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Recent advances in membrane materials and technologies for boron removal

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Abstract

The removal of boron compounds from aqueous systems is receiving worldwide attention because boron contaminations in various water sources are rising in recent years. Boron toxicities to living beings and harmfulness to semi-conductor manufacturing are increasingly accessed and recognized by researchers. A wide range of technologies has been unveiled for boron removal. Among them, membrane technologies for boron removal have come to the scientific spotlight. Especially, some emerging membrane processes were devised recently, e.g. forward osmosis (FO), polymer enhanced ultrafiltration (PEUF), membrane adsorptive filtration (MAF), membrane distillation (MD), etc. Most of them were demonstrated with many competitive edges compared to the traditional methods. This review will present a comprehensive summary of the recent advances in membrane-based deboronation technologies from the perspectives of membrane materials, membrane fabrication and system design. Comparisons between various membrane processes and prospects of each technology will be covered. The information may provide inspiration for future researchers and pave the way to develop effective and efficient deboronation technologies for the years to come.

Keywords: membrane materials; membrane processes; polymeric membranes; boron removal

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