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Superiority of date seed ash as an adsorbent over other ashes and ferric chloride in removing boron from seawater

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ABSTRACT

Many desalination plants, especially those utilising seawater as feed water, have trouble in reducing boron levels to the drinking water standards. The objective of this study is to investigate the removal of boron from seawater using low cost methods: three fly ashes as adsorbents and ferric chloride. Parameters which could affect boron removal efficiency were investigated, including pH, reaction time, and liquid/solid (l/s) ratio. The results suggested that fruit (date seed) based ash had remarkably higher efficiency of boron removal (71%) than power plants fly ash, pine tree fly ash, and coagulants. The optimum removal efficiency was achieved with the date seeds ash at pH 7 and l/s of 5. The results from the study are of practical significance as the date seed ash is showing highest removal efficiency at neutral pH. In particular, the considerable capability of date seed ash to remove boron at a neutral pH is important in reverse osmosis (RO) process, as it enables better membrane stability and minimal membrane scaling and subsequently renders low operating costs.

Keywords: Adsorbent; Boron; Date seed; Fly ash; Pre- treatment; Seawater

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