Three non-isostuctural zinc(II) coordination polymers were synthesized (varying the time of reaction or the molar ratio of reagents) under mild hydrothermal conditions ($T = 140^\circ C$) by mixture of zinc(II) acetate with 2-carboxyethylphosphonic acid and 1,10'-phenanthroline. All products were obtained as colorless single-crystals, but with different morphology. Their structures were determined by single-crystal X-ray diffraction, and the corresponding thermal stability is studied. Compound \([\text{Zn}_6(\text{HO}_3\text{PCH}_2\text{CH}_2\text{COO})_2(\text{C}_12\text{H}_8\text{N}_2)_1(\text{H}_2\text{O})_2]\) is monoclinic (space group \(P2_1/c\)) and crystallizes as discrete dimeric molecules, with one water molecule coordinated to each Zn atom, similarly to a previous reported structure \([1]\). Compound \([\text{Zn}_5(\text{HO}_3\text{PCH}_2\text{CH}_2\text{COO})_4(\text{C}_12\text{H}_8\text{N}_2)_4(\text{H}_2\text{O})_{0.32}\] (\(\text{ZnP}^3\)) is also monoclinic (space group \(C2/c\)) and crystallizes as a tridimensional network, presenting channels in which water molecules are placed. One peculiarity of this compound is the presence of three different Zn atoms (four-five-six coordinated) in their structure. Although there are some examples in the literature which shows this feature \([2-6]\), all of these consist in discrete molecules. Here we present the first tridimensional coordination polymer (MOF) with three Zn atoms having different coordination number. Compound \([\text{Zn}_6(\text{HO}_3\text{PCH}_2\text{CH}_2\text{COO})_2(\text{C}_12\text{H}_8\text{N}_2)_1(\text{H}_2\text{O})_2]\) (\(\text{ZnP}^1\)) is monoclinic (space group \(P2_1\)) and crystallizes forming 2D layered packing, with water molecules located in channels along \(a\)-axis. This compound also presents three different Zn atom in the structure (four-six-coordinated). For these three compounds, structural features, including H-bond network and the \(\pi-\pi\) stacking interactions were reported and discussed here.

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