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The Synthesis of Manganese(III) Acetate in Bipolar Packed-Bed and Trickle-Bed Electrode Cells

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Abstract: In this research, the electrochemical oxidation of Mn(II) acetate to Mn(III) acetate was investigated in aqueous acetic acid solution, using a bipolar particulate electrode cell. In order to determine the effect of flow modes on the yield of Mn(III) acetate, which is an important oxidizing agent and catalyst in organic reactions, a bipolar particulate electrode cell was employed both in flooded and trickle flow modes. The experiments were conducted at controlled potentials of 50-250 volts using the solution (10% H_2O, 90% CH_3COOH, 0.1 M $Mn(CH_3COO)_2.4H_2O$, 0.1 M $CH_3COONa.3H_2O$) and at an optimum flow rate of 0.04 $ml.s^{-1}$. The values of space-time yields for both electrode cells gave a maximum at about the same voltage range (4.5-5 V/number of layer). The maximum values obtained with approximately identical energy consumption values were 36.13 $kg.m^{-3}.h^{-1}$ and 23.73 $kg.m^{-3}.h^{-1}$ in a bipolar packed-bed and trickle-bed electrode cell, respectively. Thus, the effectiveness of the flow modes using a bipolar particulate electrode cell has been demonstrated for the electrosynthesis of Mn(III) acetate.

Key Words: Mn(III) acetate, electrosynthesis, packed-bed electrode cell, trickle-bed electrode cell

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