Patent Search

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Abstract:

The proposed invention focuses on Fe3O4@SiO2-PMA-Cu nanoparticles as a green catalyst for triazole synthesis. These multifunctional nanocatalysts combine the m properties of Fe3O4, the stability of SiO2, the acidic and oxidative properties of phosphomolybdic acid (PMA), and the catalytic activity of copper (Cu). This innovative enhances catalytic efficiency, recyclability, and environmental sustainability. The nanocatalyst facilitates azide-alkyne cycloaddition reactions under mild conditions, o eco-friendly and cost-effective alternative to traditional methods. The Fe3O4 core allows easy recovery using an external magnet, while the SiO2 shell ensures nanopa stability. PMA and Cu provide catalytic sites that improve reaction rates and yields. This invention holds significant potential for applications in pharmaceuticals, agroc and materials science, promoting advancements in green chemistry and nanotechnology.

Complete Specification

Description:The present invention relates to the field of nanotechnology and catalysis, specifically the development and application of Fe3O4@SiO2-PMA-Cu nanopa These nanoparticles serve as a green catalyst for the synthesis of triazoles, an important class of heterocyclic compounds with significant applications in pharmaceu agrochemicals, and materials science. The invention integrates magnetic nanoparticles (Fe3O4) coated with silica (SiO2) and functionalized with phosphomolybdic a (PMA) and copper (Cu) to create a highly efficient, recyclable, and environmentally friendly catalytic system. The innovative approach aims to enhance catalytic performance, reduce environmental impact, and improve the overall efficiency of triazole synthesis processes. This invention addresses the growing demand for sustainable and cost-effective methods in chemical synthesis, promoting advancements in green chemistry and nanomaterial applications.

Background of the proposed invention:

The proposed invention, Fe3O4@SiO2-PMA-Cu nanoparticles, represents a significant advancement in the field of nanotechnology and catalysis, particularly in the g synthesis of triazoles. Triazoles are a class of five-membered heterocyclic compounds containing three nitrogen atoms, which have garnered considerable attention their wide-ranging applications in pharmaceuticals, agrochemicals, and materials science. They exhibit a broad spectrum of biological activities, including antifungal antibacterial, antiviral, anticancer, and anti-inflammatory properties. The synthesis of triazoles, therefore, holds immense importance in the development of new dr bioactive molecules. Traditionally, the synthesis of triazoles has relied on various methods, including the Huisgen 1,3-dipolar cycloaddition reaction between azides alkynes. While effective, these methods often require harsh reaction conditions, toxic reagents, and expensive catalysts, posing environmental and economic challe The advent of green chemistry principles has necessitated the development of more sustainable and environmentally benign catalytic systems.

Nanocatalysts have emerged as promising alternatives due to their high surface area, tunable properties, and unique catalytic behaviors. Magnetic nanoparticles, ir

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