Insight into the micellar catalysed efficient oxidation of 2- and 3-pentanol by Cerium(IV) in greener medium of SDS and STS

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Supplementary file

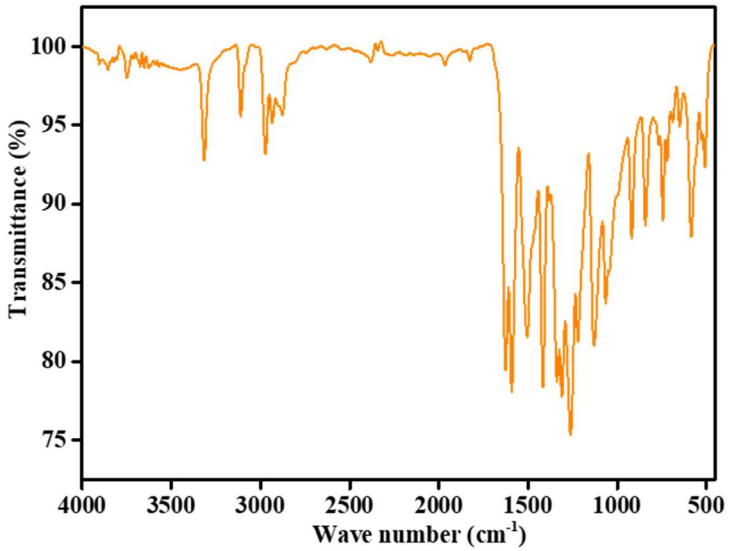


Figure 1SA: The FT-IR spectrum of the 2,4-dinitrophenylhydrazone derivatives of oxidised product of 3-pentanol.

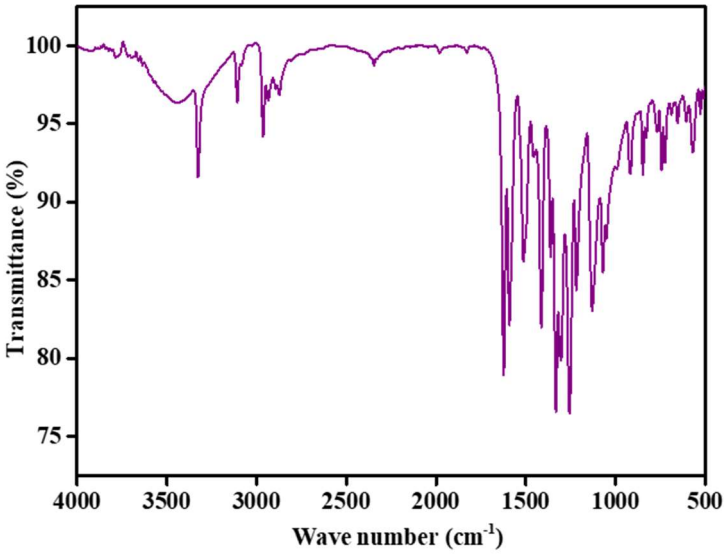


Figure 1SB: The FT-IR spectrum of the 2,4-dinitrophenylhydrazone derivatives of oxidised product of 2-pentanol.

FT-IR spectrum of the 2,4-dinitrophenylhydrazone derivatives of oxidised products show sharp peaks at 3314 cm^{-1} (Figure1SA), 3324 cm^{-1} (Figure 1SB) which indicate the N–H stretching frequencies. Peaks at 1632 cm^{-1} (Figure 1SA) and 1621 cm^{-1} (Figure 1SB) are for (C=N) stretching frequencies of hydrazones. From these FT-IR values, it is proved that carbonyl group is present in the product.

