

PVA/PSF MEMBRANE SYNTHESIS FOR PRODUCED WATER FILTRATION

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Key Words: produced water, poly (vinyl) alcohol, polysulfone

Oil and gas exploration and production yields produced water (PW) which contains metal and oil. High volumes of PW pose threats to the public and environment, creating a major ecological problem. Forward Osmosis and membrane technology have been at the forefront as a pretreatment before discharge and as an option to remove oil contaminants in PW filtrate so that it can be used for other processes. Fabricated membranes are investigated for their effectiveness and efficiency in produced water filtration. Poly (vinyl) alcohol (PVA) /polysulfone (PSf) composite membranes with silver nanoparticle prevent microbial foulant accumulation during filtration. Functionalized composite membranes with a spacing element (1,4-butanediol diglycidyl ether (1,4-BDE)) and metal chelating ligand(s) (iminodiacetic acid (IDA), nitrilotriacetic acid (NTA) or N-(2-hydroxyethyl) ethylenediamine N-N'-N' triacetic acid (HEDT)) bind metals present in the PW. Enzymes (membrane monooxygenase, soluble rubredoxin, rubredoxin reductase and alkane hydroxylases) have been shown to treat contaminated soils therefore enzymes within the membrane via glutaraldehyde crosslinking will be shown to breakdown the hydrocarbon contaminated water. Preliminary data for composite PVA/PSf membrane show promising results for PW filtration with maintaining flux while preventing fouling.