

**Research Paper** 

**CHEMISTRY** 

# Synthesis and Photophysical Properties of a Schiff Base Derived from Pyrole-2-Aldehyde and 3,3'-Diamino-N-Methyl Dipropyl Amine

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# ABSTRACT

Schiff base ligands have been extensively studied in co-ordination chemistry, mainly due to their facile synthesis, tunable steric and electronic properties. It is well known that ligands containing 'N' and 'O' atoms can easily co-ordinate metal ions. Therefore Schiff base ligands possessing N,O-donor and chromophore groups are of important building

blocks to construct luminescence complexes[1]. The pyrolide anions have received particular research interest, because they offer a reasonable mimic of the cyclopentadienyl functions and could act as competent  $\eta$ 5 ligand. Additionally, the pyrolide anions afford the possibility of forming  $\sigma$ -bond through the ring nitrogen donor, providing tunable steric and electronic features required for compensating coordinative unsaturation of metal atoms and enhancing catalytic activity towards polymerization[2]. We have successfully synthesized one of such ligand starting from pyrole-2-aldehyde.

### **KEYWORDS**:

### Synthetic Procedure

Pyrole-2-aldehyde( 0.1902gm, 2mmol ) was dissolved in 10ml methanol. To the solution 1mmol 3,3'-diamino-N-methyl dipropyl amine( 0.1612ml ) was added drop wise with constant stirring. After complete addition the whole reaction mixture was refluxed for 30 mins. A light pink transparent solution of the desired ligand was formed.



### The ligand



#### **Optimized Structure of the ligand**

The model structure of the ligand was prepared using Gaussview and was subjected to optimization with B3LYP[3] as density functional and 6-31g(d,p)[4] as basis set using Gaussian-09 package[5]. The optimized structure did not show any imaginary mode and thus a true energy minima. The optimized structure is shown in Fig. 1.



Fig. 1. Optimized Structure of the Ligand



#### Absorption Property Fig. 2 UV-VIS spectrum of the ligand

The UV-VIS study of the ligand was performed in its methanolic solution at room temperature. The ligand shows strong absorption band at ~360, ~400 and ~410 nm. The absorption of the ligand is due to intra ligand  $\pi - \pi$  electronic transition. The UV-VIS spectra is shown in Fig. 2.

**Emission Property** 



#### Fig. 3 Emission Spectra of the ligand

The emission behavior of the ligand was investigated at room temperature (298 K) in methanol solution. When the methanolic solution of the free ligand was excited with a wave length of 360 nm ( i.e.  $\lambda_{_{\!Ex}}$ = 360 nm ) the species shows emission maxima at 564 nm (  $\lambda_{\rm Fm} = 56\overline{4}$ nm ). The emission of the species is due to  $\pi^*$  -  $\pi$  intraligand transition. The emission spectrum of the ligand is shown in Fig. 3.

#### Conclusion

A new ligand was synthesized by Schif base condensation reaction. The probable structure was reported. The absorption and emission properties was investigated in solution phase. The emission maxima at 564 nm is probably due to intraligand  $\pi^*$  -  $\pi$  transition.



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