

## REGULAR LAB 5a: Chemical Reactions and Equations

**Aim** To observe a collection of chemical reactions and generate balanced chemical equations

**Chemicals** Hydrogen, ethanol, manganese dioxide, steel wool, sodium, sodium hydrogen carbonate, water, copper(II) sulfate pentahydrate, copper metal, magnesium metal, zinc metal. Solutions of; lead(II) nitrate, potassium iodide, hydrogen peroxide, sodium carbonate, copper(II) chloride, calcium chloride, hydrochloric acid, ethanoic acid.

**Apparatus** Tongs, test tubes, spot plates, test tube racks, Bunsen burners, pipets, balloon, wooden splints, test tube holders

### **Method**

Either perform (in the case of experiments that you are required to do), or observe (in the case of demos) the following chemical reactions.

In each case record your observations carefully in the results table.

- **DEMOS**

- 1. Combustion of hydrogen.**

Record observations.

- 2. Combustion of ethanol.**

Record observations.

- 3. Addition of sodium to water.**

Record observations.

- 4. Addition of lead(II) nitrate to potassium iodide solution.**

Record observations.

- **LABS**

**1. Decomposition of a compound.**

Using a pipet, add approx. 1 cm depth of the hydrogen peroxide solution to a test tube. Place the test tube in the test tube rack.

Light a wooden splint.

Carefully add a very small amount of manganese dioxide powder to the test tube and at the same time blow out the splint so that it is "glowing". Wait 10 seconds and insert the glowing splint into the mouth of the test tube.

When the reaction is complete, touch the outside of the test tube. Record your observations.

**2. Reaction of a metal with an acid.**

Using a pipet, fill one well of a spot plate with hydrochloric acid. Collect a small piece of magnesium metal and clean it with the steel wool. Place the metal in the acid. Record your observations.

**3. Oxidation of a metal.**

Take a small piece of copper metal and clean it with the steel wool. Using tongs, hold the copper in the flame of the Bunsen burner for about 45 seconds. Record your observations.

**4. Neutralization of an acid with a hydrogen carbonate.**

Using a pipet, add approx. 1 cm depth of ethanoic acid solution to a test tube. Place the test tube in the test tube rack.

Light a wooden splint.

Carefully add a small amount of sodium hydrogen carbonate powder to the test tube, wait 10 seconds and then insert the burning splint into to the mouth of the test tube.

Record your observations.

**5. Displacement of one metal with another.**

Using a pipet, fill one well of a spot plate with the copper(II) chloride solution. Collect a small piece of zinc metal and place the metal in the solution. After two minutes, use the pipet to remove the solution from the well by "sucking" it out, but leave the zinc metal in the well.

Record your observations.

**6. Precipitation reaction.**

Using a pipet add a few drops of calcium chloride solution to a well on a spot plate. Then add a few drops of sodium carbonate solution. Record your observations.

**7. Dehydration of a hydrated salt.**

Add about 1 cm depth of hydrated copper(II) sulfate crystals to a test tube. Using the blue flame of the Bunsen burner, heat the crystals strongly for about 1 minute. After heating wait another 2 minutes and then add a few drops of water to the test tube. Record your observations.

### Results

Record your observations in the table below.

DEMOS	OBSERVATIONS
1	
2	
3	
4	
LABS	OBSERVATIONS
1	
2	
3	
4	
5	
6	
7	

### Conclusions/Calculations

For each reaction use the description to help write a balanced equation. Do NOT include state symbols.

<b>DEMOS</b>	<b>DESCRIPTIONS to EQUATIONS</b>
1	Hydrogen gas burns in oxygen gas to produce water
2	Ethanol (C <sub>2</sub> H <sub>5</sub> OH) burns in oxygen to produce carbon dioxide and water
3	Sodium metal reacts with water to produce sodium hydroxide and hydrogen gas
4	When solutions of lead(II) nitrate and potassium iodide are mixed they will yield solid lead(II) iodide and a solution of potassium nitrate
<b>LABS</b>	<b>DESCRIPTIONS to EQUATIONS</b>
1	Hydrogen peroxide solution will decompose to give water and oxygen gas
2	Magnesium metal reacts with hydrochloric acid to give magnesium chloride and hydrogen gas
3	Copper metal reacts with oxygen in the air to produce copper(II) oxide
4	Sodium hydrogen carbonate will react with ethanoic acid to produce sodium ethanoate, carbon dioxide and water
5	Zinc reacts with copper(II) chloride to give copper metal and a solution of zinc chloride
6	Mixing solutions of calcium chloride and sodium carbonate will lead to the formation of calcium carbonate and sodium chloride
7	Heating hydrated copper(II) sulfate will produce steam and leave behind anhydrous copper(II) sulfate