Effect of cationic micelles of cetyltrimethylammonium bromide on the MnO₄⁻ oxidation of valine

Rayees Ahmad Sheikh, F.M. Al-Nowaiser, Maqsood Ahmad Malik, A.O. Al-Youbi, Zaheer Khan

Article info

Article history:
Received 15 April 2010
Received in revised form 22 May 2010
Accepted 26 May 2010
Available online 1 June 2010

Keywords:
Valine
Oxidation
CTAB
Catalysis
Permanganate

Abstract

In this paper we report the effect of cationic micelles of cetyltrimethylammonium bromide (CTAB) in the oxidation of valine by permanganate in the absence and presence of sulphuric acid media. The reaction follows fractional- and first-order kinetics with respect to [valine] and [H₂SO₄] in the presence of CTAB whereas [H₂SO₄] has no effect on the reaction rate in the absence of CTAB under our experimental conditions. The observed catalytic effect of CTAB is discussed in terms of penetration of non-polar side chain of valine into the palisade layer of CTAB micelles through hydrophobic interactions. The Menger and Portony model of micelles and the model modified by Bunton's group have been used to explain the catalytic role of CTAB. On the basis of various observations, the most plausible mechanism is proposed and discussed.