Klozur® Field Test Kit Chemistry

TEST KIT "K"

- For the use with alkaline, iron sulfate, or heat activation of Klozur Persulfate; based on the permanganate back-titration method

TEST KIT "C"

- For the use with chelated iron or hydrogen peroxide* activation of Klozur Persulfate; based on the ceric sulfate back-titration method
  *Note: The measurement of Klozur persulfate may have an interference due to the presence of hydrogen peroxide. Please see Test Kit "C" instructions or contact PeroxyChem for more information.

GENERAL METHODOLOGY

Persulfate anion will oxidize divalent iron [Fe(II)] to form trivalent iron [Fe(III)] in the reaction:

$$S_2O_8^{-2} + 2\ Fe^{+2} \rightarrow 2\ Fe^{+3} + 2\ SO_4^{-2} \qquad \text{Equation 1}$$

Quantitative determination of persulfate concentration can be achieved by first adding in excess a known amount of Fe(II) to the persulfate solution. A portion of the Fe(II) is then converted to Fe(III) via Equation 1. The remaining Fe(II) is then titrated with either a known concentration of potassium permanganate [$KMnO_4$] to a pink end-point (Test Kit "K") or ceric sulfate [$Ce(SO_4)_2$] to a Ferroin indicator end-point, resulting in a color change from orange to clear or light blue (Test Kit "C"). As an example, for permanganate:

$$MnO_4^- + 5\ Fe^{+2} + 8\ H^+ \rightarrow Mn^{+2} + 5\ Fe^{+3} + 4\ H_2O \qquad \text{Equation 2}$$

For ceric sulfate:

$$Ce^{+4} + Fe^{+2} \rightarrow Ce^{+3} + Fe^{+3} \qquad \text{Equation 3}$$

Using the volume of permanganate or ceric sulfate needed to reach the endpoint (which occurs when all of the remaining Fe(II) is oxidized), the amount persulfate that was originally present can be determined:

Fe(II) reacted with persulfate = Fe(II) total – Fe(II) reacted with permanganate or ceric sulfate — Equation 4

Moles of persulfate = moles of Fe(II) reacted with persulfate / 2 — Equation 5

Concentration of persulfate in groundwater = moles of persulfate * 238 g / moles / volume of ground water sample — Equation 6