Copper-nicotinamide complex: sustainable applications in coupling and cycloaddition reactions

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Synthesis of Copper (II)-nicotinamide complex
Copper chloride (0.1N) and nicotinamide (0.1N) solutions were mixed in a 2:5 ratio. The crystals of copper(II)-nicotinamide complex, Cu(nicotinamide)$_2$Cl$_2$, start growing immediately after mixing. The supernatant liquid was filtered off and dried under vacuum at 40 °C, characterized using CHN (C, 36.32%; H, 3.54%; and N, 14.13%) and TGA (ESI, Figure S1) analysis and stored at ambient conditions.

Synthesis of diaryl sulfides
Aryl iodide (1.0 mmol), thiophenol (1.2 mmol), Cs$_2$CO$_3$ (1.0 mmol), 10 mg (0.025 mol %) of Copper (II)-nicotinamide complex and PEG-400 (2 mL) were added to a crimp-sealed thick-walled glass tube. The reaction tube was placed inside the cavity of a CEM Discover focused microwave synthesis system equipped with a pressure sensor and a magnetic stirrer. The reaction conditions...
were set at 150 °C, 100 Watts for 15 min. After completion of the reaction, the products were extracted using ethyl acetate, washed with water and dried over sodium sulfate followed by concentration under vacuum and purification using column chromatography.

**Synthesis of 1,2,3-triazoles**

1.2 mmol of alkyl halide, 1.5 mmol of NaN₃, 1.0 mmol of alkyne, and 10 mn (0.025 mol %) of catalyst were placed in a crimp-sealed thick-walled glass tube. The reaction tube was placed inside the cavity of a CEM Discover focused microwave synthesis system equipped with a pressure sensor and a magnetic stirrer. The reaction temperature was set at 100 °C (temperature monitored by a built-in infrared sensor), a power level of 100 W, and pressure 10–60 psi for a duration of 8-30 min (Table 1). After completion of the reaction, the crude product was extracted with ethyl acetate followed by recrystallization or purification by column chromatography.

**Amination of 4-bromonitrobenzene**

4-Bromonitrobenzene (1.0 mmol), aliphatic amine (1.2 mmol), and 10 mg (0.025 mol %) of copper(II)-nicotinamide complex were placed in a crimp-sealed thick-walled glass tube. The reaction tube was placed inside the cavity of a CEM Discover focused microwave synthesis system equipped with a pressure sensor and a magnetic stirrer, operated at 100 °C (temperature monitored by a built-in infrared sensor) and a power level of 100 W for 60 min. After completion of the reaction, the products were extracted using ethyl acetate, dried over sodium sulfate, concentrated under reduced pressure and purified by column chromatography.

Gas Chromatography-Mass Spectrometry profiles of the representative crude reaction mixtures: