GREEN APPROACH FOR OXIDATION OF ACTIVATED ALCOHOLS IN WATER USING A MOLYBDENUM BASED METALLOMICELLAR CATALYST

IITM Technology Available for Licensing

Problem Statement

- ✓ Traditional **alcohol oxidation** methods utilize toxic oxidizing agents and generate harmful waste, posing environmental risks.
- ✓ An environmentally friendly and sustainable approach for alcohol oxidation using a **metallomicellar catalyst**, **water as the solvent**, and molecular oxygen as the sole oxidant, aiming to reduce ecological impact and promote **green chemical synthesis**.

Technology Category/ Market

Category – Green Chemistry, Sustainable Chemical Synthesis

Applications- Pharmaceutical industry, Fine chemical industry, Green chemistry, Chemical synthesis, Organic synthesis, Biomedical Engineering

Industry - Pharmaceutical industry, Catalysts, Bio-fuel application

Market -Green Chemical Market size was valued at USD 9.89 billion in 2021 and is poised to grow from USD 10.76 billion in 2022 to USD 21.13 billion by 2030, growing at a **CAGR of 8.8%** in the forecast period (2023-2030).

Key Features / Value Proposition

Technical Perspective:

- The invention offers a **green and sustainable** approach for **alcohol oxidation**, using a **metallomicellar catalyst**, **water** as the **solvent**, and **molecular oxygen** as the oxidant, reducing toxic waste and **promoting eco-friendly chemical synthesis.**

Industrial Perspective:

- This innovation has **promising applications** in pharmaceuticals, fine chemicals, and the environmental sector, providing a **cost-effective** and **environmentally conscious** method for producing valuable compounds and **reducing ecological impact.**

TRL (Technology Readiness Level)

TRL- 4, Technology validated in lab.

Intellectual Property

- **IITM IDF Ref. 1847**
- **IN 383906 (PATENT GRANTED)**

Technology

The technology for this invention involves the synthesis and utilization of a **molybdenum – based metallomicellar catalyst,** specifically **[MoO2(L1)(H2O)], Mo1.**

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The catalyst is prepared by complexation of **bis(acetylacetonato) dioxomolybdenum(VI)** with the **ligand L1(H)2.**

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The molybdenum-based metallomicellar catalyst forms organized **supramolecular structures** with surfactant molecules, **enhancing catalytic efficiency and selectivity.**

↓

The **oxidation process** takes place in an **aqueous medium,** providing **a green and sustainable solvent choice.**

↓

Molecular oxygen from **open air** is used as the **sole oxidant**, eliminating the need for **toxic or hazardous oxidizing agents.**

↓

The oxidation reaction proceeds without the requirement of any base or additive, simplifying the process and **reducing waste generation.**

↓

The technology provides a **novel and eco-friendly** approach for the **oxidation of activated alcohols to aldehydes or ketones,** making it an attractive solution for various industries seeking more **sustainable and environmentally conscious chemical synthesis methods.**

Research Lab

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Images

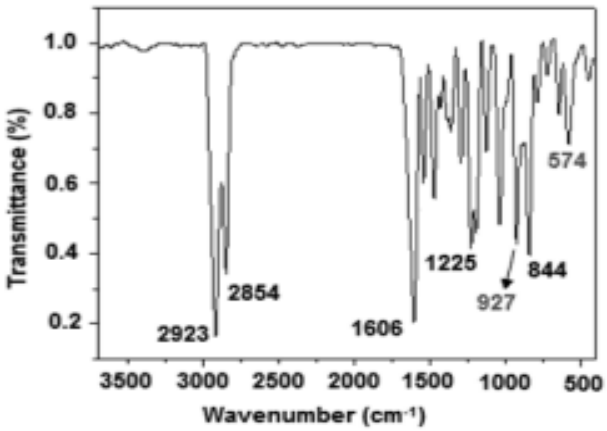

Fig 1. illustrates a graphical representation of IR spectrum of [MoO2(C25H41NO3)(H2O)], Mo1.

