Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

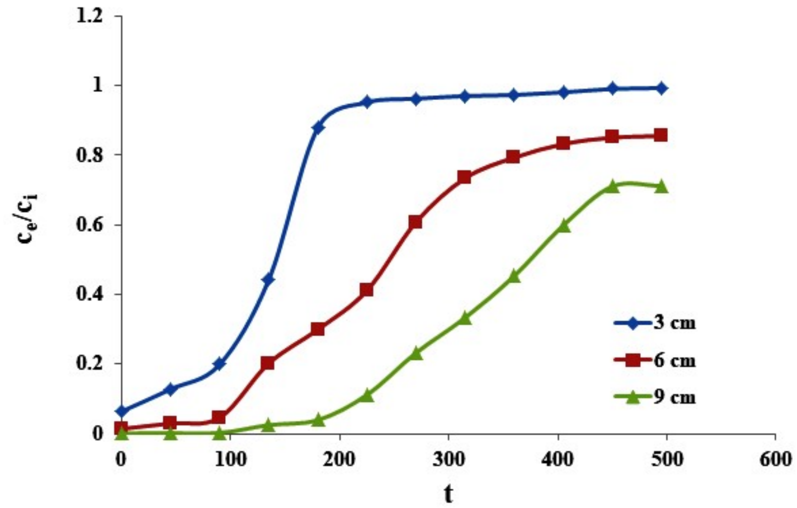

Fig S1: Breakthrough curve for arsenate adsorption at different bed heights

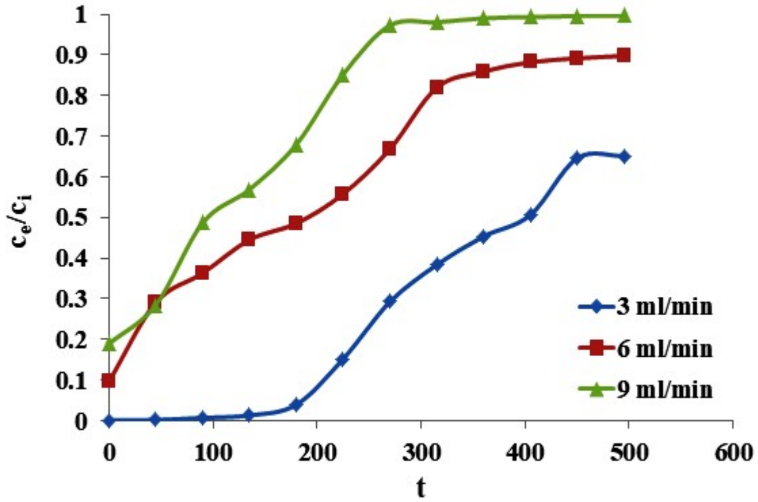

Fig S2: Breakthrough curve for arsenate adsorption at different bed heights

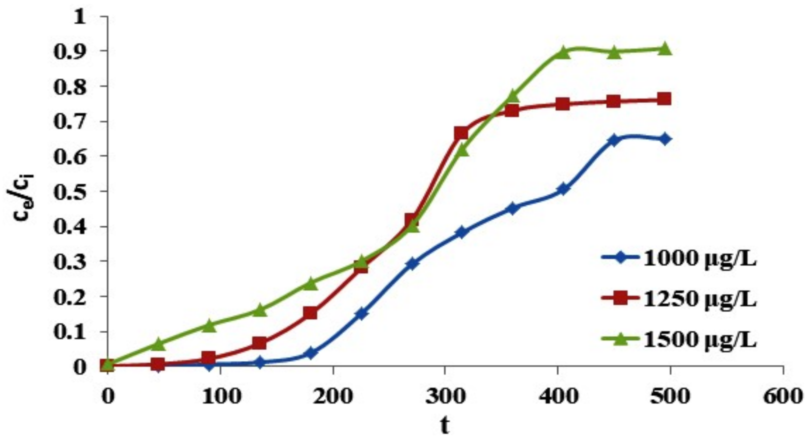

Fig S3: Breakthrough curve for arsenate adsorption at different bed heights

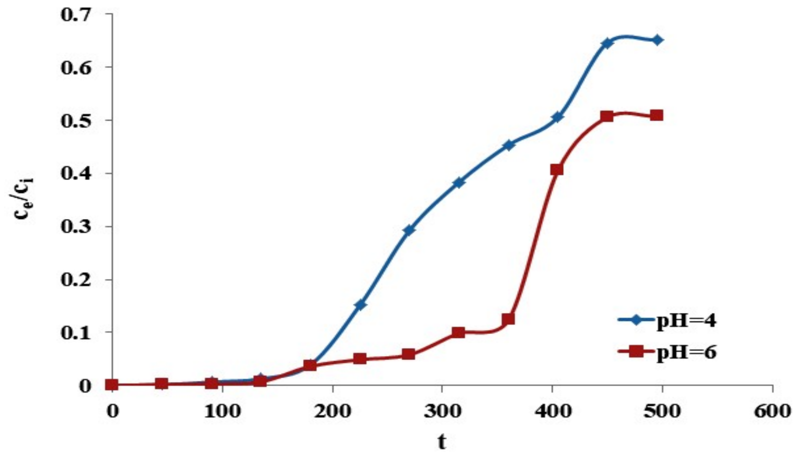

Fig S4: Breakthrough curve for arsenate adsorption at different bed heights

Effect of bed height:

Breakthrough curves for adsorption of arsenic at optimum batch pH onto Fe-AIL at various adsorbent depths by fixing influent arsenic concentration (1000 μg/L) and flow rate (3.0 mL/min) are shown in Fig. S1. The various height of Fe-AIR packing used was 3.0, 6.0, and 9.0 cm for the columns. From Fig. S1, it was also observed that the removal efficiency was increased with the increase in adsorbent height. As bed height increases, arsenic has more time to contact with Fe-AIB which resulted in higher removal efficiency of arsenic in the column. It was the increase in adsorbent doses in larger beds which provided a greater number of adsorption sites for arsenic with increase in the surface area of Fe-AIB [1]

Effect of flow rate:

The effect of flow rate on arsenic adsorption by Fe-AIR was studied by varying the flow rate from 3.0 to 9.0 mL/min and keeping the initial arsenic concentration (1000 μg/L), bed height (9.0 cm) and pH constant. The breakthrough curves are shown in Fig. S2. It was found that the adsorption capacity decreased as the flow rate increased. The phenomenon can be explained on the basis of insufficient residence time of the solute in the column [2]. This insufficient time decreases the bonding capacity of the arsenic ions onto –SH and –COOH groups present in the adsorbent surface.

