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# Application of Membrane Contactors to Remove Hydrogen Sulfide from Sour Water

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## Abstract

Wastewater containing hydrogen sulfide ( $H_2S$ ), also known as sour water, is a byproduct stream generated during oil & gas (O&G) production. Because  $H_2S$  is both toxic and corrosive, treatment to remove it is generally practiced, either by chemical treatment or stripping. Within the O&G industry, sour water strippers are generally used, especially when there is a need for recycle/reuse or for safe handling. However, those treatment processes have limitations in terms of chemical consumption or high capital cost (due to expensive materials of construction). Commercially available membrane contactors are a potential alternative technology for sour water treatment with advantages such as low capital cost, modular & compact design and thus, portability. The hydrophobic character of the membrane allows  $H_2S$  gas from the sour water to permeate through, while preventing the passage of water. When applied in this novel approach, the  $H_2S$  passing through the membrane dissolves into a receiving solution containing a chemical, e.g. amines or sodium hydroxide, which immediately converts the  $H_2S$  to a non-hazardous form thereby maximizing the concentration gradient across the membrane. Process performance has been evaluated by coupling experimental data with mass transfer equations, using the overall mass transfer coefficient as the process performance indicator. Experiments showed a mass transfer coefficient of 0.243 cm/min for both gas field sour process water and synthetic solutions, indicating no immediate

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