

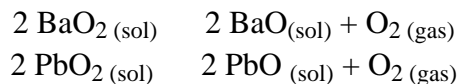
Lab Session 3, Experiment 2: Oxygen

Oxygen is the most abundant element on or near the surface of the earth. Oxygen is present in large quantities in the air, water, rocks, and minerals. Oxygen combines with almost all other elements to form compounds that are called oxides of these elements.

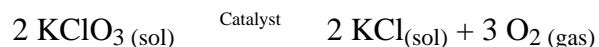
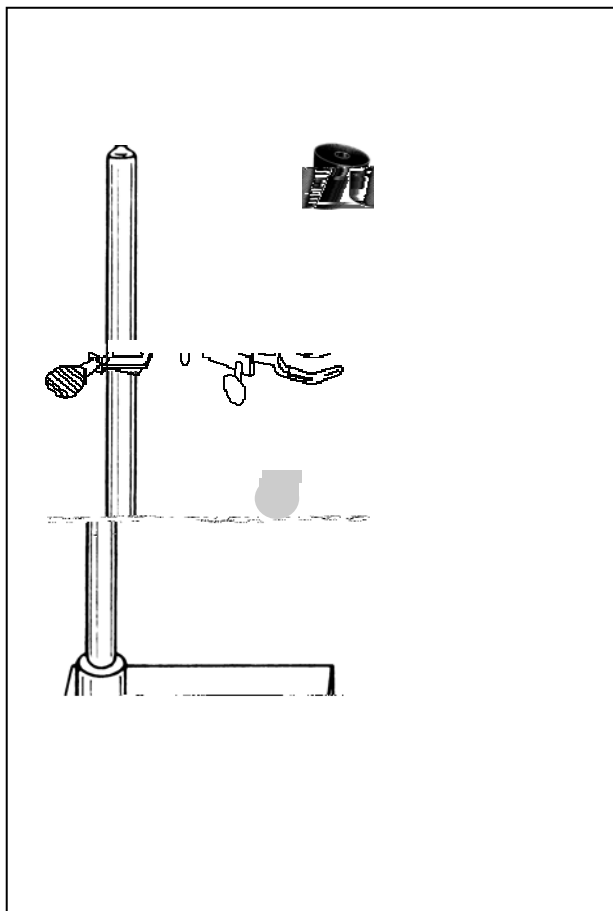
Oxygen is not highly active (or reactive) at room temperature, but at higher temperatures its activity (or reactivity) increases markedly.

2A Experiment

1. Place BaO₂ in a small test tube to a height of about 1 cm.
2. Using another small test tube, do the same with PbO₂.
3. Heat each of the test tubes in the flame of your burner. Use the "glowing splint" test to show that oxygen is produced.



4. *Clean and dry* your large test tube. Add KClO₃ to the test tube to a height of 2 - 3 cm; add, using a spatula, a pinch of catalyst, MnO₂. Mix well. Mount the test tube to a ring stand as shown in Figure 3.1. Check to make sure that the glass tube through the rubber stopper fits tightly, that the rubber stopper fits tightly in the test tube, and that the rubber tube for delivery to the pneumatic trough fits tightly on the glass tube through the rubber stopper. The rubber tubes may need to be secured by a hose clamp or by wire windings. Tight fits prevent oxygen loss to the atmosphere.
5. Prepare to collect oxygen by displacement of water. You will need two 8 oz bottles of oxygen, so before initiating the decomposition of KClO₃, fill, invert, and position in the pneumatic trough both bottles. Heat the test tube, gently at first, to start the decomposition. After each bottle is filled, cover the mouth of the bottle with a watch glass, remove it from the trough, and set it right side up on the desk.



- (a) What does the collection of oxygen by displacement of water indicate about the solubility of O₂ in water?
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(b) List four physical properties of oxygen.

(c) What is the purpose of MnO_2 ?

6. Add about 10 mL of water to each of the oxygen-filled bottles. Move the watch glass aside slightly and lower a glowing splint into the bottle. Allow the combustion to continue for several seconds. Remove the splint, cover the bottle, and swirl to mix the water and gas.

(d) What gas was produced by the combustion?

(e) Write the equation for the reaction between the gas produced and the water.

(f) Test the solution formed with litmus paper. What do you observe?

(g) Classify the oxide formed by the combustion as acidic or basic:

7. *Under the hood*, place a *small amount* of sulfur in a combustion spoon. Ignite the sulfur with the burner flame. Lower the burning sulfur into the second oxygen bottle.

(h) Record your observations.

(i) What gas is produced by the combustion?

(j) Write the equation for the reaction between the gas and water.

(k) Test the solution in the bottle with litmus paper. What do you observe?

(l) Classify the oxide formed by the combustion of sulfur as acidic or basic:

Report Form 2: Oxygen

Name _____

Partner _____ Section # _____

(a) Is O₂ soluble or insoluble in water? _____

(b) List four physical properties of oxygen. _____

(c) What is the purpose of MnO₂