Introduction

The present work carried out at DCU investigates the possibility to produce organised materials for the removal of arsenic from groundwater. Mesoporous silica KIT-6 and SBA-15 possess very high surface area and porosity and are good support for metal doping [1] and [2]. Iron and aluminium oxides were coated onto the silica host and these new adsorbents were analysed for the removal of As(III) and As(V). The possibility of controlling the selectivity of the material towards one of the arsenic species was investigated by varying the Al-Fe oxides ratio.

Synthesis of adsorbents

- Iron and/or aluminium doping by using an evaporation technique
- Organic surfactants
- Control of the pore size by varying the temperature of the drying and calcination step to remove the organic surfactant
- 2D and 3D organized mesoporous silica were produced. SBA-15 (2D) and KIT-6 (3D) were produced at various temperatures in order to obtain silica matrix of different pore size distribution.
- A series of mixed Al-Fe oxides was produced using a filling percentage of 8%.
- Average pore size between 4.2 to 7.2 nm when increasing temperature between 40 to 100 °C
- Surface area ranging between 700 to 1000 m² g⁻¹ and porosity in the range of 0.9 to 1.1 cc g⁻¹
- The organized nature of material can be visualized on the TEM images

Conclusions

Ordered mesoporous silica doped with Al-Fe oxides show very high arsenic adsorption capacity. Both As(III) and As(V) are efficiently removed.

References