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RE-USE OPTIONS OF VENEZUELAN BAUXITE RESIDUE: POTENTIAL APPLICATION IN ACID MINE DRAINAGE REMEDIATION

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The Venezuela Alumina

CVG Bauxilum plant

Bauxite residue ponds

0.8 Km
Study of the sorption properties of acid neutralised bauxite residue (solid residue) under acid conditions similar to those of acid mine drainage

- Adsorption capacity => Batch tests
  \[ \text{Zn}^{2+}, \text{Pb}^{2+}, \text{As (V) arsenate} \]
- Chemical speciation => Sequential chemical extractions
Adsorption capacity of BR

Langmuir adsorption plots for arsenate, lead and zinc. Reaction conditions: bauxite residue dosage 50g.L⁻¹, Ionic strength= KNO₃ 0.01M, pH 4.5±0.1 and temperature of 22 ± 1°C

- Pb and As(V) distributions follows the Langmuir model

- BR could adsorb more arsenate => at the highest As (V) initial concentration the percentage of adsorption by the residue was at 99 %

- Two different mechanisms operate for Zn sorption: Surface mechanism (adsorption) and co-precipitation (formation of a Zn-Al hydroxide)
Chemical speciation

Associated with Fe and Al hydroxides $\iff$ Adsorption sites

Amorphous Al-Fe-hydroxides = Higher specific surface area / porosity
- The adsorption is the main retention mechanism of As(V), Pb and Zn by the BR. The co-precipitation should not be neglected, especially for Zn.

- The Venezuelan bauxite residue could be a useful retention agent for the treatment of acid mine drainage polluted by Pb, Zn and As(V).
Thank you for your attention