

Mesoporous Multi-Metal Citrates as Scavengers for Organic Dyes

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Abstract

In this work we have established excellent adsorption properties of Multi-metal citrate complexes for the capture of Organic dyes. These complexes exhibit mesoporous character with pore diameter $\approx 40\text{\AA}$ and narrow pore size distribution in their structure as demonstrated by fitting experimental adsorption data into Barrett, Joyner and Halenda (BJH) and Density Functional Theory (DFT) models. Thus these materials have the potential of being used as scavengers for dye stuff removal from industrial waste discharge in the water stream and may replace the high cost carbon adsorbents to capture dye molecules and curb water pollution with resultant toxic, carcinogenic and mutagenic effects of dye stuff on living beings. The mesoporous Zinc, Nickel, Iron, Copper multi-metal citrate complexes with different combinations of these metal ions and citric acid linker have been synthesized under mild hydrothermal conditions through green synthetic pathways. Because of their biocompatibility and non toxicity, these low cost mesoporous materials may prove boon for transport of dyes used as contrast agents during diagnostics applications due to their increased image contrast and chemical stability.