Effect of initial arsenic concentration:

The effect of the initial arsenic concentration (1000, 1250 and 1500 μg/L arsenic) at a constant bed height of 9 c.m, flow rate of 3.0 mL/min and normal pH is shown in Fig. S3. The figure showed that the adsorption efficiency of Fe-AIR decreased on gradual increase of influent arsenic concentration. This is due to shortening of the mass transfer zone [3].

Effect of column diameter:

The effect of the pH (4 and 6) at a constant bed height of 9 c.m, flow rate of 3.0 mL/min and normal pH is shown in Fig. S4. With the increase in pH gradual decrease in breakthrough time was reported. This can be ascribed to integrated effect of the enhancement in divalent As (V) specie's fraction and deterioration in the quantity of protonated species of R-CH (NH_2)-COOH in PAA with enhancement in the influent pH. In the pH range 5.0-6.0 [4].

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2. Gupta, A.K., Deva, D., Sharma, A. and Verma, N. Fe–grown carbon nanofibers for removal of arsenic(V) in wastewater, Industrial & Engineering Chemistry Research,2015, 49(15), 7074–7084.

3. Ranjan, D., Talat, M. and Hasan, S.H. Rice polish: an alternative to conventional adsorbents for treating arsenic bearing water by up–flow column method, Industrial & Engineering Chemistry Research, 2009, 48(23), 10180–10185.

4. Pennesi, C., Veglio, F., Totti, C., Romagnoli, T. and Beolchini, F. Nonliving biomass of marine macrophytes as arsenic(V) biosorbents, Journal of Applied Phycology, 2012, 24(6), 1495–1502.