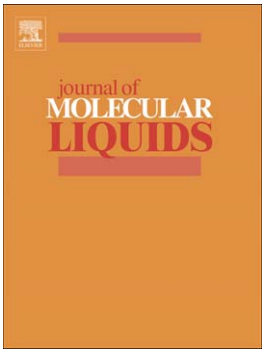

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Micellar effect on hetero-aromatic nitrogen base promoted chromic acid oxidation of 1,3-propanediol in aqueous media at room temperature

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Abstract

Surfactants are classified on the basis of the nature of the hydrophilic groups. Surfactant micelle represents a tiny template or nanoreactor which is generally used for preparing nano-structured materials of desired sizes and shapes with required functionalities. In this present investigation chromic acid oxidation of 1,3-propanediol (1,3-PDO) to 3-hydroxy propionaldehyde (3-HPA) was carried out by using four representative promoters: picolinic acid (PA), 2,3-pyridine dicarboxylic acid (2,3 diPA), 2,2'-bipyridine (bipy) and 1,10-phenanthroline (phen) in presence and absence of surfactants sodium dodecylsulphate (SDS), *N*-cetylpyridinium chloride (CPC) and Triton-X-100 (TX-100). Reactions were performed under pseudo-first-order condition: $[1,3\text{-PDO}]_T >> [Cr(VI)]_T$ in aqueous media at 30 °C temperature. Different combinations were performed to select the suitable combination of promoter and micellar catalyst for this oxidation. Based on the kinetic results, combination of TX-100 and phen was found to be the most suitable one for this oxidation. The mechanisms of both unpromoted and promoted reaction paths were proposed. The product was confirmed by 2,4-DNP test followed by FTIR spectroscopy of the hydrazone derivative.

Keywords: 1,3-Propanediol; 3-Hydroxy propionaldehyde; 2,3-pyridine dicarboxylic acid; TX-100, Nanoreactor.