Abstract

Nano composites based upon Graphene-$CuFe_2O_4$ were synthesized by using sol-gel auto combustion method. Different ratios (20%, 30%, 40%, 50%, 60%, 80%) of copper ferrite were dissolved into graphene. Then prepared samples were characterized for the application of water purification from arsenic materials using XRD, SEM, EDX, FTIR, VSM, and (BET) surface area analysis. XRD results confirmed the existence of prepared sample with nanoparticle size. Crystallite size of nano particles of $CuFe_2O_4$ is 53 nm and varies by varying ratio of ferrite. Crystallite size varies between 34 nm to 53 nm. FTIR confirms the C=O double bond of carboxyl functional group at 1650 cm^{-1}, C=C aromatic stretching at 1580 cm^{-1} and peak at 468 cm^{-1} corresponds to Cu-O^-. SEM gave the results of surface morphology which was in accordance with required results. EDX confirms the qualitative and quantitative contents of ferrite nanoparticles and nano composites. VSM results illustrated that pure crystal structure of magnetic nanoparticles has been synthesized by the sol-gel method with magnetic saturation (M_S) of 16 emu/g and remanence magnetization of 29.22 emu/g. Saturation magnetization (M_S) and remanence magnetization decreases as the content of graphene increases due to the dia-magnetic behaviour of graphene. BET results confirm the increase in the specific surface area and pore volume also confirms the porosity of the $CuFe_2O_4$ nanoparticles and $CuFe_2O_4$ nano composites. The GNPs/$CuFe_2O_4$ composite exhibited significant, fast adsorption of arsenic over a wide range of solution PH_s with exceptional durability, selectivity, and recyclability, which could make this composite a very promising candidate for effective removal of arsenic from waste water. Magnetic properties of the $CuFe_2O_4$ nanoparticles and $CuFe_2O_4$ –Graphene nano composites demonstrated desirable arsenic adsorption properties. Finally, $CuFe_2O_4$ nanoparticles were composited by graphene to investigate its adsorption properties.