



Survey of Cambridge structural data base (CSD 2017), reveals 4 hits of pyridine-2,4,6-tricarboxylic acid (PTA) with cerium has been reported. The present work describes the synthesis of complexes derived from PTA with cerium and heterometallic metals such as europium, silver and cobalt under sono-chemical method. In $[\text{Eu}(\text{PTA})_{1.5} \cdot 4\text{H}_2\text{O} \cdot \text{Ce}(\text{PTA})_{1.5} \cdot 3\text{H}_2\text{O}]$ (3) Europium is nine coordinated by conventional *O-N-O* tridentate fashion such as oxygen atoms [O(9), O(11) and N(3)] of PTA ligand, two oxygen atoms oxygen atoms [O (23) and O(24)] of another PTA and four coordinated water molecules [O(57), O(58), O(63) and O(64)]. In the same complex Cerium is nine coordinated by conventional *O-N-O* tridentate fashion from two PTA ligands such as oxygen atoms [O(25), O(29) and N(18)] and [O (43), O(44) and N(33)] and three coordinated water molecules [O(48), O(51) and O(52)] to generate tricapped trigonal prismatic geometry. In $[\text{Ag}_2(\text{PTA})_{1.5} \cdot \text{Ce}(\text{PTA})_{1.5}]$ (1), Silver is four coordinated by oxygen atoms [O(8), O(9), O(23) and O(24)] from two PTA ligands, while other silver is coordinated by conventional *O-N-O* tridentate fashion such as oxygen atoms [O(12), O(15) and N(4)] from other PTA ligand. In the same complex Cerium is six coordinated by conventional *O-N-O* tridentate fashion from two PTA ligands such as oxygen atoms [O(28), O(29) and N(18)] and [O (43), O(44) and N(33)] to generate octahedral geometry. In $[\text{Co}(\text{PTA}) \cdot \text{Co}(\text{PTA})_{0.5} \cdot 3\text{H}_2\text{O} \cdot \text{Ce}(\text{PTA})_{1.5}]$ (2), Cobalt is four coordinated by oxygen atoms [O(8), O(9), O(23) and O(24)] from two PTA ligands, while other cobalt is coordinated by conventional *O-N-O* tridentate fashion such as oxygen atoms [O(12), O(15) and N(4)] from other PTA ligand and three water molecules [O(49), O(50), and O(51)]. In the same complex Cerium is six coordinated by conventional *O-N-O* tridentate fashion from two PTA ligands such as oxygen atoms [O(28), O(29) and N(18)] and [O (43), O(44) and N(33)] to generate octahedral geometry. Effective photoluminescence analysis was investigated for picric acid and observed significant change in emission intensity against Cerium metal complexes.

On quenching with these quenchers, it was observed that these have strong affinity for these compounds which shows that the pyridine ring of the ligand can absorb energy and later, transfers it to the metal ion of complex. The complexes proved to be good sensors of explosives and toxic material when their quenching effect was observed against picric acid. The study suggested that complex 2 can be used in degrading the dye methylene blue in waste water of textile as well as other industries and complex 3 can be used in the development of sensors for picric acid.