

研究快报

## 二十元环超大孔磷酸亚磷酸锌锰的合成与结构

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**摘要** 本文以1,3-环己二甲胺[1,3-Cyclohexanebis(methylamine), CHBMA]为模板剂, 采用水热法合成了微孔磷酸亚磷酸锌锰  $[\text{H}_2\text{CHBMA}][\text{Zn}_{1.5}\text{Mn}(\text{HPO}_3)_2(\text{PO}_4)]\cdot\text{H}_2\text{O}$ (命名为TJPU-3Mn), 单晶结构解析显示该化合物为首个与超大孔磷酸铝JDF-20具有相同拓扑结构的微孔晶体, 沿 $c$ 方向具有二十元环超大孔道, 孔道中的CHBMA分子均为顺式构象, 有望用于分离和识别CHBMA异构体。

**关键词** [水热合成](#) [磷酸亚磷酸锌锰](#) [单晶结构](#)

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## Synthesis and Structure of Manganese Zinc Phosphate-phosphite with Extra Large Twenty-membered Ring Channels

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**Abstract** A novel three-dimensional manganese zinc phosphatophosphite  $[\text{H}_2\text{CHBMA}][\text{Zn}_{1.5}\text{Mn}(\text{HPO}_3)_2(\text{PO}_4)]\cdot\text{H}_2\text{O}$ (TJPU-3Mn) with extra-large twenty-membered ring channels was isolated by 1,3-cyclohexanebis(methylamine) as the template under hydrothermal conditions. Single crystal structure refinement reveals that TJPU-3Mn crystallizes in the monoclinic space group  $C2/c$ , with cell parameters,  $a=3.3929(7)$  nm,  $b=1.3045(3)$  nm,  $c=0.89713(18)$  nm,  $\beta=104.37(3)^\circ$ ,  $V=3.8465(13)$  nm<sup>3</sup>,  $Z=2$ . The connectivities of the  $\text{ZnO}_4$ ,  $\text{MnO}_4$ ,  $\text{PO}_4$  and  $\text{HPO}_3$  groups create a three-dimensional porous architecture with extra-large twenty-membered ring channels intersected by eight-membered rings. It is the first structure analogue to the famous aluminophosphate JDF-20. More interestingly, the diprotonated CHBMA cations in the channel are all in *cis* configuration, indicating the potential for separation and recognition of CHBMA isomers. Powder X-ray patterns reveal the structure of TJPU-3Mn sustains after the emission of water molecules obtained by calcining at 150 °C for 2 h.

**Key words** [Hydrothermal synthesis](#) [Zinc manganese phosphate-phosphite](#) [Single crystal structure](#)

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