

REMOVAL OF MEMBRANE FOULING COMPOUNDS FROM PRODUCED WATER

Song Jin*

MWH

3665 JFK Parkway, Suite 206

Fort Collins, CO 80525

Voice: 970-212-2766

Fax: 970-377-9406

song.jin@mwhglobal.com

Paul Fallgren

Western Research Institute

Laramie, WY

Large volume of water is co-produced with production of oil and gas. Treatment for surface discharge is one of the common options in produced water management. Natural and industry specific organic matter and oxyanions such as guar gum (GG), humic acid (HA), selenium (Se) and arsenic (As) are both contaminants and agents that tend to foul membranes during water treatment using membrane technologies. Conventional pretreatment such as coagulation, flocculation, sedimentation, and filtration are not effective to all these constituents. An innovative technology of using synthetic calcinated layered double hydroxides (LDH) was investigated for removing these fouling agents from water. Adsorption isotherms were evaluated with Langmuir and Freundlich models. Results show the affinity of GG and HA to LDH to be 11.31 and 9.33 mg g⁻¹ LDH, respectively. Kinetic isotherms modeled using a pseudo-second order model indicates that the sorbing rates of LDH to GG and HA increase with initial GG and HA concentrations. The removal efficiency for Se and As in raw produced water achieved 40% and 70%, respectively. This study demonstrates that LDH may offer an alternative and cost-effective method in removing the common fouling compounds during membrane treatment of produced water.

###