

## **Developing a cationic selective membrane with Aloe Vera for the desalination of water**

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The scarcity of access to clean water for agriculture is a growing global issue. Desalination techniques such as reverse osmosis, capacitive deionization, and multi-stage flash have been developed and modified to address this crisis. This study focused on electrodialysis and, specifically, the application of cationic selective membranes. For this purpose, carboxymethyl cellulose (CMC) and graphene oxide (GO), with the addition of aloe vera, were used to enhance the anionic functional groups and porosity. The desalination ability of composite series was determined using a permselectivity study and ion exchange capacity study. GO, CMC, and aloe vera were the best combinations in this study which gives the highest permselectivity and ion exchange capacity. Increasing the graphene oxide percentage in the polymer solution enhances the efficiency of the cationic selective membrane, 50% (V/V) of graphene oxide composition gives the highest permselective and ion exchange capacity. This composite was characterized using FT-IR, XRD, SEM, and other techniques. It was identified that the synthesized composite can be used as a cationic selective membrane in the electrodialysis process if the pH value is higher than 4.2. The synthesized composite also proves reusability over 12 cycles, ensuring prolonged durability. The results of this study demonstrated the potential of using bio-filter materials for desalination, which is a sustainable and cost-effective solution for water desalination. The use of aloe vera as a compound in the cationic selective membrane is a promising finding, and they are natural and eco-friendly answers for the desalination process.

**Keywords:** Desalination; Graphene oxide; Carboxy methyl cellulose; Aloe vera; Cationic-selective membrane.

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