Iron Removal from Aqueous Solutions by Fabricated Calcite Ooids

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Abstract : The precipitated low magnesium calcite ooids in assembled softening unit from natural Mediterranean seawater samples were used as adsorbent media in a comparative study with granular activated carbon media in a two separated single-media filtration vessels (operating in parallel) for removal of iron from aqueous solutions. In each vessel, the maximum bed capacity, which required to be filled, was 13.2 l and the bed filled in the vessels of ooids and GAC were 8.6, and 6.6 l, respectively. The operating conditions applied to the semi-pilot filtration unit were constant pH (7.5), different temperatures (293, 303 and 313 k), different flow rates (20, 30, 40, 50 and 60 l/min), different initial Fe(II) concentrations (15–105 mg/ l) and the calculated adsorbent masses were 34.1 and 123 g/l for GAC and calcite ooids, respectively. At higher temperature (313 k) and higher flow rate (60 l/min), the maximum adsorption capacities for ferrous ions by GAC and calcite ooids filters were 3.87 and 1.29 mg/g and at lower flow rate (20 l/min), the maximum adsorption capacities were 2.21 and 3.95 mg/g, respectively. From the experimental data, Freundlich and Langmuir adsorption isotherms were used to verify the adsorption performance. Therefore, the calcite ooids could act as new highly effective materials in iron removal from aqueous solutions.

Keywords : water treatment, calcite ooids, activated carbon, Fe(II) removal, filtration
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