^{-1}$  be assigned to  $\nu(\text{OH})$ ,  $\nu(\text{CHO})$ ,  $\nu(\text{C—O})$  and  $\nu(\text{OCH}_3)$ , respectively. In its aluminium(III) complex the band at 3530  $\text{cm}^{-1}$  disappears suggesting deprotonation of phenolic-OH to bind to the metal. The  $\nu(\text{OCH}_3)$  band shift down to 1028  $\text{cm}^{-1}$  suggesting coordination of vanilline through  $\text{OCH}_3$ . The  $\nu(\text{C—O})$  band also shifts down by 55  $\text{cm}^{-1}$  indicating coordination through C—O (phenolic). The  $\nu(\text{CHO})$  band of vanilline remains mostly undisturbed upon complexation indicating its non-coordination. This may be due to its stereochemical non-availability for chelate ring formation. In case of Salicylic acid the  $\nu(\text{OH})$  spotted at 3238  $\text{cm}^{-1}$  (hydrogen-bonded), splits up into two on complexation, occurring at 3251 and 3074  $\text{cm}^{-1}$ . This indicates coordination of OH to the metal. The  $\nu_{\text{asym}}(\text{COO}^-)$  and  $\nu_{\text{sym}}(\text{COO}^-)$  identified at 1581 and 1407  $\text{cm}^{-1}$  respectively in salicylic acid complex suggest involvement of  $\text{COO}^-$  in bonding. In salicylaldehyde the  $\nu(\text{OH})$  and  $\nu(\text{CHO})$  bands occur at 3240 and 1665  $\text{cm}^{-1}$  respectively. The low positions might be due to strong intramolecular hydrogen-bonding. Upon complexation with aluminium the  $\nu(\text{OH})$  band disappears and  $\nu(\text{CHO})$  band shifts down to 1631  $\text{cm}^{-1}$  indicating deprotonation of phenolic OH and coordination through CHO to bind to the metal.

the complexes were prepared by the general method of interaction of a suspension of aluminium acetate,  $\text{Al}(\text{CH}_3\text{COO})_2\text{OH}$  in acetone with the ligand in 1 : 3 mole ratio. The reaction mixtures were refluxed with constant stirring on a hot plate magnetic stirrer for 1 h. The resulting compounds were filtered, washed with the solvent and dried at 100°C.

## REFERENCES

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