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Regular Article

Immobilization of invertase on chitosan coated γ-Fe_2O_3 magnetic nanoparticles to facilitate magnetic separation

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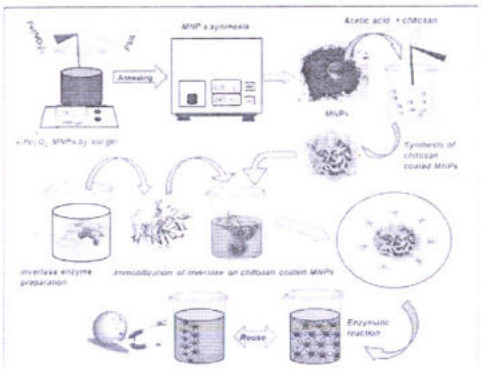
GRAPHICAL ABSTRACT



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ABSTRACT

Industrially important invertase enzyme was immobilized on chitosan coated sol gel derived γ-Fe_2O_3 magnetic nanoparticles (MNPs) to enable it for repetitive use by magnetic separation. MNPs were characterized by X-ray diffraction (XRD), dynamic light scattering (DLS), field emission scanning electron microscope (FE-SEM), Fourier transform infrared (FTIR) spectrometer and magnetic measurements. FTIR studies confirmed successful immobilization of invertase on MNPs. The ability to convert sucrose into invert syrup was enhanced in immobilized invertase compared to that of free enzyme. Further it was found that invertase immobilized on MNPs (IIMNPs) were more stable at varying pH and temperature conditions. Magnetic separation technique was successfully employed for reuse of the IIMNPs for 20 times without significant loss of activity.

1. Introduction

The applications of magnetic nanoparticles in various bioprocesses have been the focus of an intensive research for more than a decade. Nanomagnetic materials have a special relevance to bioapplications due to their size compatibility with cells (10–100 pm), viruses (20–450 nm), proteins (5–50 nm) and genes (2 nm wide by 10–100 nm long). Intensive research into magnetic nanomaterials has accelerated the development of magnetically separable catalysts for reuse. Magnetic separation has been studied to facilitate the handling and recovery of proteins, enzymes and organocatalysts [1]. Biomagnetic materials have

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