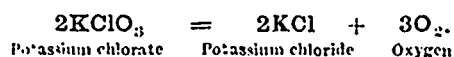


**35. Dissociation.**—Decomposition like that of mercuric oxide under the influence of heat is an example of what is known as *dissociation*. This term is applied to those cases of decomposition in which certain bodies are resolved at an elevated temperature into simpler bodies, which are capable of re-uniting and reproducing the original compound when the temperature is again allowed to fall.

### 36. From Potassium Chlorate.

**Exp. 1.**—A molecule of the white crystalline substance called Potassium Chlorate consists of one atom of Potassium, the symbol of which is K, one atom of Chlorine, Cl, and three atoms of Oxygen, O<sub>3</sub>; hence its formula is denoted by KClO<sub>3</sub>. Take a few crystals of this substance, put them into a test-tube, and heat, gently at first, loosely stopping the mouth of the test-tube with the thumb. The salt begins to spirt or “de-eripitate,” then fuses, and on further heating appears to boil. Plunge a glowing splint of wood into the tube; the splint immediately bursts into flame with a slight explosion, showing that oxygen gas has been produced. Now, if oxygen has been produced from potassium chlorate, that substance must have undergone a change. To put this to the test, take a few crystals of the chlorate, dissolve them in water in a test-tube, and add a drop or two of a solution of silver nitrate; the liquid remains clear. Dissolve a small quantity of the substance remaining in the test-tube, and add a drop or two of silver nitrate solution; at once a white solid forms in the liquid, showing that the potassium chlorate has been changed by heat. The substance remaining in the test tube when the oxygen is given off is called Potassium Chloride, KCl. The reaction which has taken place is expressed by the following equation:—



### 37. From Potassium Chlorate and Manganese Dioxide.

To obtain oxygen from potassium chlorate, greater heat is required than glass vessels generally bear, and it is, therefore, seldom adopted in practice, except when very pure oxygen is required. It is found, however, that if the potassium chlorate is mixed with about one-fourth its weight of manganese dioxide, MnO<sub>2</sub>, the oxygen is given off at a much lower temperature.

**Exp. 2.**—Coarsely powder 20 grams (nearly  $\frac{3}{4}$  oz.) of potassium chlorate, place it upon a piece of paper, turned up at the edges so as to form a kind of trough, and by means of this transfer the chlorate to a test-tube 6 in. by  $\frac{3}{4}$  in. This quantity will about half fill the tube. Place upon the same paper about 5 grams of manganese dioxide and transfer it to the test-tube. Place a small piece of paper on the mouth of the tube to keep the thumb clean, and shake vigorously till the two substances are thoroughly mixed. Choose a sound cork, very slightly larger than the mouth of the test-tube, squeeze it well till it becomes soft and elastic, and with a cork borer or rat-tail file bore a hole through it so that a glass tube may be inserted tightly into it. Take a piece of glass tubing about 45 centimeters (18 inches) in length, bend it in two places, one downwards about 5 centimeters (2 inches) from the end of the tube; the other should be upwards and as near the other end of the

tube as possible. The object of the second bend is to facilitate the escape of the bubbles of gas by giving them a forward and upward direction. The downward bend should now with gentle pressure and twisting motion be inserted in the cork.

Take a large cork, bore a hole in it to fit the rod of the retort-stand, twist a piece of copper wire around the cork, leaving about eight inches of the end free. Twist the free ends of the wire around the test-tube, insert the cork in the tube and arrange for collecting the gas.

Take two quart and five pint bottles, fill two of them with water, and place mouth downwards, one on the shelf of the pneumatic trough, the other in the water in the trough, ready to take the place of the one on the shelf. On gently heating the test-tube, oxygen will readily be given off. When the bottle is full, slide it off the shelf with one hand, and with the other slide the full bottle into its place. Bring a glass plate under its mouth while still under water, raise it out of the water, and place it mouth upwards on the table. If any of the bottles have to be kept for a considerable time, they should be placed mouth downwards in a saucer containing a little water, which will act as a valve to prevent the gas from escaping.

One ounce or 28.3 grains of potassium chlorate should yield 1 $\frac{3}{4}$  gallons, or nearly 7.75 litres.

**38. Precautions.**—In performing this experiment, the following precautions should be observed:—

(1) In the preparation of the mixture, care must be taken to avoid the accidental introduction of small fragments of organic matter. A small quantity of the oxygen mixture should be heated in a test-tube before using it on a large scale, as occasionally the manganese dioxide contains lamp-black and substances of kindred nature, the presence of which would lead to an explosion.

(2) When the delivery-tube is fitted into the cork, and the cork into the test-tube, blow down the open end of the delivery-tube; no air must be heard to escape, or must be seen to bubble out on moistening the cork.

(3) As soon as the oxygen begins to be delivered, the heat beneath the test-tube should be so regulated that the evolution of the gas should be tranquil and uniform.

(4) The uppermost portions of the mixture should be heated before the lower, which should be heated only after the uppermost parts refuse to yield any more gas.

(5) The test-tube should never be more than three-fourths full, lest particles of solid matter be projected into the delivery-tube.

(7) The test-tube should be inclined at an angle of about 45°, and must never be placed upright.

(7) When the process is to be stopped, the end of the delivery-tube must be immediately removed from the water, otherwise the cold-water is liable to go back into the hot test-tube and break it; and the test-tube must not be allowed to touch cold or wet objects, which would cause the hot glass to crack.

### 39. Manner in which the Manganese Dioxide acts.

**Exp. 3.**—Mix one gram of potassium chlorate with half a gram of each of the following substances, viz: Manganese