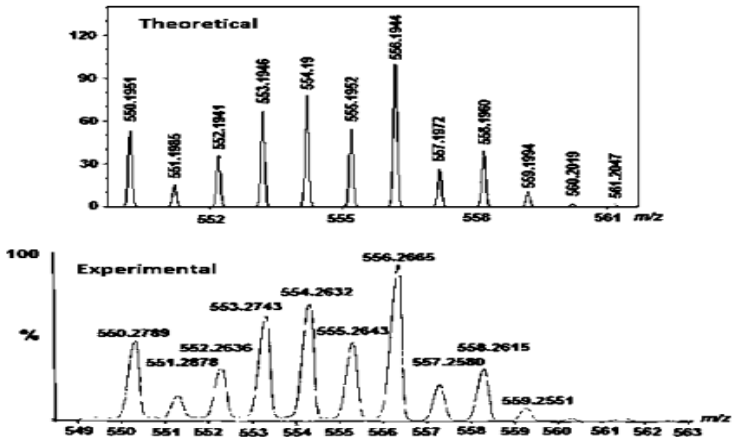

Fig 2. illustrates a graphical representation of ESI-MS analysis of Na)+ [MoO2(C25H41NO3)(H2O)], Mo1 (shows for ([Mo1-H2O]+)

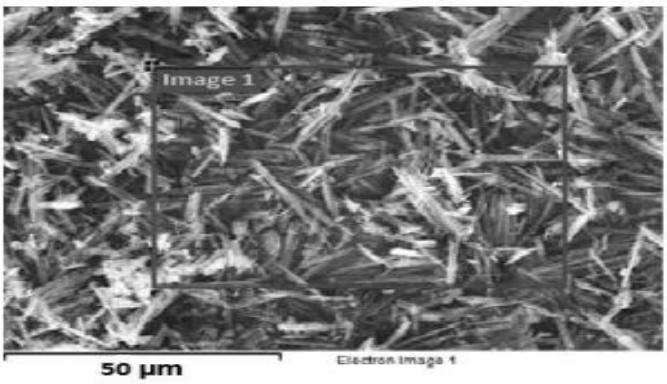

Fig 3. illustrates a graphical representation of SEM image of [MoO2(C25H41NO3)(H2O)], Mo1

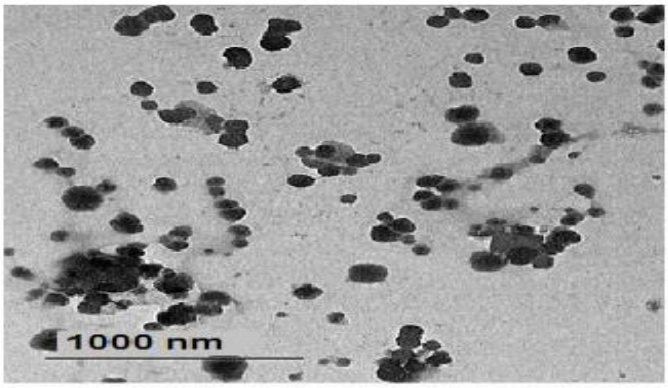

Fig 4. illustrates a graphical representation of TEM image of [MoO2(C25H41NO3)(H2O)], Mo1

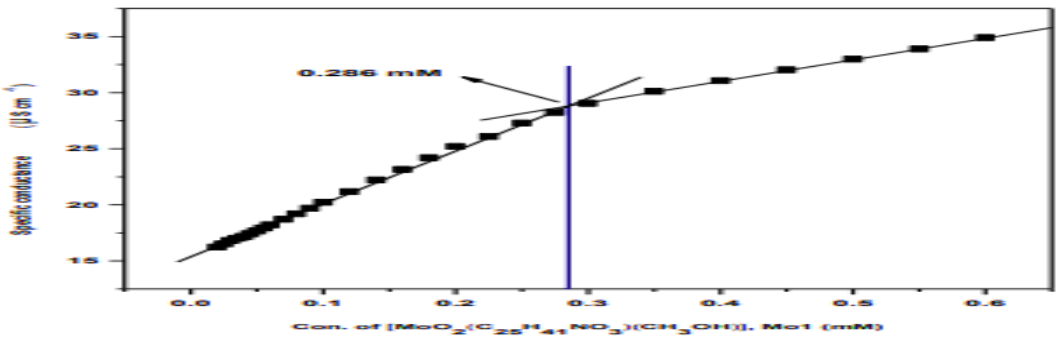

Fig 5. illustrates a graphical representation of CMC of [MoO2(C25H41NO3)(H2O)], Mo1

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