



GENERAL INTRODUCTION

PART A – Lacunary Polyoxometalates

Chapter – 1 Introduction

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Chapter – 2 Synthesis and characterization of unsupported and supported Undecamolybdophosphates

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- Introduction
- Synthesis of Undecamolybdophosphate
- Characterization
 - Elemental Analysis
 - Thermal Analysis
 - Fourier Transform Infrared Spectroscopy
 - ^{31}P MAS NMR
 - Diffused Reflectance Spectra
 - Powder X-ray Diffraction
- Synthesis of Supported Undecamolybdophosphates
- Characterization
 - Chemical stability
 - Leaching test
 - BET surface area
 - Thermal Analysis
 - Fourier Transform Infrared Spectroscopy
 - ^{31}P MAS NMR
 - Diffused Reflectance Spectra
 - Powder X-ray Diffraction
 - Scanning Electron Microscopy
- Conclusions

Chapter – 3 Supported Undecamolybdophosphates as Sustainable Catalysts

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- Introduction
- Oxidation reactions using O_2 as an oxidant
 - Oxidation of alcohols (benzyl alcohol, cyclopentanol, cyclohexanol, 1-hexanol, 1-octanol)
 - Oxidation of alkenes (styrene, α -methyl styrene, cyclohexene)
- Oxidation reactions using H_2O_2 as an oxidant

- Oxidation of alcohols (benzyl alcohol, cyclopentanol, cyclohexanol, 1-hexanol, 1-octanol)
- Oxidation of alkenes (styrene, α -methyl styrene, cyclohexene)
- Probable reaction mechanism
- Kinetic study
- Conclusions

PART –B Transition Metal Substituted Polyoxometalates

Chapter – 4 Introduction

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Chapter – 5 Synthesis and characterization of Transition Metal (Co, Mn, Ni)- Substituted Phosphomolybdates

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- Synthesis of transition metal (Co, Mn, Ni)- substituted phosphomolybdates
- Characterization of Transition metal (Co, Mn)- substituted phosphomolybdates
 - Elemental Analysis
 - Crystal structure and Thermal analysis
 - Powder X-ray Diffraction
 - Fourier Transform Infrared Spectroscopy
 - Diffused Reflectance Spectra
 - Electron Spin Resonance Spectroscopy
 - ^{31}P MAS NMR
- Characterization of Ni- substituted phosphomolybdate
 - Elemental Analysis
 - Thermal analysis
 - Powder X-ray Diffraction
 - Fourier Transform Infrared Spectroscopy
 - Diffused Reflectance Spectra
 - Scanning Electron Microscopy
- Conclusions

Chapter – 6 Transition Metal (Co, Mn, Ni)- Substituted Phosphomolybdates as Sustainable catalysts

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- Introduction

- Oxidation reactions using O₂ as an oxidant
 - Oxidation of alcohols (benzyl alcohol, cyclopentanol, cyclohexanol, 1-hexanol, 1-octanol)
 - Oxidation of alkenes (styrene, α-methyl styrene, cyclohexene)
 - Probable reaction mechanism
- Oxidation reactions using H₂O₂ as an oxidant
 - Oxidation of alcohols (benzyl alcohol, cyclopentanol, cyclohexanol, 1-hexanol, 1-octanol)
 - Oxidation of alkenes (styrene, α-methyl styrene, cyclohexene)
 - Kinetic study
- Conclusions

Chapter – 7 Use of PMo₁₁Ni as a sustainable catalyst for Suzuki coupling

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• **NOVELTY OF THE WORK**

- Papers presented in International/National Conference, Symposium