## **Gum Arabic-Coated Magnetic Nanoparticles for Methylene Blue Removal**

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**Abstract :** Magnetic nanoparticles (MNPs) were fabricated using the chemical co-precipitation method followed by coating the surface of magnetic Fe3O4 nanoparticles with gum arabic (GA). The fabricated magnetic nanoparticles were characterised using transmission electron microscopy (TEM) which showed that the Fe3O4 nanoparticles and GA-MNPs nanoparticles had a mean diameter of 33 nm, and 38 nm, respectively. Scanning electron microscopy (SEM) images showed that the MNPs modified with GA had homogeneous structure and agglomerated. The energy dispersive X-ray spectroscopy (EDAX) spectrum showed strong peaks of Fe and O. X-ray diffraction patterns (XRD) indicated that the naked magnetic nanoparticles were pure Fe3O4 with a spinel structure and the covering of GA did not result in a phase change. The covering of GA on the magnetic nanoparticles was also studied by BET analysis, and Fourier transform infrared spectroscopy. Moreover, the present study reports a fast and simple method for removal and recovery of methylene blue dye (MB) from aqueous solutions by using the synthesised magnetic nanoparticles modified with gum arabic as adsorbent. The experimental results show that the adsorption process attains equilibrium within five minutes. The data fit the Langmuir isotherm equation and the maximum adsorption capacities were 8.77 mg mg-1 and 14.3 mg mg-1 for MNPs and GA-MNPs, respectively. The results indicated that the homemade magnetic nanoparticles were quite efficient for removing MB and will be a promising adsorbent for the removal of harmful dyes from waste-water.

**Keywords :** Fe3O4 magnetic nanoparticles, gum arabic, co-precipitation, adsorption dye, methylene blue, adsorption isotherm **Conference Title :** ICCIS 2015 : International Conference on Chemical Industry and Science

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