

NOTE

Reactions of N-Hydroxy-N-o-Tolyl-N'-(2-Methyl) Phenyl Benzamidine Hydrochloride with Various Metal Ions

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Reactions of N-hydroxy-N-o-tolyl-N'-(2-Methyl) phenyl benzamidine hydrochloride (HTPMBH) with different metal ions have been studied in the present investigation. Studies reveal that the reagent reacts with Cu(II) and Ni(II) to form water-insoluble complexes of definite composition. These complexes are thermally stable. Gravimetric estimation of these metal ions can be carried out using this reagent. V(V) forms violet water-insoluble complex which can be extracted in chloroform in 1 M to 10 M acetic acid. The extraction is quantitative and can be utilised for spectrophotometric determination of V(V). Fe(III) forms orange-red complex extractable in benzene in presence of thiocyanate. The mixed ligand complexes of iron(III), vanadium(V) and molybdenum(V) show the promising results of using the reagent for selective extraction and subsequent determination of these metals.

Key Words: N-Hydroxy-N-o-tolyl-N'-(2-methyl) phenyl benzamidine hydrochloride, Reactions, Metal ions, Complexes

N-Hydroxy-N,N'-diaryl benzamidine monobasic and bidentate chelating agents have been first synthesised by Ley and Holzweissing^{1,2} and analytical potentialities of these were recognised by Mishra *et al.*³⁻⁷

The special feature of these reagents is that by substitution in the phenyl group attached to coordinating nitrogen, the complexing properties can be modified. The reactions of newly synthesised reagent, N-hydroxy-N-o-tolyl-N'-(2-methyl) phenyl benzamidine hydrochloride (HTPMBH) have been studied. It was found that newly synthesised ligand reacts with Cu(II), Ni(II), Mo(V) producing heavy granular precipitates which were insoluble in hot water and many common organic solvents. In some cases coloured complexes are obtained which were soluble in ethanol. Some metal ions reacted with this reagent in presence of various complexing agents like aldehydes, carboxylic acids, thiocyanate, azide etc. forming coloured chloroform extractable mixed complexes.

The reactions of the reagents towards the metal ions were studied by using the

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procedure described by West⁸. The completeness of the precipitate was ascertained by spot test technique⁹.

Systronic pH-meter type 321 was used for all pH measurements. A Carl Ziess spekol spectrophotometer was employed for absorbance measurement. Sintered glass crucibles having G-3 porosity were employed for collecting the precipitate.

Reagent Solution: Generally 1 to 2 per cent (w/v) solution of reagent in ethanol was employed for precipitation work and 0.1 per cent (w/v) solution in chloroform or benzene was used for colour development and extraction.

General procedure: 1 mL aliquot of the solution containing approximately 5 mg of metal ion was taken in a 100 mL beaker and diluted to 50 mL. The pH of the solution was lowered by the addition of acetic acid. To this, the alcoholic reagent solution was added dropwise with constant stirring. The pH of the solution was slowly increased by addition of ammonium and the initial pH at which any precipitation or colouration commenced was recorded. The precipitates were digested on boiling water bath, filtered off, washed and finally dried at 110–120°C.

The analytical data of reactions with various metal ions is shown in Table-1.

TABLE-1
ANALYTICAL DATA OF REACTIONS WITH VARIOUS METAL IONS

Metal Ions	Complexing Agent HTPMBH and	Approximate pH/Acidity Range	Characteristics of Complex
Cu(II)	–	3.5–10.0 M	Buff coloured complex insoluble in hot water and common organic solvents.
V(V)	Acetic Acid	1.0–10.0 M	Blue-violet complex extractable into chloroform, ϵ , 4200 at 580 nm.
V(V)	Thiocyanate	0.8–3.2 M	Blue-violet complex extractable into chloroform, ϵ , 4000 at 580 nm.
V(V)	4-Hydroxy benzaldehyde	2.3–5.1 M	Greenish blue complex extractable into chloroform, ϵ , 8280 at 580 nm.
V(V)	Salicylaldehyde	2.6–6.0 M HCl	Green-blue complex extractable into chloroform, ϵ , 5100 at 588 nm.
Fe(III)	Thiocyanate	0.25–0.60 M	Orange red complex extractable into benzene, ϵ , 11480 at 470 nm.
Fe(III)	Benzoic acid	2.5–5.8 M	Red purple complex extractable into benzene, ϵ , 330 at 530 nm.
Mo(V)	Thiocyanate	2.1–3.9 M HCl	Orange red complex extractable into benzene, ϵ , 3690 at 470 nm.

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REFERENCES

1. H. Ley, *Ber.*, **34**, 2620 (1901).
2. H. Ley and Holzweissing, *Ber.*, **36**, 18, (1903).
3. K. Saryanarayana and R.K. Misra, *Anal. Chem.*, **46**, 1605 (1974).
4. _____, *Indian J. Chem.*, **13**, 295 (1975).
5. K.K. Deb and R.K. Mishra, *J. Indian Chem. Soc.*, **53**, 178 (1976).
6. K.S. Satyanarayana and R.K. Mishra, *J. Indian Chem. Soc.*, **53**, 63, 928 (1976); **55**, 787 (1978).
7. K.S. Patel and R.K. Mishra, *J. Indian Chem. Soc.*, **55**, 462 (1978).
8. P.W. West, *J. Chem. Edu.*, **18**, 528 (1941).
9. F. Feigl, *Spot Test in Inorganic Analysis*, 5th Edn., Elsevier Publishing Co., Amstcrdam (1958).

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