

Abstract

Selective aerobic oxidation of thiols to disulfides without any over oxidized products is studied using cryptomelane type manganese oxides (K-OMS-2) with a tunnel structure as catalysts. Using K-OMS-2 prepared by different synthetic procedures, complete conversion was obtained under air atmosphere without generating any overoxidized products. K-OMS-2 prepared by solvent free method (K-OMS-2_{SF}) with the highest surface area ($155 \pm 1 \text{ m}^2/\text{g}$) gave complete conversion, while materials prepared using hydrothermal method (K-OMS-2_{HY}) with the lowest surface area ($44 \pm 1 \text{ m}^2/\text{g}$) gave only 18% conversion at room temperature. Selective poisoning of the acid sites suggests that Lewis acid sites are the dominating active site during the reaction. Effects of surface area of the catalyst, solvent polarity, substrate effect, catalyst recyclability and temperature were studied. The catalyst could be recovered in the active form after the reaction without significant structural changes. The characterization of the catalyst using XRD, SEM, TGA, BET, TEM, and FT-IR are reported. The process developed is environmentally benign and is indeed heterogeneous.