Obtaining a Polyadsorbent From the Natural Diatomite to Purify Wastewater From the Ions of Heavy Metals

Zhaksygaliyeva, Sayazhan (School: Miras International School)

Highly toxic heavy metals find their way to living organisms through water and air. Emission of wastewater to water resources only proliferate the harm and health implications of exposure to heavy metals. Application of diatomite, which is a highly porous siliceous rock, to clear wastewaters is an economically viable solution. Nonetheless, in its natural form, such material lacks the sufficient sorptive properties. The research aimed to investigate means to enhance adsorptive properties of the modified diatomite to extract ions of heavy metals: cadmium, lead, zinc, and copper. In this study, diatomite was activated through two phases: first ion-exchanging metals on the surface were removed and replaced with H+ by using aqueous HCl solution; next, making use of NH4OH solution, protons of H were replaced with OH- . Subsequently, adsorption in static conditions was conducted for 0,25- 5 hours and sorbent's composition was analyzed by Atomic Absorption Spectrophotometry (AAS). The results showed that over 95% of Cu2+, Cd2+, Pb2+, Zn2+ adhered to diatomite at an optimal time of 60 minutes. The adsorbed diatomite was also successfully desorbed with 1 mol of HCl solution and washed with distilled water. Repeated activation allowed desorbed diatomite to perform as an adsorbent again. Hence, it was proved that diatomite could act as a reusable adsorbent, a polyadsorbent in other words.

Awards Won:
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: Full Scholarship from King Fahd University of Petroleum and Minerals(KFUPM) (and a $400 cash prize)
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: NOT TO BE READ -- $400 cash prize for each Full Scholarship from King Fahd University award recipient