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电荷转移配合物 $(C_2H_8N)_3(PW_{12}O_{40}) \cdot 2H_2O$ 的合成及催化性质

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Synthesis and Catalytic Properties of the Charge Transfer Compound $(C_2H_8N)_3(PW_{12}O_{40}) \cdot 2H_2O$

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- 摘要
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摘要 采用水热法, 在DMF-水溶剂中合成出一种新型的电荷转移配合物 $(C_2H_8N)_3(PW_{12}O_{40}) \cdot 2H_2O$, 利用红外光谱和差热重对其进行结构表征和热稳定分析, 并通过X-射线单晶衍射对其结构进行确证. 结果表明, 配合物属于三方晶系, $R3m$ 空间群, 晶胞参数为 $a=1.626\ 82(12)\ nm$, $b=1.626\ 82(12)\ nm$, $c=2.481\ 9(4)\ nm$, $\alpha=90^\circ$, $\beta=90^\circ$, $\gamma=120^\circ$, $V=5.688\ 4(11)\ nm^3$, $Z=6$, $R1=0.057\ 7$, $wR2=0.144\ 4$, $S=1.006$. 配合物对甲醇具有较好的催化活性, $175\ ^\circ C$ 时, 当甲醇初始浓度为 $5.37\ g \cdot m^{-3}$, 流速为 $4.51\ mL \cdot min^{-1}$, $0.20\ g$ 催化剂对甲醇的消除率达到59%.

关键词: 磷钨酸盐 水热合成 催化 消除 甲醇

Abstract: A new charge-transfer compound $(C_2H_8N)_3(PW_{12}O_{40}) \cdot 2H_2O$ synthesised by hydrothermal technology using DMF-water as solvent which was characterized by IR spectroscopy, TG-DTA and single-crystal X-ray diffraction. The results show that the compound belongs to the trigonal system, $R3m$ space group, and the cell parameters. Crystal data: trigonal, space group: $R3m$, $a=1.626\ 82(12)\ nm$, $b=1.626\ 82(12)\ nm$, $c=2.481\ 9(4)\ nm$, $\alpha=90^\circ$, $\beta=90^\circ$, $\gamma=120^\circ$, $V=5.688\ 4(11)\ nm^3$, $Z=6$, $R1=0.057\ 7$, $wR2=0.144\ 4$, $S=1.006$. The compound has good catalytic activity for the oxidative elimination of methanol. When the initial concentration of methanol is $5.37\ g \cdot m^{-3}$, and the flow rate is $4.51\ mL \cdot min^{-1}$, 59% of methanol is eliminated at $175\ ^\circ C$.

Key words: phosphotungstic acid hydrothermal synthesis catalytic elimination methanol

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