

Poster Presentation

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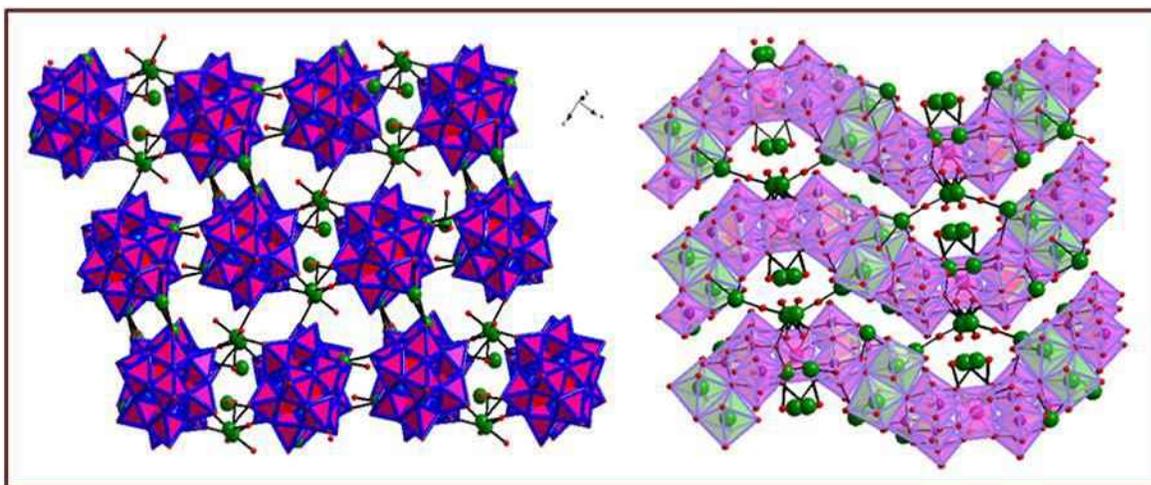
The synthesis of lanthanide based sandwich type polyoxometalates

A. Kaur¹, M. Hundal¹

¹Department of Chemistry, Guru Nanak Dev University, Amritsar, Punjab, India

Polyoxometalates (POMs) have been declared as a rising field in advance inorganic chemistry, since the first polyanion was reported by Berzelius in 1826. Polyoxometalates (POMs) containing Keggin and Wells-Dawson moieties are chemically robust and can be easily modified with incorporation of different metal ions [1]. The incorporation of Ln(III) ions into polyoxometalates offers unique functionality for generation of new complexes containing luminescent, magnetic, catalytic and surface functional properties [2]. Ln(III) ions are having multiple coordination number, can link polyoxometalates into solid-state oligomers, sandwich-type and large wheel structures. Mono-lacunary or mono-vacant sandwich type clusters are obtained by removing octahedral metal atoms from POM cluster and connecting two POM units by lanthanide ions. These complexes are having interesting magnetic properties due to valence electrons in 4f and may behave like single molecular magnets, as reported in literature. These also exhibit photoluminescence properties followed by excitation of O-W ligand to metal charge transfer. In Ln-POMs, Ln ions can play important role in connecting POM units due to their high oxophilicity and coordination flexibility. Moreover, the assembly of purely inorganic POM-based frameworks occupies high potentiality for the synthesis of new porous materials which combine the thermodynamic stability of zeolites and mesoporous silicas [3]. So taking a cue from the literature, we have studied the interactions of polyoxometalate anions with different lanthanide ions like Eu(III), Nd(III), Sm(III) and Gd(III). The above mentioned Ln(III) based complexes are sandwich type, have been isolated and characterized by means of FT-IR spectroscopy, thermo gravimetric analysis (TGA) and X-ray single crystal analysis. Single-crystal X-ray diffraction analyses shows that in these POM units the Ln(III) ion(s) substitute for [WO]₄⁺ unit(s) in the 'cap' region of the tungsten-oxygen framework of the parent Keggin ion. In each cluster, sandwich structures in the asymmetric unit are linked by K(I) cation. Each potassium atom is coordinated with terminal oxygen atoms and these terminal oxygen atoms are forming bridge between Ln(III) and K(I) ions. The coordination numbers of potassium metal ions vary from 6 to 11 in different clusters. These bridging K⁺ ions are responsible for 3-D structure in each complex.

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3-D view of Ln³⁺ and polyoxometalate based sandwich type clusters

Keywords: sandwich type polyoxometalates