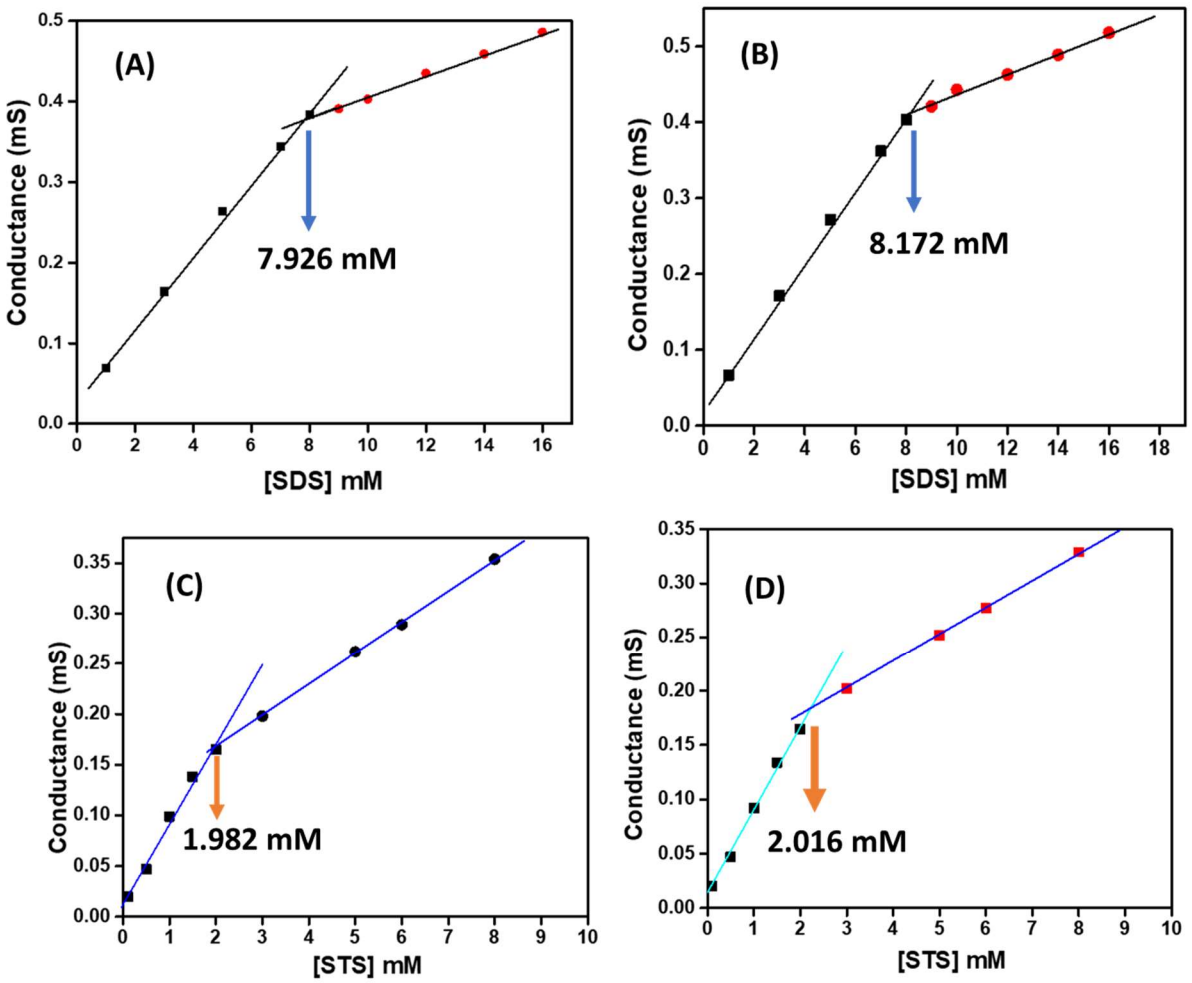


Figure 2S: CMC determination when organic additives are added (A) SDS + 2-pentanol (B) SDS + 3-pentanol (C) STS + 2-pentanol (D) STS + 3-pentanol

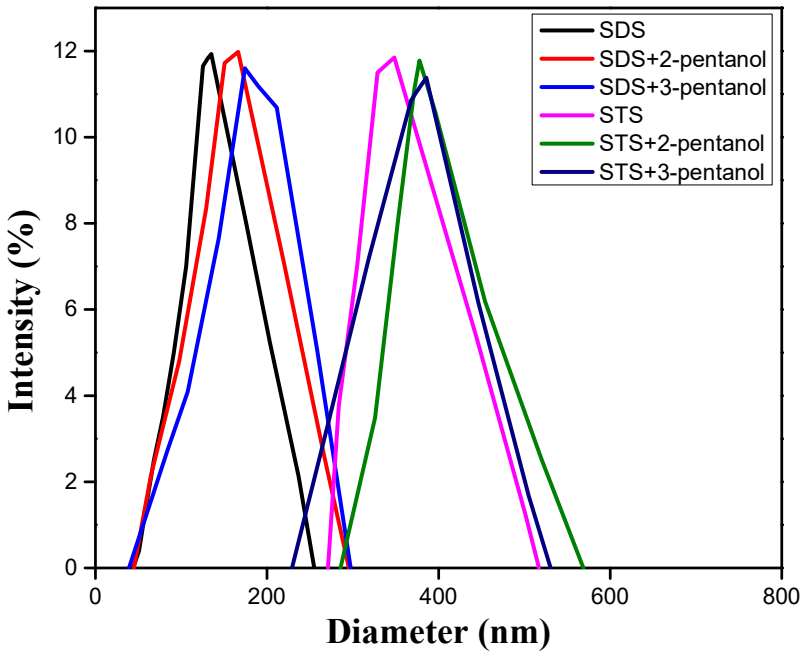


Figure 3S: Diameter of the aggregates formed by surfactants alone and mixture of surfactants and alcohols.

