22nd Iranian Chemistry Conference, 23-25 August, 2023
University of Kurdistan

# A novel coordination complex based on amidine-functionalized polyacrylonitrile fiber/copper (I) : A recyclable solid acid catalyst for click reaction

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In this research, a novel modified polyacrylonitrile fiber with an amidine functional group as an effective platform for stabilization of homogeneous active catalytic species of copper (I) iodide was prepared and its utilization as a recyclable heterogeneous catalyst for Click reactions for the first time. During this study, a new heterogeneous catalyst of copper (I) fixed on polyacrylonitrile fiber was designed by two-step rooting of amine ligands and two-toothed amidine ligands in the surface layer of existing commercial polyacrylonitrile fiber (PANFEA/CuI). Amidine groups in functionalized fibers were used to stabilize copper (I) ions by bonding these ions with amidine two-binding electron donor ligands then evaluate the catalytic activity of the resulting two catalysts respectively in Click multi-component reaction were studied. Fibers from different stages are identified and by X-ray diffraction (XRD), infrared spectroscopy (FT-IR), solid ultraviolet spectroscopy, CHN elemental analysis, scanning electron microscopy (SEM) and optical microscopy (OM) techniques. The capacity of heterogeneous catalyst (mmol/g of catalytic species using EDX and ICP techniques. The PANFEA/CuI system effectively catalyzes the one-pot three-component Click reactions of halides, azides, and alkynes and selectively produces the 1,4-isomer 1,2,3-triazole with high yield in water under mild conditions for 2-4 min. The PANFEA/CuI system was successfully recycled up to five times without reducing its catalytic efficiency and selectivity. The XRD pattern of the recycled catalyst after five times used in the model reaction shows that the fibrous structure of the catalyst is preserved. Cheapness, ease of separation and purification process, recyclability and reuse, and low leaching of catalytically active particles are prominent features of this new green environmentally friendly catalysts.

**Keywords**: Coordination Complex, Heterogeneous Polymeric Catalyst, Click Reaction, Polyacrylonitrile Fiber

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