**Frustrated effect in Co2+ spin-3/2 zigzag chains**

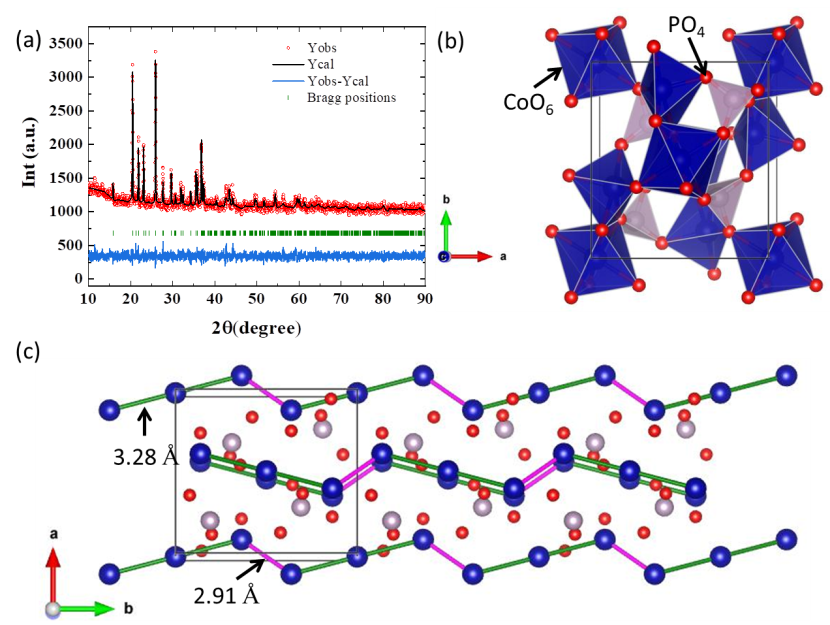
**Compound: Co3P2O8**

Shalini Mishra2, Ritu Kumawat1, Sunidhi Chouhan1, Isha1, Koushik Chakraborty1, Netram Kaurav2, A. K. Yogi1

1*UGC-DAE Consortium for Scientific Research, University Campus, Khandwa Road, Indore-452001, India*

*2Govt. Holkar Science College, A.B. Road, near Bhawarkua Square, Indore, Madhya Pradesh 452001 India*

Email address –imshalini09@gmail.com



**Fig. 1**: XRD & crystal structure of Co3P2O8.

The search for exotic ground states in low-dimensional quantum magnets with geometric frustration has been a very active research field of both theoretical and experimental studies. We report a comprehensive investigation of the synthesis of new low-dimensional quantum magnets and studied their structural properties in detail. We have used solid-state reaction technique to prepare Co3P2O8 polycrystalline sample. To check the synthesis progress and structural properties of Co3P2O8, we have used the lab source 1.54 Å (Cu-*Kα*) x-ray diffraction technique which confirms the formation of single-phase monoclinic compound with lattice parameters *a* = 7.556, *b* = 8.371, *c* = 5.064, *α* = 90, *β* = 94.05˚, *γ* = 90˚ and the space group *P 21/n* at 700 ˚C. We have observed the color of the material changed from black to purple at the above-mentioned temperature. For detailed crystallographic information of the synthesized compound we have used Rietveld refinement method over collected powder x-ray diffraction data and the goodness of fit values obtained are found to be χ2 = 1.38 and R-factor = 2.71. The representative refined pattern is shown in Fig. 1 (a) indicating the synthesized compound is in single phase and has monoclinic *P 21/n* symmetry. The crystal structure of Co3P2O8 compound in crystallographic *ab*-plane is shown in Fig. 1 (b). From our bond valance sum (BVS) analysis we found that Co is in +2 oxidation state. Interestingly, Co2+ ions are forming 1D zigzag chains along the crystallographic direction *b*-axis are shown in Fig. 1 (c). The zigzag chains of Co2+ ions can introduce frustration in the magnetic-lattice. The shorter bond-distances of Co-Co atoms indicate Co3P2O8 host dimers (2.91 Å) in the lattice may show interesting magnetic properties.