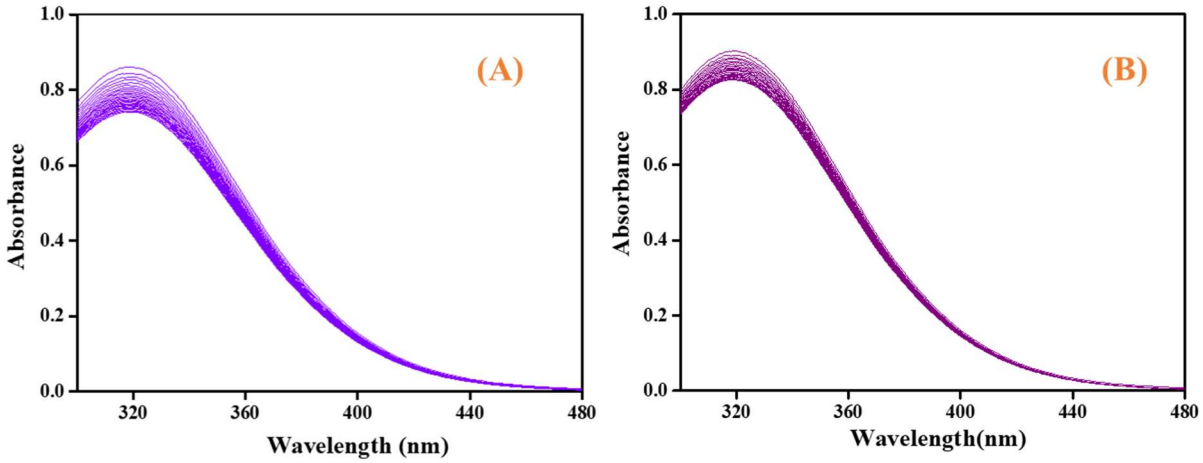


Figure 4S: UV-Vis absorption spectra of oxidation reaction in 8mM STS aqueous medium (A) for 2-pentanol and (B) for 3-pentanol at regular 5 min intervals.

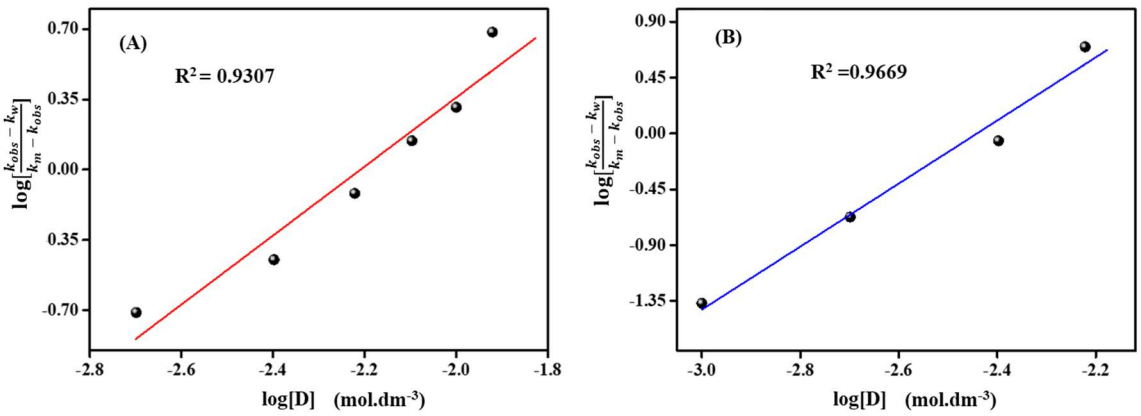


Figure 5S: Fitting of experimental kinetic data to Piszkiewicz's model: 3-pentanol oxidation reactions in presence of (A) SDS surfactant (B) STS surfactant.

