

A Case study :

## Synthesis and characterization of Cu (II) complexes of dithiocarbamates with different substituents

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### ABSTRACT

The ligands, disodium diethylenetriamine bis(dithiocarbamate), diendtc and disodium triethylenetetramine bis(dithiocarbamate), triendtc have been prepared and Cu(II) complexes of these ligands along with pyrrolidine dithiocarbamate are synthesized. These Cu(II) dithiocarbamate complexes are characterized by elemental analysis, IR, UV, and ESR. The electronic spectra of Cu(II) dithiocarbamate complexes are indicative of square planar ( $D_{2h}$ ) symmetry which is supported by ESR spectra of these complexes. The ESR Spectra are also indicative of substantial distortion in Cu(diendtc) and Cu(triendtc) complexes

**KEY WORDS :** Cu (II) Complexes, Elemental analysis, IR, UV and ESR spectra

**How to cite this paper :** Kakoti, Dwipen and Gogoi, P.K. (2011). Synthesis and characterization of Cu (II) complexes of dithiocarbamates with different substituents. *Asian J. Exp. Chem.*, 6 (2):115-118.

**Received :** 31.08.2011; **Revised :** 12.10.2011 ; **Accepted :** 15.11.2011

### Synthesis of the ligands:

#### Ammonium pyrrolidine dithiocarbamate:

Pyrrolidtc of AR grade was obtained from LOBA chemical.

#### Synthesis of disodiumdiethylenetriamine bis (dithiocarbamate), diendtc:

This was prepared by reacting 50 ml diethylenetriamine (18ml,1M) with 50ml NaOH(6g,1M) and  $CS_2$ (18ml,2M)in distilled methanol under ice- cold condition. The NaOH solution was first added to diethylenetriamine slowly through constant stirring.The  $CS_2$  solution was finally added dropwise under constant stirring. The white precipitate thus formed, was filtered in a Buchner funnel and washed several times with methanol and dried in air. Yield  $\approx$ 78 per cent.

#### Preparation of disodium triethylenetetraamine bis(dithiocarbamate), triendtc:

The disodium triethylenetetraamine bis (dithiocarbamate) was prepared by reacting 50 ml triethylenetetraamine(22.5ml,1M) in distilled methanol, under ice cold condition using similar procedure as described above. Yield  $\approx$ 70 per cent.

### Synthesis of copper complexes with the ligands:

*Bis (pyrrolidine dithiocarbamate) Cu(II), Cu (pyrrolidtc)<sub>2</sub>:*

It was prepared by adding methanolic solution of

pure cupric acetate (recrystallised,0.1M) to methanolic solution of ammonium pyrrolidine dithiocarbamate(0.2M). The brown coloured precipitate of *Cu (pyrrolidtc)<sub>2</sub>* was obtained which was filtered in a Buchner funnel, washed several times with methanol and finally dried in a dessicator.Yield  $\approx$  65 per cent. It was then recrystallised from methanol-dichloromethane(1:3) mixture.

#### Diethylenetriamine bis(dithiocarbamate) Copper (II), Cu (diendtc):

This brownish yellow complex was prepared by the reaction between methanolic solution of cupric acetate (0.1M) and disodium salt of the ligand(0.1M) in water-methanol (1:3)mixture, through constant stirring employing similar procedure as described above. Yield  $\approx$  40 per cent.

#### Triethylenetetraamine bis (dithiocarbamate) copper(II), Cu(triendtc);

The brown coloured complex was obtained by the reaction of methanolic solution of cupric acetate(0.1M) with disodium salt of the ligand(0.1M) in water-methanol (1:1)mixture employing similar procedure as described above. Yield  $\approx$  30 per cent.

### Physical measurements:

#### Elemental analysis:

#### Determination of sulphur<sup>79</sup>:

About 300mg of Cu-complex of the ligand was taken