



A Green approach to the oxidation of some industrially important alcohols using Ammonium meta vanadate in mildly acidic medium

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Toxic and expensive metals like Osmium,Chromium and Ruthenium in different oxidation states have been exhaustively used as catalysts for organic reactions.The use of these metals is hazardous to the environment and hence should be reduced as far as possible.We have successfully used less toxic and cheaper transition metal ions of the first series to catalyze the oxidation of some industrially important alcohols by Ammonium meta vanadate under mildly acidic conditions.

Some of the alcohols oxidized are:

- 1)Acyclic alcohols –The primary alcohols, Nerol,Citronellol and Geraniol are used in the preparation of perfumes.
- 2) Cyclic alcohols-The secondary alcohols, Cyclopentanol.Cyclohexanol and Cyclooctanol are used in the manufacture of polymers,plasticizers and pharmaceuticals.
- 3)Substituted ethanols-2-Chloroethanol,2-Butoxyethanol and 2-Phenoxyethanol are used in the preparation of varnishes,crop protection chemicals and industrial cleaners.

The oxidation was studied under first order kinetic conditions with respect to the inorganic oxidant and the progress of oxidation was monitored iodometrically.From the variation of oxidation rate with temperature (303-313K), the thermodynamical activation parameters of the oxidation process were evaluated and interpreted.The sequences of oxidation rates of alcohols has been explained on the basis of their steric,isomeric and structural characteristics.

Transition metal ions ,Mn(II),Co(II) and Ni(II) have been used to catalyze the oxidation of alcohols.For each alcohol under study ,the sequence of catalytic efficiencies of the metal ion catalysts has been determined. The oxidation rates of all alcohols studied varied linearly with the metal ion catalyst concentration.

A suitable reaction mechanism has been suggested for the oxidation of alcohols using Ammonium meta vanadate in acidic medium.

Recent Publications

- 1.Prabhu DV, Rana Chetana (2019) Kinetic and thermodynamic investigations of the oxidation of Cinnamyl alcohol by some organic oxidants in

alkaline medium. Research Journal of Chemistry and Environment 23(4):27-30.

- 2.Prabhu DV, Parbat Harichand A(2018) A kinetic approach to the oxidation of alcohols by KBrO_3 in acidic medium using transition metal ion catalysts. Rasayan Journal of Chemistry 11(3):1349-1356.

DOI:http://dx.doi.org/10.31788/RJC.2018.1132054

- 3.Prabhu DV ,Parbat Harichand A (2018) Kinetics of controlled oxidation of some aliphatic alcohols using Potassium iodate.Asian Journal of Chemistry 30(11):2591-2594.

DOI:http://doi.org/10.14233/ajchem.2018.21681

- 4.Prabhu DV, Rana Chetana (2018) Kinetic studies of the oxidation of secondary cyclic perfumery alcohols using $\text{K}_2\text{S}_2\text{O}_8$ in acidic medium. Rasayan Journal of Chemistry 11(3):1084-1087.

DOI:http://dx.doi.org/10.31788/RJC.2018.1131862

- 5.Prabhu DV , Parbat Harichand A (2018) Kinetic and thermodynamic investigations of the oxidation of some industrially important secondary cyclic alcohols by Chloramine T in alkaline medium.Indo American Journal of Pharmaceutical Sciences 5(1):S46-S51.

Biography

Dr D V Prabhu is Former Head and Adjunct Professor , Department of Chemistry,Wilson College,Mumbai,India..His research interests are Reaction Kinetics and Environmental Chemistry.To date he has published 57 papers in reputed journals and has presented 80 papers in conferences.He has authored six ISBN books in Physical and Analytical Chemistry.Dr Prabhu is the Editor in Chief ,GP Globalize Research Journal of Chemistry (ISSN Print 2581 5911) and Chief Editor,Green Chemistry and Technology Letters(e ISSN 2455 3611).

Dr Prabhu is the Founder General Secretary of Association of Chemistry Teachers,India's national registered body of Chemistry educators (www.associationofchemistryteachers.org) He is actively involved in the Indian National and International Chemistry and Junior Science Olympiads and has served as the Head Mentor and Delegation Leader of the Indian teams to the International Olympiads.

Dr Prabhu was elected Fellow of the Royal Society of Chemistry,UK (FRSC) in May 2019.He was awarded the Best Chemistry Teacher Award by Chemical Research Society of India in 2006