Welcome to A Level Chemistry

Determination of an unknown metal

Starter: "Noah's ark"

1. Name the 2 most reactive alkali metals;
2. Name 2 products of sodium reacting with water;
3. State 2 equations involving the number of moles;
4. Name 2 types of chemical structure;
5. State 2 factors the affect the strength of attraction between the nucleus and valence electrons;

Welcome to Chemistry

Get ready to see your world in a new way….

How many atoms are the in a beaker of water?

How does your blood regulate its pH?

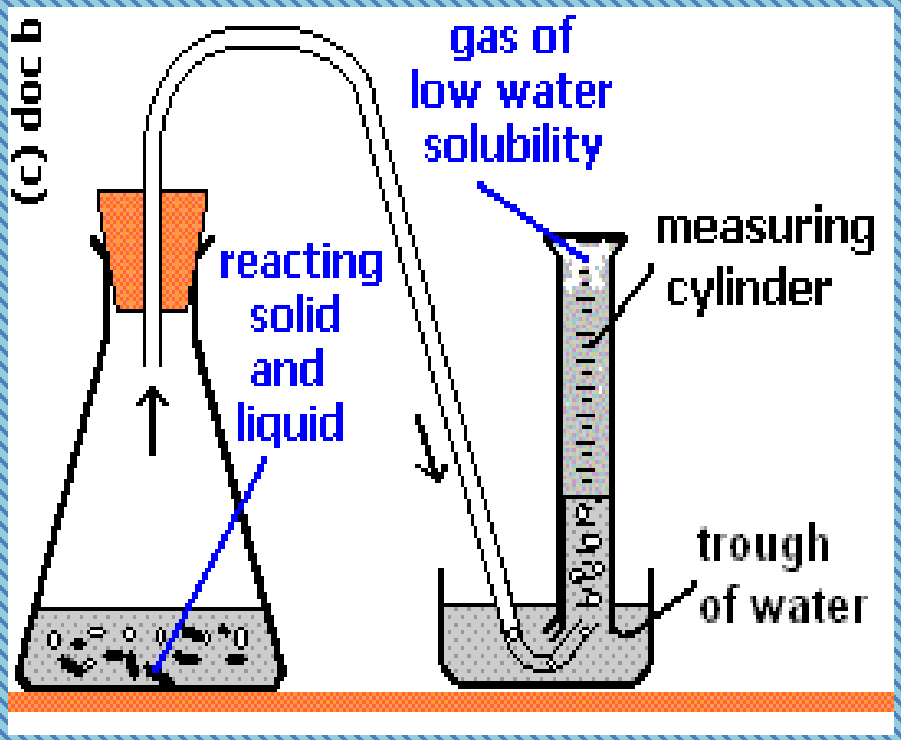
Why are some chemicals coloured when others are colourless?

Practical Investigation –
What is the unknown metal?

- Now you need to work out the identity of an unknown metal experimentally.

- **Here is your equipment, put it together how you think it should be used.**

This should be your set up



Quick Questions

1) Why is it important that your gas has low water solubility?

2) What gas have you encountered that is water soluble?

NOTE: You will not have been allowed to use this metal at GCSE.

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION
FIRE	Flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with water.
EXPLOSION	Risk of fire and explosion on contact with combustible substances and water.	
EXPOSURE		AVOID ALL CONTACT!
•**INHALATION**	Burning sensation. Cough. Laboured breathing. Shortness of breath. Sore throat. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.
•**SKIN**	Redness. Skin burns. Pain. Blisters.	Protective gloves. Protective clothing.
•**EYES**	Redness. Pain. Severe deep burns.	Safety goggles, or eye protection in combination with breathing protection.
•**INGESTION**	Abdominal cramps. Abdominal pain. Burning sensation. Nausea. Shock or collapse. Vomiting. Weakness.	Do not eat, drink, or smoke during work.

Once you've finished: The unknown metal, M, is from group 1. Use this information to write a balanced equation for the reaction of M with water.

1. Remove any excess oil and weigh between 0.05 g and 0.07 g of your unknown group 1 metal. Record the exact mass.
2. Measure 100 cm^3 of distilled water and decant it into the conical flask.
3. Record the initial volume of gas within the inverted 250 cm^3 measuring cylinder.
4. Add the metal to a conical flask and immediately replace the stopper.
5. Collect the gas produced and record the final volume of gas produced.

Deducing the Identity of the Group 1 Metal

You will need:

a) Your Mass of metal

b) Your volume of Hydrogen

c) A balanced symbol equation for the reaction of a group 1 metal with water (Use the symbol 'X' for the metal in your equation)

d) The two following equations:

$$Mole = \frac{Mass}{Mr}$$

$$Moles = \frac{Gas\ Volume}{24\,000}$$

The equation for the reaction is

$$2X + 2HCl \rightarrow 2XCl + H_2$$

- V cm^3 of hydrogen was produced.

  Since at RTP 24 000 cm^3 of hydrogen contains 1 mole.

  $\frac{V}{24\,000}$ cm^3 = n moles of hydrogen

- From the balanced equation, if there are n moles of hydrogen there are 2n moles of X.
- So 2n moles of X has a mass of m g (whatever you weighed out)
- Using **Moles = Mass/ Mr** we find that **Mr = Mass/ Moles**
- So your Mr = m/ 2n

Between now and your next Chemistry lesson…

Complete the worksheet on deriving chemical formulae.

Bring this to lesson two for checking and marking.

Summer Home learning

During your taster lessons, you will receive electronic copies of the CGP "*Head Start to A-level Chemistry*" workbook (ISBN 9781782942801).

You will need to work through this resource, make notes in the A4 exercise book provided, and complete all the questions at the bottom of each page.

You should use the answers within the back of the workbook to self-mark and correct your work using a different coloured pen.

You will need to complete an entry assessment in September based upon this content, so you must ensure you are adequately prepared for this assessment upon your return to school.

Keep all this work safe, as your teachers will expect to see it, completed and self-marked, in September.