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## Synthesis of Magnetic Nanoparticles Coated with Covalently Bonded Carboxymethyl Cellulose

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**Abstract :** Magnetite nanoparticles (MNP) were synthesized through the coprecipitation method and then modified with carboxymethylcellulose (CMC) by using carbodiimide chemistry. These nanoparticles exhibited a crystal size of  $30 \pm 20$  nm and a magnetization saturation of 48 emu/g. FTIR was used to determine the grafting of the CMC molecules, observing a peak at  $1507\text{ cm}^{-1}$ , which suggest the covalent bond of this hydrophilic polymer onto the magnetic nanoparticles. These nanoparticles exhibited a hydrodynamic size of about  $173 \pm 53$  nm after suspension in distilled water, as estimated from DLS. Additionally from TGA, a 16% of organic material was estimated to be grafted onto the nanoparticles, indicating the possibility of a crosslink between a CMC molecule and several nanoparticles, as CMC has about 388  $\text{COO}^-$  groups per chain. This crosslink can yield agglomerated nanoparticles, as observed from SEM measurements. Despite agglomeration, modification of magnetic nanoparticles with CMC renders high hydrophilic nanoparticles that can be suspended in aqueous media forming a stable colloidal solution.

**Keywords :** Magnetite nanoparticles, carboxymethylcellulose, Carbodiimide chemistry.

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