

# CATIONIC POLYELECTROLYTES BASED ON NATURAL POLYMER AS DRAW SOLUTE IN FORWARD OSMOSIS PROCESS

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## **Abstract**

Potential of cationic starch (CS) as draw solute in FO process has been investigated in this study. The CS was synthesized by grafting 2,3-epoxypropyl trimethylammonium chloride (ETAC) onto the backbone of corn starch via etherification reaction. The successful synthesis of CS was confirmed by nuclear magnetic resonance spectroscopy (NMR) and their solution properties of CS including pH, electric conductivity, osmotic pressure and viscosity were also explored. The results of FO performance showed that CS has substantial osmotic pressure to draw water from low saline solution and its efficiency was higher at a greater temperature. The maximum water fluxes ( $J_w$ ) of 4.10 and 2.20 L m<sup>2</sup> h<sup>-1</sup> were achieved with pure DI water and NaCl (2 g L<sup>-1</sup>) as feed solutions and 30 wt% CS as draw solute at 45 °C. Compared to the inorganic salt (NaCl), CS has a significant lower reverse flux ( $J_s$ ) due to its larger molecular weight. Moreover, the diluted CS solution was effectively separated by ultrafiltration with the rejection rate of more than 99%. To further increase water flux during the regeneration process, cross flow filtration or other recycling membrane process such as membrane distillation is suggested. However, in overall, CS is feasible to use as a draw solution in FO process.

## **Keywords**

Forward osmosis; Draw solute; Cationic starch; Reverse solute flux; Water flux