

Reaction of Potassium Permanganate with Glycerin by: William C. Deese

Description: The students observe a spectacular chemical reaction, the oxidation of glycerin using potassium permanganate as the oxidant.

Materials: Potassium permanganate, glycerin, 0.1M NaOH, two large test tubes, test tube stage, mortar and pestle ceramic pad, forceps, coffee can (for waste container)

Procedure:

- 1) Show the students the bottles containing glycerin and KMnO_4 .
- 2) Grind about a teaspoon of the KMnO_4 into a powder and place in a pile on the pad.
- 3) Make a small dimple in the pile with a piece of chalk, and add three drops of glycerin onto the KMnO_4 .
- 4) Observe the reaction. Observations suggest a chemical change occurred.
- 5) To test the hypothesis, fill each test tube about $\frac{2}{3}$ full with 0.1M NaOH.
- 6) Add a small amount of KMnO_4 to one test tube and observe the purple color.
- 7) Using forceps, add a small piece of the pellet formed in the reaction to the other test tube, swirl, and observe the green color of the solution.

Reaction: The species imparting the green color is the manganate ion, MnO_4^{2-} . Insoluble manganese dioxide is also produced in the reaction. The reason sodium hydroxide solution is used is that, although the manganate ion is unstable with respect to disproportionation to MnO_2 and MnO_4^- , the reaction is slow under basic conditions.

One reaction that occurs is:



Notes: Since the purpose of the demonstration is to observe properties and behavior, it is not necessary to tell the students the chemical names of these compounds. This demonstration is therefore appropriate for pre-chemistry classes.

Hazards: This reaction produces both flame and sparks. Also, bits of hot solids are often expelled several centimeters. KMnO_4 can cause an explosion if brought into contact with organic or other easily oxidized substances.

Disposal: Place the solid waste into the coffee can for storage. The solutions can be flushed down the drain with a large amount of water. When disposal of the solids is necessary, flush the soluble solids down the drain and discard the insoluble material in a waste container.

Reference: *Lecture Demonstrations for General Chemistry*, Dale Alexander, New Mexico State University, Las Cruces, New Mexico, p. 7.