ABSTRACT

Water purification has become a major problem due to the presence of harmful bacteria. Various methods are present for the treatment of contaminated water and removal of pathogenic bacteria. But there can be more efficient ways for the treatment.This study conducted uses iron oxide nanoparticles which are functionalized for the removal of pathogenic bacteria from water.Magnetic iron oxide nanoparticles are prepared by polyol method. In this method ferrous and ferric chloride derivatives are mixed together in a particular proportion and refluxed at very high temperatures. The synthesized bare nanoparticles are then functionalized using chitosan which is a polysaccharide. Chitosan is highly biocompatible material making it efficient for the removal of bacteria.These functionalized nanoparticles are then characterized by XRD, FTIR and FE-SEM. The results show even distribution of nanoparticles and the efficient coating of chitosan. Functionalized nanoparticles have many applications in biotech industries. Here these chitosan functionalized nanoparticles have been used for the removal of pathogenic bacteria from contaminated water making it safe to drink. The experiment has been carried out for the gram positive S. aureus and gram negative E. coli bacteria. The nanoparticles are efficiently bound to the bacterial wall which can be seen by FE-SEM. These are then removed using a powerful external magnetic force. Agglomerates can be seen at the bottom of the flask and clear solution at the top. The capture efficiency of the nanoparticles can be seen by the change in optical density using a colorimeter. The maximum capture efficiency is found to be 95% for S. aureus and 91% for E. coli at 30 minutes and 35 minutes respectively. Hence, it can be concluded that this method can be used for efficient removal of pathogenic bacteria from contaminated water.