

Long-term influence of aeration on arsenic trapping in ZVI/sand bed reactor

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Scheme of the pilot unit

Each up-flow reactor consists of a column with 8 cm internal diameter and 40 cm height, with four intermediary sampling points (P1 to P4). The inner volume of the reactor was 2 L but taking into consideration the volume of ZVI/sand support, the available volume (empty bed volume) was close to 500 mL. The inlet and outlet were filled only with sand to prevent any loss of ZVI.

The reactor was fed with synthetic water by using a peristaltic pump (typical flow rate: 10 mL/min, corresponding to a 50 min residence time). Addition of air bubbling was possible at the bottom of the reactor.

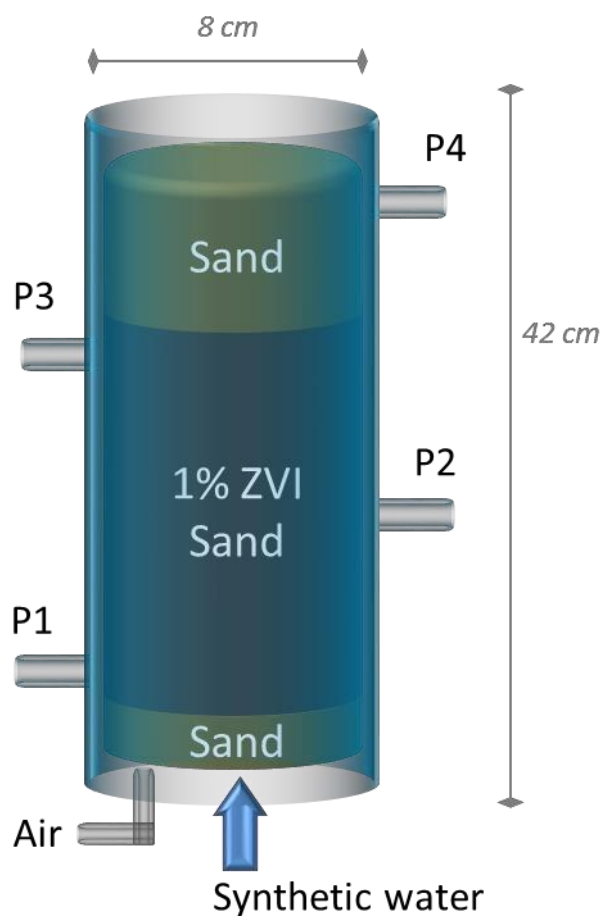


Figure S1: Scheme of the column used to study arsenic removal by ZVI/sand.

Composition of the synthetic water

The synthetic water used for the experiments corresponded to a calcareous signature equilibrated at pH 8. It was prepared with purified water and addition of analytical grade reagents to reach to following composition:

Table S1: Composition of the synthetic water.

Na^+	K^+	Ca^{2+}	Mg^{2+}	HCO_3^-	Cl^-	SO_4^{2-}	NO_3^-	H_2SiO_3	
1.74	0.13	0.62	0.54	1.24	0.74	1.05	0.02	0.16	(mM)

This synthetic water was spiked with Na_2HAsO_4 up to the desired arsenate concentration.

Dissolved oxygen monitoring

Dissolved oxygen was monitored during the whole experiment at the outlet of both aerated and non-aerated columns. Its evolution is given below:

