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Title: Modifying commercial sponges using magnetic nanoparticles and investigating the separation of organic pollutants from water

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As a source of life, water plays a decisive role in the existence and development of human society. However, global water pollution has become a much more pressing issue today [1]. The frequent occurrence of oil and chemical spills has caused severe environmental pollution and environmental problems, which has made the separation of oil from water a serious challenge [2]. In this research, a hydrophobic sponge structure with high absorption capacity of organic compounds was prepared. In all stages of the synthesis, we tried to use methods with less energy, water solvent, and low risk compounds to be based on green chemistry. First, iron oxide nanoparticles were synthesized by ultrasound waves and then coated with polyvinyl alcohol. FT-IR analysis was used to identify and investigate the synthesis and modification of nanoparticles. These modified nanoparticles were placed on the surface of polyurethane sponges. The modified sponges became hydrophobic after exposure to 300 °C due to the partial destruction of the structure and the loss of hydrophilic functional groups. The investigation of the interaction between water drop and hexane drop showed that hexane is immediately absorbed by the modified sponge, while the water drop is not allowed to enter and is placed spherically on the surface of the sponge. Examining the absorption properties of these sponges also showed that they have a high and fast ability to absorb organic pollutants from the water surface, so that when they come in contact with the organic pollutants on the water surface, they immediately absorb and remove the organic compound from the water surface.

Keywords: Iron oxide nanoparticles, hydrophobicity, separation of water from oil, environment

References

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