

# The crystal structure and thermal stability of [bis-picrate(pentaethylene glycol)]praseodymium(III)picrate complex

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[Bis-picrate(pentaethylene glycol)]praseodymium(III) picrate,  $[\text{Pr}(\text{pic})_2 \cdot (\text{EO5})^+ [\text{pic}]^-]$ , was successfully obtained from the reaction of praseodymium nitrate hexahydrate, picric acid and pentaethylene glycol in acetonitrile–methanol as solvent. The crystal system is monoclinic with space group  $P2_1/c$ ,  $a = 18.91419(11) \text{ \AA}$ ,  $b = 9.0470(6) \text{ \AA}$ ,  $c = 24.1209(14) \text{ \AA}$  and  $\alpha = \gamma = 90^\circ$ ,  $\beta = 109.07(1)^\circ$ ,  $V = 3880.3(4) \text{ \AA}^3$  and  $Z = 4$ . The Pr atom is coordinated to the flexible and open EO5 ring via all the six oxygen atoms and two picrate ligands, one via phenoxo oxygen atom and the other one with both phenoxo and nitro oxygen atoms in a bidentate manner resulting a 9-coordinate tricapped trigonal prismatic geometry. The two picrate ligands coordinated to the Pr atom are at the opposite sides of the hexadentate EO5 ring with phenyl fragments almost perpendicular with dihedral angle of  $89.7(3)^\circ$ . Thermal analysis results show that the complex is stable up to  $100^\circ\text{C}$  when it began to slowly decompose and followed by an explosive decomposition at  $290^\circ\text{C}$ .

**KEY WORDS:** Pentaethylene glycol; lanthanide; praseodymium complex; picrate complex; PEG.

## Introduction

The selective complexation behaviour of lanthanide ions and the flexibility of the macrocyclic polyethers that offer their donor atoms for coordination have been extensively investigated.<sup>1–6</sup> Polyethylene glycol (PEGs) are series of polyethers of much interest due to the

flexibility and chelation sites of the PEG that seem well suited for lanthanide coordination. It is envisaged that the open-chain structure will offer a greater degree of flexibility relative to the cyclic structure as the cavity is fixed. Acyclic polyether complexes are thus able to coordinate in a variety of fashion including planar, crown ether-like wrapping, helical wrapping, and bridging interactions involving terminal oxygen donors.<sup>6</sup> Most of the complexes reported are of the type  $[\text{MX}_n(\text{PEG})]$  or  $[\text{MX}_n \cdot \text{OH}_2(\text{PEG})]^+ [\text{X}_n^-]$  where X can be halogen, nitrate,  $\text{H}_2\text{O}$  etc. The conformation of the PEG ligands was found to be dependent on the Ln(III) metal ions, and the chain length of the PEG ligands which affect the

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