

4. Nitrogen Dioxide

Nitrogen dioxide will be produced in two steps. First you will generate, in separate containers, nitric oxide, NO, and oxygen, O₂. These two gases will react to form nitrogen dioxide, NO₂.

A. NO Generating Bag

1. Place about 1.5 g (1/2 teaspoon) of potassium nitrite, KNO₂, into a bottom corner of a 1 *quart* heavy duty Ziploc bag.
2. Fill a plastic pipet with 6 M sulfuric acid (caution). Place the pipet into the bag. Do not seal it yet.

B. O₂ Generating Bag

1. Cut a 1 *pint* bag to produce pull tabs on the edges of the bag. The goal is to allow this bag to be opened when it is inside another bag.
2. Place about 1 g (1/2 tsp.) of iron(III) chloride, FeCl₃, into the bottom corner of the modified bag produced above.
3. Fill a plastic pipet with 3% hydrogen peroxide, H₂O₂. Place the pipet into the bag, smooth it to remove as much air as possible, and seal the bag. Be careful not to press against the pipet.
4. Place the smaller O₂ generating bag into the larger NO generating bag. Smooth out the air and seal.
5. Move to a fume hood. Expel the H₂O₂ from the pipet in the inner bag onto the FeCl₃. The bag will fill with O₂.
6. Expel the H₂SO₄ from the pipet in the outer bag onto the potassium nitrite. The bag will fill with NO plus a small quantity of NO₂ resulting from residual oxygen in the bag.
7. Without opening the larger bag, open the inner smaller bag. Record your observations.
8. Expel the air from a clean pipet, and carefully insert it into the gas-filled bag at one corner of the seal. Do not open the bag more than absolutely necessary. Taking care not to touch the liquids or solids in the bag, insert the pipet deep into the bag and release the bulb so that the pipet fills with gas. Remove the pipet and reseal the bag.
9. Put 1 mL of distilled water into a clean test tube. Bubble the NO₂ into this water. Measure the pH of the resulting solution.
10. Place the used bags in the bucket labeled "waste bags".