SYNTHESIS AND CHARACTERIZATION OF MOO3 SUPPORTED NANOCOMPOSITES FOR CATALYTIC APPLICATIONS

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Abstract

In this work, transition metal salts such as Zn (II) was dopped on MoO3 and nanocomposites were prepared with different concentrations of zinc oxide and molybdenum oxide (ZM) by using sol-gel method. These synthesized materials were characterized by X-Ray powder diffraction (XRD), Flame Emission Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray analysis (EDX) technique. The effect of amount loading of zinc oxide on activity of catalyst was studied by choosing liquid phase nitration of phenol as a model reaction. For the same reaction effect of various solvents, effect of reaction time and reusability of the catalyst was also studied. Catalyst calcined at 500°C temperature with 10 wt.% ZM showed highest phenol conversion also greater o-nitrophenol selectivity is claimed over this catalyst. It was observed that high phenol conversion co-relates with the presence of greater number of strong Brönsted acid sites over the catalyst surface whereas the selectivity of o-nitrophenol is related to the pore size of the catalysts. No use of sulfuric acid along with the nitric acid used in its diluted form in the reaction makes the process safe and environmentally friendly.

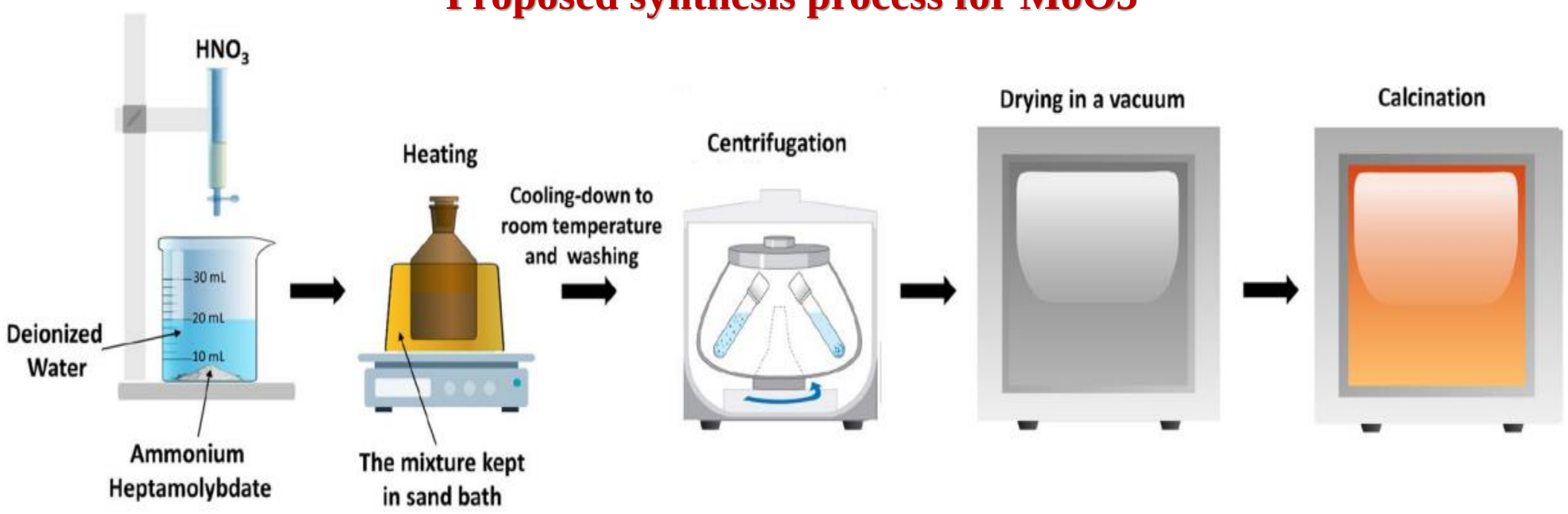
Introduction

This research focuses on the eco-friendly synthesis of nano materials through the application of the Sol-Gel and Ultra-Spray Pyrolysis Routes, aiming to elucidate optimal conditions for green fabrication. Employing the different characterisation techniques, to analyze the structural and morphological attributes of the resulting nano materials.

Additionally, the research study incorporates an evaluation of the possible viability of these synthesis routes, emphasizing economical nanomaterial production. This investigation contributes crucial insights to the realm of nanotechnology, advancing our understanding of scientific conscious and efficient nano material synthesis

Set up

Proposed synthesis process for MoO3



Design/Other information

Successful synthesis of Molybdenum-Doped Silica Nanoparticles-

•Confirmation of the successful incorporation of molybdenum onto the silica nanoparticles through characterization techniques such as XRD, SEM/TEM, EDS/XRF, and FTIR.

•Obtained doped silica nanoparticles in powder form, indicating successful synthesis and calcination process

Characterization of Synthesized Nanoparticles-

•Determination of the crystal structure and phase composition of the doped silica nanoparticles through XRD analysis.

Applications

•The implications of this research extend far beyond the laboratory. The nano materials synthesized through our dual approach hold promise in diverse sectors, including electronics, medicine, energy storage, and environmental remediation.

Conclusions

The implications of this research extend far beyond the laboratory. The nano materials synthesized through our dual approach hold promise in diverse sectors, including electronics, medicine, energy storage, and environmental remediation.

The ability to fine-tune material characteristics opens avenues for designing more efficient sensors, catalytic systems, and targeted drug delivery carriers.

Moreover, the incorporation of green synthesis principles aligns with global sustainability goals, offering a blueprint for responsible nanomaterial production.

References

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