

## ABSTRACT

The present work describes the synthesis of Cobalt metal complexes derived from 3,4 PDA under various conditions like reflux, hydrothermal and Co-ligand like Azide and 4,4 bipyridine. In  $[\text{Co}_2(3,4 \text{ PDA}) \cdot 8\text{H}_2\text{O} \cdot \text{Bipyd}] \cdot \text{NO}_3^-(7)$ , Cobalt 13 is six coordinated through [O(39), O(40), O(41) and O(42)] oxygen atoms from four water molecules and two nitrogen atom [N(3)] and [N(15)] from 4,4-bipyridine and 3,4 PDA respectively to generate  $\text{CoN}_2\text{O}_4$  octahedral geometry. Cobalt 26 is six coordinated through [O(21) and O(22)] oxygen atoms from 3,4 PDA and four oxygen from water molecules [O(27), O(28), O(29) and O(30)]. One nitrate anion may be placed in lattice.

In  $[\text{Co}_2(3,4 \text{ PDA}) \cdot 7\text{H}_2\text{O} \cdot \text{N}_3] (9)$ , Cobalt 13 is six coordinated through [O(8) and O(9)] from TMA, three oxygen atoms from water molecules [O(30), O(31) and O(32)] and one nitrogen atom [N(27)] from azide to generate  $\text{CoNO}_5$  octahedral geometry. Cobalt 14 is six coordinated through [O(9) and O(11)] oxygen atoms from 3,4 PDA and four oxygen from water molecules [O(15), O(18), O(21) and O(22)].

Results of CHNS analysis have been in good agreement with the proposed structures, while FT-IR spectroscopy also supports the binding of ligand with metal. Effective Photoluminescence quenching was observed by complex 7 and 9 against illicit materials like lead, picric acid and nitro alline, copper sulfate, methanol. While no significant emission intensity was observed for complex 2