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NOTES

Synthesis, Spectral and Antibacterial Studies on Rare-Earth Metal Complexes with 1-Hydroxy-1-phenyl-3-benzoyl-2-thiourea

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1-Hydroxy-1-phenyl-3-benzoyl-2-thiourea (HPBT) and its complexes with Y(III), Sm(III) and Gd(III) were synthesised and screened for their antibacterial activity against some gram positive as well as gram negative bacteria. All the metal complexes possessed good antibacterial activity against *E. coli*, *staphylococci* and *streptococci* species. The newly synthesised complexes have been characterised by elemental analysis and spectral studies.

Thiourea derivatives have been widely used as therapeutic agents[1–3]. Recently extensive investigations were carried out in the synthesis and biological activity of heterocyclic compounds and their metal complexes. In the present work few metal complexes have been synthesised and screened for their possible antibacterial activity.

1-Hydroxy-1-Phenyl-3-benzoyl-2-thiourea was prepared by condensing equimolar quantities of phenylhydroxylamine and phenyl-isothiocyanate in ether[4,5].

The metal complexes were prepared by refluxing 1-hydroxy-(1-phenyl)-3-benzoyl-2-thiourea (HPBT) solution (0.05 M in 30 ml ethanol) and metal nitrate solution (yttrium nitrate, samarium nitrate and gadolinium nitrate) (0.05 M in 15 ml ethanol) for *ca.* 5 hrs. The coloured solids so separated were filtered washed with water and acetone and dried in vacuo. The microanalytical results reveals that these complexes have the composition $M(AB)_2NO_3$ where M = Sm^{3+}, Gd^{3+} and Y^{3+}.

The IR spectra of ligand shows bands around 3270–3230 cm^{-1} due to N—H stretching vibration. In the case of metal complexes these bands have been observed in the range 3240–3200 cm^{-1} bands due to N—C—N and C=S are observed in the region 1510–1475 cm^{-1} and 1210–1200 cm^{-1} respectively. In case of metal complexes bands assignable to C=S have been shifted to lower frequencies indicating that sulphur atom of the ligand is involved in bonding.

The antibacterial activity was carried out using cup-plate method at a concentration of 500 mg. ml^{-1} in DMF against *streptococci*, *staphylococci*, *E. coli*, *proteus* and *pseudomonas* species. The results are shown in Table 1. All the metal complexes showed good antibacterial activity against

TABLE 1

ANTIBACTERIAL ACTIVITY OF METAL COMPLEXES OF 1-HYDROXY-1-PHENYL-3-BENZOYL-2-THIOUREA

Compound	Activity (Zone of Inhibition)				
	E. Coli	Proteus Sp.	Pesudomonas Sp.	Streptococci Sp.	Staphylococci Sp.
$Gd(HPPT)_2NO_3$	++	+	−	−	++
$Sm(HPPT)_2NO_3$	++	+	−	−	++
$Y(HPPT)_2NO_3$	+++	++	−	+	++

E. coli, proteus and *staphylococci* species whereas *streptococci* and *pseudomonas* species were found resistant.

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