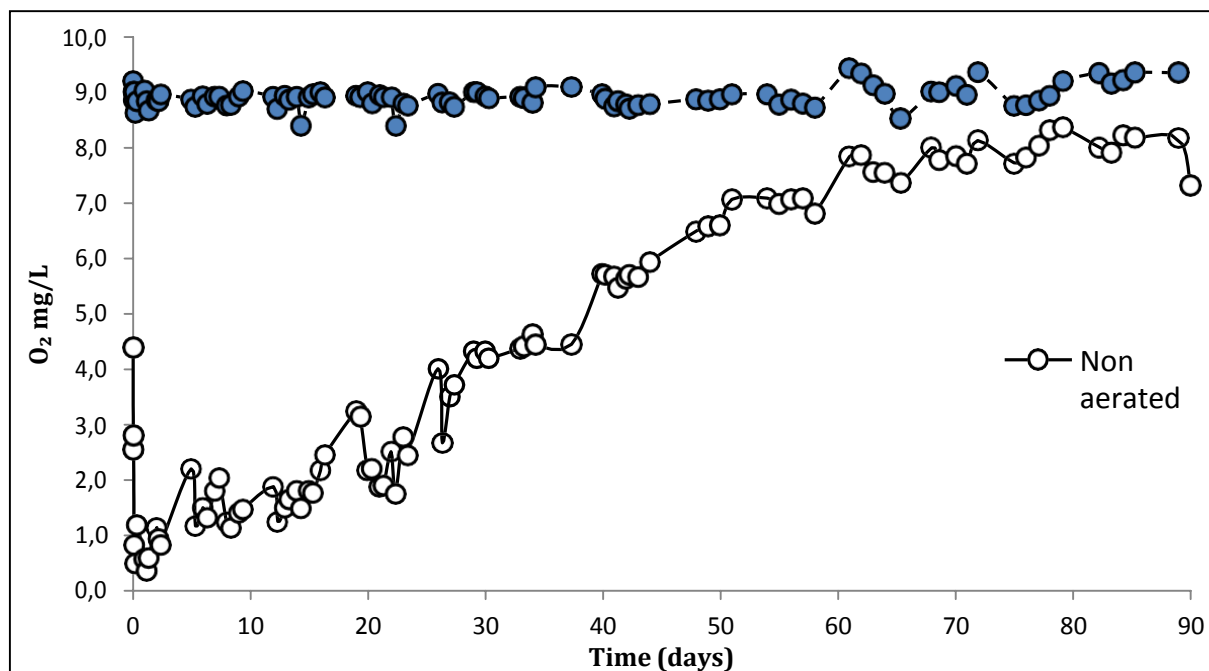


Figure S2: Monitoring of dissolved oxygen at the outlet of aerated and non-aerated columns.

Pictures of ZVI/sand support.

At the end of the experiment, columns were dismantled to recover the ZVI/sand support. Pictures corresponding to the support inside the aerated and non-aerated systems are presented below:

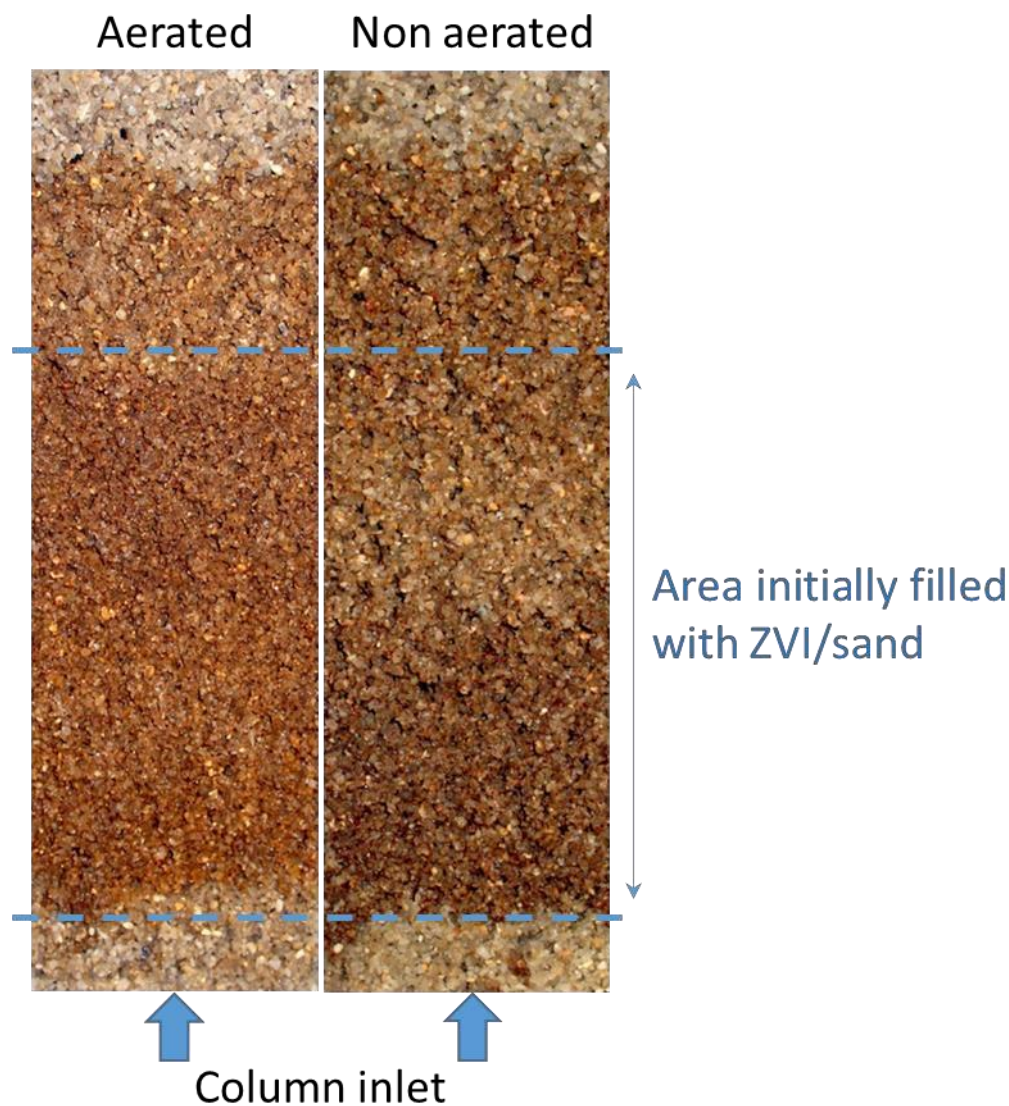


Figure S3: Pictures of ZVI/sand support recovered at the end of experiment.

On aerated systems, a homogeneous orange coloration was observed in the part of the column that was initially filled with ZVI/sand. Some ZVI byproducts were able to move above this area (light orange coloration of sand).

On non-aerated systems, the coloration was different not homogeneous: darker brown in the lower part followed by a light brown on the upper part of the column initially filled with ZVI/sand. Some ZVI byproducts also migrated above the filled area.