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Rajendran Antony, Rajendiran Marimuthu, Pratap Vishnoi, Ramaswamy Murugavel

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Ethoxysilane appended M(II) complexes and their SiO₂/MCM-41 supported forms as catalysts for efficient oxidation of secondary alcohols

Rajendran Antony, Rajendiran Marimuthu, Pratap Vishnoi and Ramaswamy Murugavel*
Organometallics and Materials Chemistry Lab, Department of Chemistry,
Indian Institute of Technology Bombay, Mumbai-400076, India
E-mail: rmv@chem.iitb.ac.in and muks@iitb.ac.in

ABSTRACT

Divalent transition metal complexes ML₂ (M = Mn **1**; Co **2**; Cu **3**; Zn **4**), possessing an ethoxysilane group as a part of the bidentate Schiff base ((*E*)-1-((3-(triethoxysilyl)propylimino)methyl)naphthalen-2-ol (**L**)), have been synthesized. While the copper complex **3** has been isolated in an analytically pure form and characterized by spectroscopic and single crystal XRD studies, the formation of complexes **1**, **2**, and **4** in solution has been verified by ESI mass spectroscopy and subsequently used for further catalyst preparation without their isolation. Treatment of the in situ formed **1-4** with pre-activated silica in boiling toluene produces the catalysts **5-8**, respectively. The copper complex **3** was also treated with MCM-41 in boiling toluene to obtain CuL₂@MCM-41 (**9**). Elemental analysis (CHN), ESI MS, IR, UV-vis., ¹³C & ²⁹Si NMR, EPR, P-XRD, TGA, BET, SEM and TEM have been used to characterize the compounds. Compounds **3** (homogeneous) and **5-9** (heterogeneous) have been utilized as catalysts in the oxidation of secondary alcohols to corresponding carbonyls in the presence of H₂O₂, *t*-BuOOH, and C₆H₅C(CH₃)₂OOH. **3** and **9** have shown better catalytic activity than the rest of the catalysts investigated. Combination of **9** with H₂O₂ is the best catalytic system due to its efficiency and reusability besides being environment friendly.

KEYWORDS: Schiff base, coordination, spectroscopy, heterogeneous catalysis, oxidation, green chemistry

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