CHAPTER 3: CHEMICAL FORMULAE AND EQUATIONS

Extra Activity

Aim: To construct balanced chemical equations

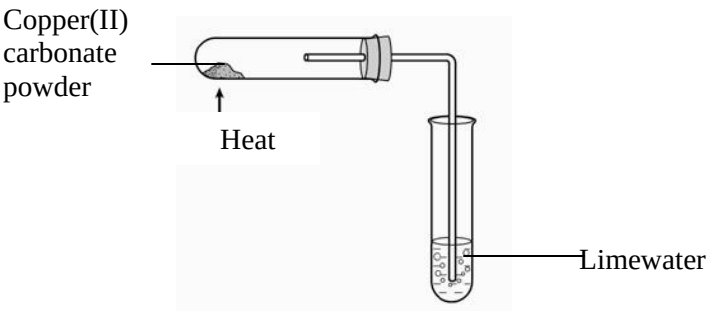
Materials: Copper(II) carbonate powder, limewater, concentrated hydrochloric acid and concentrated ammonia solution

Apparatus: Test tubes, stoppers, delivery tube, dropper, Bunsen burner and spatula

Procedure:

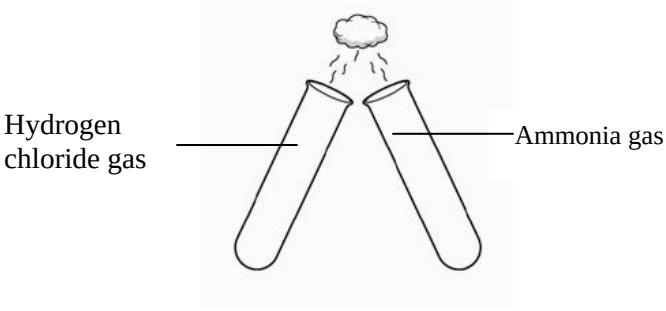
A. Heating of copper(II) carbonate

1. Placed half a spatula of copper(II) carbonate powder in a test tube.
2. The copper(II) carbonate is heated and the gas produced is passed through limewater.
3. The observations which occur are recorded.



B. Formation of ammonium chloride

1. A dropper is used to placed some concentrated hydrochloric acid in a test tube and the test tube is stoppered.
2. Repeat step 1, using concentrated ammonia solution.
3. Both stoppers are removed and the two test tubes are brought close to each other.
4. The observations are recorded.



Observations:

Activity	Observation
A	The copper(II) carbonate changes colour from green to black. The lime water turns milky.
B	Thick white fumes are produced above the mouths of the test tubes.

Discussion:

1. Copper(II) carbonate decomposes when heated and changes to black solid copper(II) oxide.
2. Limewater turns milky. This shows that carbon dioxide is released.
3. The balanced equation for Activity A is

$$\underset{\text{Copper(II) carbonate}}{CuCO_3(s)} \rightarrow \underset{\text{Copper(II) oxide}}{CuO(s)} + \underset{\text{Carbon dioxide}}{CO_2(g)}$$

4. Concentrated hydrochloric acid and concentrated ammonia solution produce hydrogen chloride gas and ammonia gas respectively.
5. The white fumes are ammonium chloride.
6. Therefore, the balanced equation for Activity B is

$$\underset{\text{Hydrogen chloride}}{HCl(g)} + \underset{\text{Ammonia}}{NH_3(g)} \rightarrow \underset{\text{Ammonium chloride}}{NH_4Cl(s)}$$