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论文

mCMC-PEG-CS双极膜在电还原制备巯基乙酸中的应用

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摘要:

以 Fe^{3+} 改性羧甲基纤维素(CMC)和聚乙二醇(PEG)共混物为阳膜, 以戊二醛改性壳聚糖(CS)和聚乙二醇共混物为阴膜, 制备了mCMC-PEG-CS双极膜, 并将其用作电解还原制备巯基乙酸(TGA)电解槽中阴阳两室间的隔膜。以硫代硫酸钠法合成的巯基乙酸(TGA)和二硫代二乙酸(DTDGA)混合物为原料, 研究了酸浓度、温度及电解电流密度对电还原DTDGA制备TGA的生成量和电流效率的影响。实验结果表明, 在TGA初始合成质量分数为2.79%, 电流密度为10 mA/cm², 35 °C电解时, 阴极室电还原产物巯基乙酸的电流效率为74.69%, 电解过程中的平均电流效率为54.02%。与传统的金属还原法还原DTDGA制备的TGA相比, 不仅避免了昂贵的金属还原剂锌的消耗, 而且消除了反应副产物锌泥对环境的污染。

关键词: mCMC-PEG-CS双极膜 巍基乙酸(TGA) 电还原 二硫代二乙酸(DTDGA)

Electro-generation of Thioglycolic Acid Using mCMC-PEG-CS Bipolar Membrane as Separator in Electrolysis Cell

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Abstract:

mCMC-PEG-CS bipolar membrane(BM) was prepared by cation and anion exchange membrane. Cation exchange membrane was prepared with polyethylene glycol(PEG)-sodium carboxymethyl cellulose(CMC) blends which were modified by Fe^{3+} , and anion exchange membrane was prepared by PEG-chitosan(CS) blends which were modified by glutaraldehyde(GA), respectively. mCMC-PEG-CS bipolar membrane was used as a separator in the electrolysis cell to produce thioglycolic acid(TGA). Thioglycolic acid(TGA) was prepared by electro-reduction of dithioglycollic acid(DTDGA) with the mixture of TGA and DTDGA as the raw materials. The influences such as acid concentration, temperature and electrolysis current densities on the electro-generation and the current efficiency of TGA were studied. The experiment results show that TGA was prepared effectively by electroreduction of dithioglycollic acid(DTDGA) with the mixture of TGA(2.79%) and DTDGA in the cathodic room. The current efficiency was up to 74.69% at 35 °C in a cylinder electrolysis cell at 10 mA/cm². To compare with the traditional of metal reduction method, the electro-reduction technology saves the zinc powder and eliminates the pollution to environment.

Keywords: mCMC-PEG-CS Bipolar membrane Thioglycolic acid(TGA) Electro-reduction Dithioglycollic acid(DTDGA)

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