

研究论文

电催化氧化法处理苯酚废水的Mn-Sn-Sb/ γ -Al₂O₃粒子电极研制

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摘要 采用溶胶-凝胶法制备了一系列不同Mn/Sn/Sb比的 γ -Al₂O₃负载型粒子电极,

以苯酚为模型污染物考察了粒子电极的催化活性,并用BET表面积、SEM和XRD等手段,对粒子电极的微结构、表面形貌及物相进行了表征.研究表明,在Sn和Sb含量相同的情况下,Mn与Sn的摩尔比为2:1时催化活性最高,

其催化活性远远高于某化学物理所提供的Ru/TiO₂粒子电极.所制粒子电极不仅具有相当高的电催化活性,

而且在使用过程中催化性能稳定,经5次反复使用后仍具有较高的催化活性.

反应过程中活性组分的流失是粒子电极失活的主要原因,催化剂表面积炭也可能是粒子电极失活的原因之一.

关键词 [电催化氧化](#) [粒子电极](#) [废水处理](#) [苯酚](#)

分类号

Preparation of Mn-Sn-Sb/ γ -Al₂O₃ Particle-electrodes for Electrocatalytic Oxidation of Phenol Wastewater

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Abstract Electrocatalytic oxidation of phenol was investigated in the presence of a series of composite metal oxides supported on γ -Al₂O₃ as particle electrodes. These particle electrodes were prepared by sol-gel method. Morphologies and microstructures were characterized by BET surface area, scanning electron microscope and X-ray diffraction. Mn-Sn-Sb (2: 1)/ γ -Al₂O₃, which had a molar ratio of Mn to Sn of 2: 1 and 0.1 wt% Sb, was found to have the highest electrocatalytic activity. It was observed that both disappearance of phenol and loss of total organic carbon (TOC) obtained for the Mn-Sn-Sb (2: 1)/ γ -Al₂O₃ were significantly more efficient than that obtained with the Ru/TiO₂ particle electrode used as reference. In addition, Mn-Sn-Sb (2: 1)/ γ -Al₂O₃ particle-electrode was found to be active even after the particle electrode was reused five times, indicating high stability with the particle electrode. The causes for the deactivation of particle electrodes were discussed, and were related to the dissolution of the active ingredients from the catalyst surface as well as polymeric deposits on the catalyst surface.

Key words [electrocatalytic oxidation](#) [particle electrode](#) [wastewater treatment](#) [phenol](#)

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