Salts Removal as an Effective and Economical Method of Bakken Formation Treatment

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Abstract

One of the main aims of managing and containing waste disposal in deep rock formations is to safeguard individuals, the surroundings, and the groundwater reserves. The elevated salt content of the water produced by the rock formation necessitated an analysis of its chemical composition, including its major ion content, in order to understand the characteristics of the rock. Additionally, the total dissolved solids (TDS) in the ND Bakken formation are greater than 300g/l, which is much higher than the concentration of salt in seawater; therefore, it is reasonable to propose a modified process to treat the salts found in this formation produced water. Produced water in the unconventional U.S. Bakken oilfield has become a significant concern since oil and gas production growth has been substantial, and operating costs are increasing. Reusing this considerable amount of produced water has become necessary since the treated water can be used for potable supplies, irrigation, deep well injection, maintenance, and fracking, which improves profits and mitigates groundwater pollution. Several metals (Mg, Ca, Mn, Sr, Li, and K) were extracted from the flow back water and water produced in the Bakken oilfield using lime, caustic soda, and soda ash at different dosages and pH values during this project. The separation treatment using selective precipitation can be invaluable as a pre-treatment process of desalination techniques. Extracted salts are effective coagulants for removing various contaminants from wastewater; therefore, the extracted $Mg(OH)_2$ and $CaCO_3$ were used for wastewater treatment and establish their efficiency in removing COD and the nutrients phosphorous and nitrogen from ND wastewater. The recovery of these elements from produced water may create additional financial benefits for oil-producing areas. More importantly, this sustainable disposal of produced water may encourage the recycling and reuse practice, ultimately reducing the use of freshwater for hydraulic fracturing.