Silica-tethered cuprous acetophenone thiosemicarbazone (STCATSC) as a novel hybrid nano-catalyst for highly efficient synthesis of new 1,2,3-triazolyl-based metronidazole hybrid analogues having potent antigiardial activity

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Abstract

The preparation, characterization and application of silica-tethered cuprous acetophenone thiosemicarbazone (STCATSC) as a novel hybrid nano catalyst for synthesis of new 1,2,3-triazolyl-based metronidazole hybrid analogues is described. STCATSC is fully characterized by different microscopic, spectroscopic and physical techniques, including scanning electron microscopy (SEM), transmission, X-ray diffraction (XRD), Energy-dispersive X-ray spectroscopy (EDS), thermogravimetric analysis (TGA), FT-IR and inductively coupled plasma (ICP) analysis. This catalyst is used to prepare the new 1,2,3-triazolyl-based metronidazole hybrid analogues. The 'Click' Huisgen cycloaddition reaction of 2-methyl-5-nitro-1-prop-2-ynyl-1*H*-imidazole with diverse β-azidoalcohols in a THF-water media at R.T. provides the products in good to excellent yields using STCATSC. STCATSC is proved to be a stable, low cost, reusable and environmentally benign hybrid catalyst. Products are *in vitro* tested against Giardia lamblia (G. lamblia) in which determined that all compounds exhibit varied promising antigiardial activity compare to metronidazole as a reference drug. Among the products, 1-(4-((2-methyl-5-nitro-1*H*-imidazol-1-yl)methyl)-1*H*-1,2,3-triazol-1-yl)-3-phenethoxypropan-2-ol and 1-(4-((2-methyl-5-nitro-1*H*-imidazol-1-yl)methyl)-1*H*-1,2,3-triazol-1-yl)-3-(3-phenylpropoxy)propan-2-ol are demonstrated to exhibit the potent antigiardial activity even stronger than metronidazole.