

### Theoretical analysis of hybrid forward osmosis, electro dialysis and reverse osmosis process for seawater desalination

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With an objective of searching for greater the ion mobility through membranes, hybridizing ED with FO and RO can provide an access to a wide range of ionic species with higher mobility in seawater. In this process the purpose of ED is to concentrate part of the draw solute which returns back to the FO and dilute the rest which flows to RO for final desalination. With higher dilute effluent concentration, the performance of electro dialysis is expected to remain the same because of higher current density. With a lower concentration of dilute effluent, the performance of reverse osmosis increases. As a result, the energy consumption and the capital cost are expected to decrease than the standalone electro dialysis system. Besides, reduction in pretreatment cost for desalination, fouling phenomena in ED module, improvement in product water quality are additional advantages gained from the process. In this research, selection a draw solute with best ion mobility is selected. Total operating and capital costs will be analyzed for each draw solute and, finally, the competitiveness of the process will be determined.