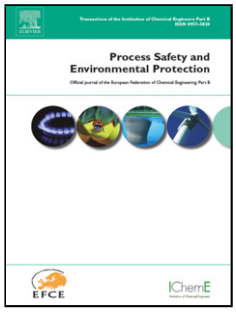

Title: Iron oxide and its modified forms as an adsorbent for arsenic removal: A comprehensive recent advancement

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<AT>Iron oxide and its modified forms as an adsorbent for arsenic removal: a comprehensive recent advancement

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<ABS-Head><ABS-HEAD>Graphical abstract
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<ABS-P><xps:span class="xps_Image">fx1</xps:span>
<ABS-HEAD>Highlights► Comparative study of various iron oxide adsorbents for arsenic removal is discussed. ► Magnetic features of iron oxides in separation and regeneration is discussed. ► Interaction mechanism between arsenic and iron oxides has been included. ► Challenges in disposal of desorbed arsenic have been included. ► Household and community level implementation of iron oxide is added.
<ABS-HEAD>Abstract
<ABS-P>Arsenic, one of the elements having most terrible impact on the human being, is threatening the world continuously. Arsenic exists in the combined form in rocks under earth which on dissolution contaminates ground water. The contamination has led to a massive epidemic in East and South-East Asia and problem is more dangerous for peoples of Bangladesh and adjoining province, Bengal of India, where more than 100 million peoples are currently affected by arsenic contaminated ground water. Arsenic exists in water as oxyacids in two oxidation states, As(III) and As(V), former is more toxic. Various techniques are under use for the removal of both forms of arsenic but most of these are not suitable for As(III) form. Adsorption has been proved most preferable technique for the removal of both forms of arsenic. Various types of solid materials had been used as adsorbent but nanomaterials have been reported more effective. However, some of these materials are toxic and difficult to separate after adsorption, ineffective in the presence of water constraints. Iron oxides and its modified forms overcome all these shortcomings. Arsenic adsorption using various types of iron oxides has been surveyed and their sorption efficiencies have been compared herein. The effect of presence of other competitive ions in water has also been discussed. The valuable literature available on arsenic remediation, latest advancement, implementation of iron oxides in filters and future perspective along with safe disposal of sludge produced using iron oxide based materials have been incorporated.
<KWD>Abbreviations: ROS (Reactive oxygen species), MMA (Monomethyl arsenic acid), (DMA) Dimethyl arsenic acid, DNA (Deoxyribonucleic acid), WHO (World Health Organization), EPA (Environmental Protection Agency), USEPA (United States Environmental Protection Agency), fcc (Face-Centred Cubic), hcp (Hexagonal Close Packing), CRM (Cold Rolling Mill), FTIR (Fourier Transform Infrared Spectroscopy), XRD (X-ray Diffraction), SEM (Scanning Electron Microscopy), TEM (Tunnelling Electron Microscopy), EDX (Energy Dispersive X-Ray Analyser), EXAFS (Extended X-ray Absorption Fine Structure), PZC (Point of Zero Charge), WTRs (Water Treatment Residuals), D-R isotherms (Dubinin-Radushkevich).
<KWD>Keywords: Arsenic; Arsenic effect; Arsenic remediation; Adsorption; Iron oxide