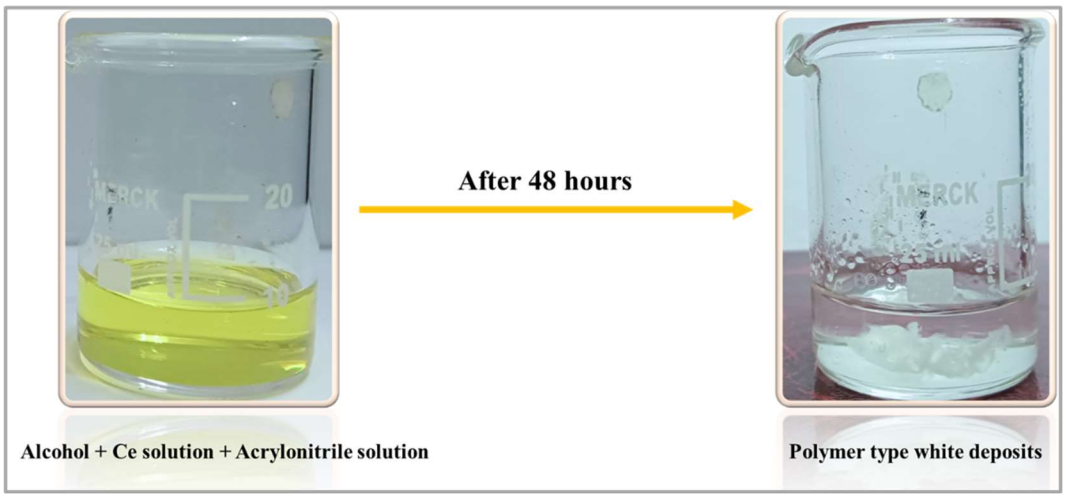
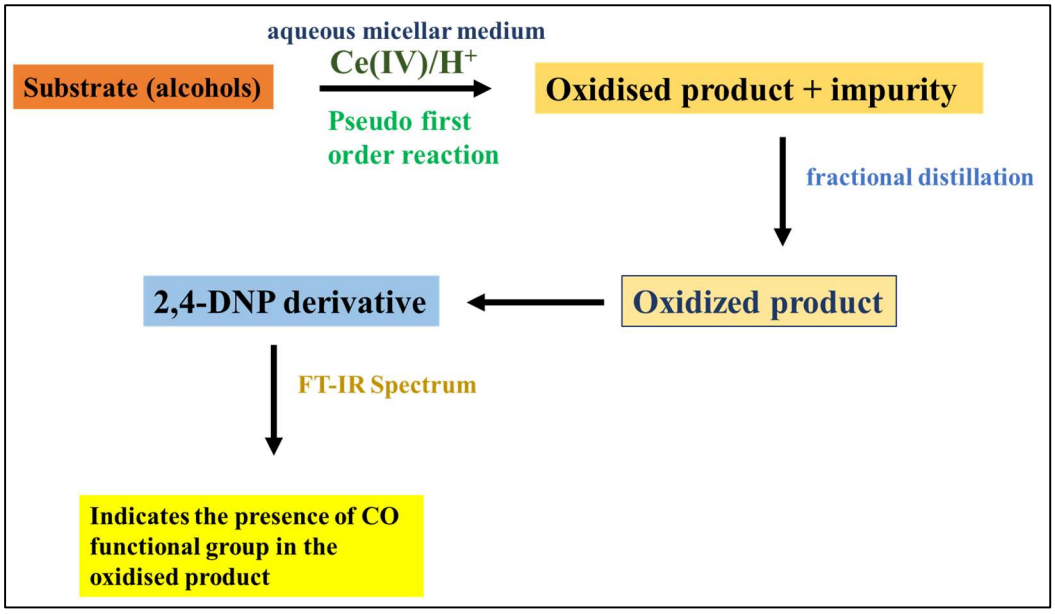


Figure 6S: free radical test of the oxidation reaction

Experimental procedure:

To study the kinetics of the organic reactions, we take the reactants concentrations in the order of 10^{-3} & 10^{-4} (M) following pseudo first order condition. But in order to characterize the product, we perform the reaction with large concentration of reactants following pseudo first order condition to get the sufficient amount of yield of the product. So that we can perform the 2,4-DNP test and FT-IR spectra to identify the product.



Recyclability:

The surfactants are recycled after the completion of reaction. By introducing some metal salt solution into the reaction system, the surfactant is precipitated out. Here, we use $CaCl_2$ salt solution. The precipitate is then separated using a filtration method. The Na^+ counter-ion of NaDS and NaTS is replaced by the bulky Ca^{2+} ion, which led to the precipitation of $Ca(DS)_2$ and $Ca(TS)_2$. After purification, $Ca(DS)_2$ and $Ca(TS)_2$ can be utilized as surfactant media for further application.