

Accepted Manuscript

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PII: S0304-3894(18)30468-0
DOI: <https://doi.org/10.1016/j.jhazmat.2018.06.028>
Reference: HAZMAT 19465

To appear in: *Journal of Hazardous Materials*

Received date: 18-12-2017
Revised date: 25-5-2018
Accepted date: 11-6-2018

Please cite this article as: Dousova B, Lhotka M, Filip J, Kolousek D, Removal of arsenate and antimonate by acid-treated Fe-rich clays, *Journal of Hazardous Materials* (2018), <https://doi.org/10.1016/j.jhazmat.2018.06.028>

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Removal of arsenate and antimonate by acid-treated Fe-rich clays

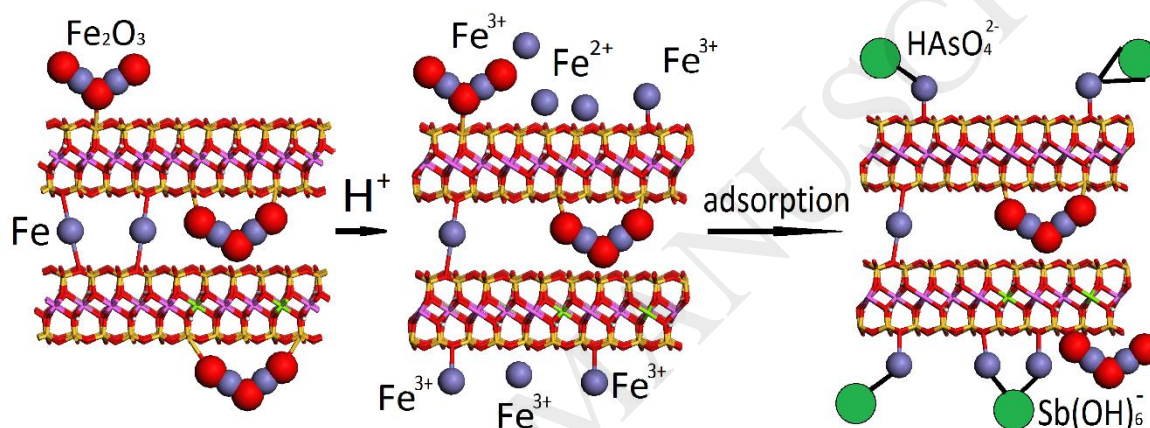
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Graphical abstract



Highlights

- Acid leaching of Fe-rich clays causes the transformation of structural Fe.
- Well crystallized Fe(III) oxides maintain their original structures.
- Amorphous Fe(III) phases are transformed to ion-exchangeable Fe³⁺ ions.
- Acid leaching increased sorption selectivity of Fe-rich clays for As/Sb oxyanions.
- Acid treatment of Fe-rich clays suggests new perspectives in anionactive sorbents.

ABSTRACT

Iron impurities in clays degrade the quality in many aspects, but available Fe oxides can significantly improve adsorption affinity of clays to anionic particles. Two natural Fe-rich clays (kaolin and bentonite) were treated in 0.5 M HCl (pH = 1.1) and 0.15 M (COOH)₂ (pH = 1.2), and then used to adsorb As^V/Sb^V oxyanions from model solutions. After acid leaching, the equilibrium sorption capacities (q_{\max}) increased from 2.3×10^{-3} to 39.2×10^{-3} mmol g⁻¹ for As^V

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