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The effectiveness of persulfate in the remediation of petroleum contaminants in saline environment at elevated groundwater temperature

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In the past few decades, several aqueous oxidants have been utilized to remediate petroleum hydrocarbons. However, the majority of research in this field has been focused primarily on the use of oxidants in treating fresh water at low groundwater temperature settings. In this study, bench top batch experiments were conducted to investigate the effectiveness of persulfate as an oxidation agent to remediate petroleum hydrocarbons in alternative settings (saline environments at high groundwater temperature). Benzene, Toluene, thylbenzenes, and Xylenes (BTEX), Trimethylbenzenes (TMBs), Naphthalene, and fractions (F1, F2 and F3) are the target investigated organic compounds during this study.

The main objectives of this study are: 1) evaluating the effectiveness of persulfate (alkaline activated and non-activated) as a chemical oxidation agent; 2) examining the role of persulfate concentrations on the degradation rates of selected organic contaminants; and 3) determining the isotopic (13C and 2H) fractionation factors associated with the chemical transformations of selected organic contaminants.

The outcome of this study will aid in selecting the most effective remediation methods in these alternative settings (high salinity and elevated temperatures). Furthermore, this study will enhance the use of compound-specific isotope analyses (CSIA) as a monitoring tool to better understand the fate of organic compounds during the remediation treatment.