

Provect-OX® Self-Activating ISCO + Enhanced Bioremediation Reagent

Provect-OX® is a reagent that combines *in situ* chemical oxidation (ISCO) and enhanced bioremediation for the remediation of soil and groundwater contamination. This patented technology uses ferric iron to activate sodium persulfate, generating powerful oxidizing species that rapidly degrade a wide range of contaminants, including chlorinated solvents, petroleum hydrocarbons, and pesticides. The primary advantage of using **Provect-OX** over other industry products is its ability to **actively manage rebound**.

Why Select Provect-OX?

- ◆ **Effective:** Maximizes synergy between persulfate and iron by combining ISCO and enhanced bioremediation treatment.
- ◆ **Efficient:** Lower overall project costs due to sub-stoichiometric oxidant dosing requirements.
- ◆ **Safe:** Integrated catalyst activates the persulfate without heat, chelated metals, extreme pH conditions or hydrogen peroxide.
- ◆ **Ease of Use:** One product only—no extra containers, multi-step mixing (fewer compatibility issues) or multiple reagent deliveries.

Chemistry & Treatment Mechanism

Advanced Persulfate Activation

Sodium persulfate is activated by ferric iron [Fe (III)], which requires lower activation energy than alternative activation methods and does not consume persulfate during activation.

Persulfate reacts through:

- ➔ Direct electron transfer
- ➔ Free-radical oxidation pathways

Provect-OX produces some of the strongest oxidants available for remediation [e.g., Sulfate radical (+2.6 V), Ferrate (+2.2 V) & Persulfate anion (+2.01 V)]. **Provect-OX** will also include Terr-OR™ ferrate stabilizer and pH buffer to offset the sulfuric acid produced during breakdown of the persulfates.

Enhanced Bioremediation & Rebound Control

Provect-OX will provide enhanced bioremediation. Residual iron and sulfate act as terminal electron acceptors supporting facultative and anerobic biodegradation. Oxidation by-products serve as electron shuttles, enabling reduction of ferric to ferrous iron, continuing iron redox cycling for ongoing persulfate activation. While ferrous iron is formed through reduction of the ferric species as a terminal electron acceptor, residual sulfate is utilized as a terminal electron acceptor by facultative organisms thereby generating sulfide under these same conditions. Together, the ferrous iron and the sulfide promote the formation of pyrite as a remedial byproduct. This reaction combats the toxic effects of sulfide and hydrogen sulfide accumulation on the facultative bacteria, while also providing a means of removing targeted organic and inorganic contaminants via precipitation reactions. These secondary attenuation mechanisms manage residual contamination and minimize rebound, extending treatment effectiveness beyond initial oxidation.

Application Methods: Direct push temporary point injection, screened well injection, soil mixing, and excavation placement.