

GRAVIMETRIC ANALYSIS OF POTASSIUM CHLORATE

Adapted from 2006 Nova Chemical Science Challenge



Westminster College

PURPOSE

The objective of this experiment is to determine the chemical formula of potassium chlorate via a gravimetric analysis. You will then utilize your experimental results to balance the chemical reaction.

THEORY

When heated, potassium chlorate undergoes a reaction to form a potassium chloride and elemental oxygen.



The relative amount of oxygen can be measured by heating a pre-weighed sample of potassium chlorate and determining the mass of the remaining residue. The decrease in mass brought about by heating represents the amount of oxygen originally present in the sample. From this data, you will be able to calculate the chemical formula of potassium chlorate by determining the number of moles of potassium chloride produced and the number of moles of oxygen released.

SAFETY

This experiment requires the use of an open flame. Be very careful, and be sure to extinguish the flame when it is not in use.

Potassium chlorate is a strong oxidizer, so any waste should be flushed down the drain with plenty of water. Placing the potassium chlorate waste in the trash can creates a fire hazard.

PROCEDURE

1. Support a clean crucible in the wire triangle placed on the ring stand. Tilt the crucible lid well to one side so that it rests largely on the triangle and partly on the crucible edge.

2. Light the Bunsen burner. Adjust the height of the ring so that the top of the inner cone of the flame is just touching the crucible bottom. Heat the crucible to glowing for 5 minutes. Turn off the Bunsen burner and allow the crucible to cover to cool to room temperature for 5 minutes.
3. From now on, handle the crucible and cover with tongs only and carry it to and from the balance over a clean dry beaker or Petri dish. Weigh the crucible plus the lid on the top loading balance, and record this mass directly on the back of this report form.
4. Obtained a pre-measured sample of potassium chlorate and load it into the crucible. Weigh the crucible, cover, and potassium chlorate and record the mass.
5. Place the crucible, cover, and potassium chlorate in the wire triangle leaving the crucible cover tilted slightly to allow the oxygen to escape while it is being heated. Heat the crucible and its contents. Continue heating for 5 minutes after the bubbling in the crucible stops. After heating, immediately close the crucible lid, and allow the sample to cool for an additional 5 minutes. Weigh the crucible, cover, and potassium chloride residue.

Data table	Data
Mass of crucible and cover	
Mass of crucible, cover and potassium chlorate	
Mass of crucible, cover, and potassium chloride residue after heating	

DATA ANALYSIS

Mass of potassium chlorate sample –

Mass of potassium chloride residue (show calculations below) –

Moles of potassium chloride residue (show calculations below) –

Mass of oxygen releases (show calculations below) –

Moles of elemental oxygen lost (show calculations below) –

Determine the moles of elemental oxygen in potassium chlorate by dividing the moles of elemental oxygen released by the moles of potassium chloride. Round your value to the nearest whole number. (show calculations below) –

Write the complete and balanced equation for this reaction. What type of reaction is this?