

环境友好催化剂 $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ 的制备及其催化性能研究

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摘要 制备了新型固载杂多酸盐 $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ 环境友好催化剂,并以丁酸丁酯的合成作为探针反应,系统考察了原料 $\text{H}_4\text{SiW}_{12}\text{O}_{40}\cdot x\text{H}_2\text{O}$ 与 TiO_2 摩尔比、焙烧温度、焙烧时间等制备条件对 $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ 催化活性的影响。实验表明:制备催化剂的适宜条件为原料 $\text{H}_4\text{SiW}_{12}\text{O}_{40}\cdot x\text{H}_2\text{O}$ 与 TiO_2 摩尔比为 0.47,焙烧温度为 350 $^{\circ}\text{C}$,焙烧时间为 3.0 h。利用该条件下制备的催化剂 $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ 合成了丁酸丁酯正丁醇与正丁醇的投料摩尔比 $n(\text{醇}):n(\text{酸}) = 1.3:1$,催化剂的用量占反应物总投料质量的 1.3%,反应时间为 1 h,丁酸丁酯的产率为 97.2%。该催化剂 $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ 用于制备其它丁酸酯类(如乙酯、丙酯、戊酯、异戊酯)时同样取得了好的结果。

关键词 [硅酸盐](#) [钨酸盐](#) [钛化合物](#) [氧化钛](#) [丁酸酯](#) [酯化](#) [催化活性](#) [焙烧](#) [丁醇](#)

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Preparation and Catalytic Activity of $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ in Synthesis of Butyric Esters

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Abstract A new environmentally friendly catalyst, $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ was prepared. Its catalytic activity in esterification of n-butanoic acid and re-butyl alcohol was measured and compared with that of $\text{H}_3\text{PW}_{12}\text{O}_{40}$ or H_2SO_4 . $\text{TiSiW}_{12}\text{O}_{40}/\text{TiO}_2$ showed better catalytic activity than $\text{H}_3\text{PW}_{12}\text{O}_{40}$ or H_2SO_4 . The optimum reaction condition was that the molar ratio of alcohol to acid was 1.3:1, the mass ratio of the catalyst used to the reactants was 1.3%, and the reaction time was 1 h. Under these conditions, the yield of ethyl ester is 87%, propyl ester 93%, n-butyl ester 97.2%, n-amyl ester 98%, and iso-amyl ester 95%, respectively.

Key words [SILICATE](#) [TUNGSTATE](#) [TITANIUM COMPOUNDS](#) [TITANIUM OXIDE](#) [butyric ester](#) [ESTERIFICATION](#) [CATALYTIC ACTIVITY](#) [ROASTING](#) [BUTANOL](#)

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