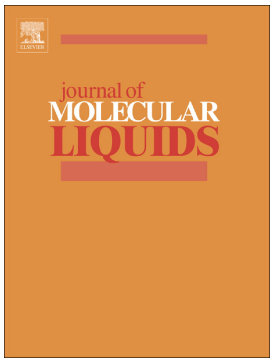

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Sodium dodecyl sulphate-assisted synthesis, optical properties and catalytic activities of silver/manganese dioxide nanocomposites

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Abstract

A sodium dodecyl sulphate (SDS)-assisted approach was used for the synthesis of α-MnO_2 nanorods by aerial oxidation of $MnCl_2$ in the presence of NaOH. The mixing order of reactants (Mn^{2+} + OH^-, Mn^{2+}+ SDS, Mn^{2+}-OH^-+ SDS and Mn^{2+}-SDS +OH^-), their molar ratios and pH have significant impacts on the pseudo-first-order kinetics of the redox system. Use of SDS decreases the Mn^{2+} reduction potential and avoids the formation of $Mn(OH)_2$ as an intermediate in alkaline medium. α-MnO_2 nanorods were further used in the preparation of Ag@MnO_2 nanocomposites by a wet chemical method. The morphologies of α-MnO_2 and Ag-doped MnO_2 were determined by transmission electron microscopy (TEM), energy dispersive spectroscopy (EDX), X-ray diffraction (XRD) and dynamic light scattering (DLS) measurements, which show that the α-MnO_2 nanorods are successfully converted into Ag-doped MnO_2. The complex formation constant, K_C = 26 mol^{-1} dm^3, and difference in absorption, $\Delta\varepsilon$ = 5.5 mol^{-1} dm^3 cm^{-1}, were calculated. The optical band gap energy was calculated and found to be 2.4 and 2.0 eV for MnO_2 and Ag@MnO_2, respectively.

Key words: SDS; MnO_2 ; Morphology; Aggregation

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