

COMPARISON OF POTASSIUM AND SODIUM PERMANGANATE IN TERMS OF IN-SITU CHEMICAL OXIDATION

POROVNÁNÍ MANGANISTANU DRASELNÉHO A MANGANISTANU SODNÉHO V RÁMCI IN-SITU CHEMICKÉ OXIDACE

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Abstract:

In-situ chemical oxidation is an innovative decontamination technique widely used in full-scale in last few years. This technique is based on infiltration of properly selected oxidation agent into subsurface. Oxidation agent destructs present contaminant to substances harmless for environment. Most commonly used oxidant is potassium permanganate. Proper selection of oxidation agent is a crucial step in the whole technology setup. Oxidant selection depends on target locality soil composition, hydro-geological properties, type and amount of the contaminant etc. Potassium permanganate is most commonly used because of its low price, easy use and high reliability. In last time some companies start to prefer Sodium permanganate for ISCO application. There are no obvious chemical differences between Sodium and Potassium permanganate excepting solubility (KMnO₄ 63 g/l (20°C), NaMnO₄ 900 g/l (20°C)), and price where the Sodium permanganate is much more expensive in the commercial market. The oxidation strength is carried by MnO₄⁻ anion – same in both permanganates.

Main goal of this study was to compare interactions of Potassium and Sodium permanganates with the soil from contaminated fields. Non target oxidant demand (NOD) and changes of soil hydraulic parameters were measured and compared during contact with both permanganates. There was observed NO significant difference between Potassium and Sodium permanganate during performed experiments. NO differences were measured by the NOD parameter and hydraulic conductivity as well. Both oxidation agents can be considered as equal in terms of performed in-situ chemical oxidation experiments. But for practical full scale application there is absolute advantage in the low price of Potassium permanganate. Because of its high price Sodium permanganate is not suitable for full-scale ISCO application.

Keywords:

In-situ chemical oxidation, Chlorinated ethylenes, Potassium permanganate, Sodium permanganate