Desalination and Water Treatment
www.deswater.com

doi: 10.1080/19443994.2014.979442

57 (2016) 2134–2141
January

Taylor & Francis
Taylor & Francis Group

Rapid and efficient removal of boron from deep sea water using synthesized polymer resin

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Received 13 January 2014; Accepted 16 October 2014

ABSTRACT

The present investigation aims to remove boron from deep sea water using the N-methyl D-glucamine-modified polymeric resin as synthesized in the laboratory. The resins are characterized by IR analysis and the morphology is discussed with the help of scanning electron microscopic images. Further, the resin is distributed in three different bead sizes i.e. 0.25, 0.5 and 1.0 mm, and assessed their removal efficiency for the boron removal under batch and column operations. Batch data show that a very fast uptake of boron took place and within 20 min of contact, almost a complete removal of boron occurred. Further, the kinetics of boron uptake is performed using linear equations of pseudo-first-order and pseudo-second-order rate equations. The applicability of pseudo-second-order rate law inferred that the boron is sorbed onto the solid surface by strong chemical forces, forming an "inner sphere complexes". The batch and column data obtained for the boron removal is then critically compared with the commercially available resin. Further, reusability of this resin is also obtained taking the repeated operations using the same used resin. These results may, perhaps, enable to reduce the input cost of deep sea water treatment.

Keywords: Terpolymer; N-methyl D-glucamine; Chelation; Seawater; Boron; Removal

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