Activating Klozur® SP with Iron-EDTA

BACKGROUND

Klozur® SP can be activated with iron–EDTA (FeEDTA), a chelated iron, for the oxidative destruction of organic contaminants of concern, including PCE, TCE, DCE, vinyl chloride, BTEX, low molecular weight aromatic hydrocarbons, methyl-tert-butyl ether (MTBE), 1,4-dioxane, and others.

For the FeEDTA activation of Klozur SP, the iron concentration in the groundwater needs to be maintained between 150 mg / L (ppm) and 600 mg / L (ppm). Iron concentrations below 150 ppm will result in kinetics that may not be favorable for the oxidation of various contaminants, and concentrations in excess of 600 ppm may lead to increased persulfate decomposition. FeEDTA is 13% iron by weight, thus requiring between 1,154 ppm and 4,615 ppm FeEDTA to maintain the desired groundwater iron concentrations.

PeroxyChem recommends the addition of FeEDTA as an activator when iron activation is selected, even if there is iron already present in the subsurface. Measured iron concentrations present in soils may not be available for sodium persulfate activation or the iron may not be distributed evenly enough through the treatment zone to insure adequate activation of the sodium persulfate.

SAFETY AND HANDLING

FeEDTA is a yellowish-green powder with slight health hazards. Appropriate Personal Protective Equipment (PPE), including chemical goggles and a respirator for dust is required when handling this product.

Review the Safety Data Sheets (SDS) with all workers prior to use and follow guidance within the SDS when handling FeEDTA.

PeroxyChem does not recommend combining FeEDTA with persulfate in the same batching tank, as persulfate decomposition may occur with subsequent generation of heat and oxidant loss.

PeroxyChem recommends the use of separate batch tanks to make up the persulfate solution and the FeEDTA solution. The solutions may then be mixed inline prior to the well-head and co-injected or injected separately in a serial fashion.

DETERMINING THE AMOUNT OF ACTIVATOR NEEDED

1. Determine the volume of groundwater to be treated with FeEDTA activated Klozur SP.

2. The minimum amount of FeEDTA needed to achieve 150 ppm of Fe in the groundwater can be determined by:

$$\text{Lbs FeEDTA} = \#\text{ gallons of groundwater} * 150 * 6.38 \times 10^{-5}$$

At room temperature (20 C), FeEDTA is soluble up to a concentration of 90 g/L (0.75 lb/gallon).