Chemistry – Core Practical's

AQA Topics	AQA Chapter	Core Practical	Year Taught	Exam Paper
Atomic Structure	C1 Chapter 1		9	1
The Periodic Table	C1 Chapter 2		9	1
Structure and Bonding	C1 Chapter 3		10	1
Chemical Calculations	C1 Chapter 4	2	9 &10	1
Chemical Changes	C2 Chapter 5	1	10	1
Electrolysis	C2 Chapter 6	3	10	1
Energy Changes	C2 Chapter 7	4	10	1
Rates and Equilibrium	C3 Chapter 8	5	10	2
Crude oils and fuels	C3 Chapter 9		11	2
Organic Reactions (Triple Only)	C3 Chapter 10		11	2
Polymers (Triple Only)	C3 Chapter 11		11	2
Chemical Analysis	C4 Chapter 12	6 and 7	10	2
The Earth's Atmosphere	C4 Chapter 13		11	2
The Earth's Resources	C4 Chapter 14	8	11	2
Using our Resources (Triple Only)	C4 Chapter 15		11	2

	Required practicals	Topic
1	**Prepare a salt from an insoluble metal carbonate or oxide.** Prepare with the appropriate apparatus and techniques, a pure, dry sample of a soluble salt from an insoluble carbonate or oxide.	C5.5 C5.6
2	**Use titration to investigate reacting volumes.** Use titration to find out how much of an acid is needed to completely react with an alkali.	C4.7
3	**Investigate the electrolysis of a solution** Investigate the electrolysis of different aqueous solutions using inert electrodes.	C6.4
4	**Investigating temperature changes.** Use appropriate apparatus to investigate the variables that affect energy changes in reactions involving at least one solution.	C7.1
5	**Investigating the effect of concentration on rate of reaction.** Investigate how changes in concentration affect rates of reactions using a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity.	C8.4
6	**Calculate R_f values.** Use paper chromatography to find out the R_f values of the dyes found in different food colourings.	C12.2
7	**Use chemical tests to identify unknown compounds.** Use a range of chemical tests to identify negative and positive ions in ionic compounds.	C12.5
8	**Purify and test water.** Analyse and purify water from different sources, including pH, dissolved solids and distillation.	C14.2

CP1- C5.6 Making a salt from a metal carbonate

Aims

In this required practical, you will prepare a sample of a salt by reacting an insoluble carbonate with an acid.

Equipment

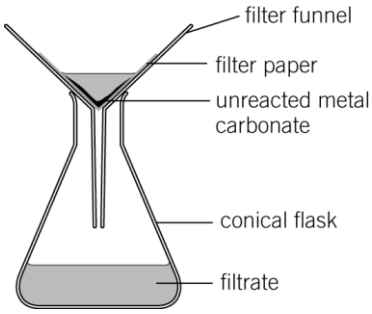
- 25 cm^3 measuring cylinder
- 100 cm^3 beaker,
- spatula
- glass rod
- filter paper
- funnel
- tongs
- Bunsen burner, heat proof mat, tripod, gauze
- evaporating basin
- 1 mol/dm^3 sulfuric acid
- 2 mol/dm^3 hydrochloric acid:
- magnesium carbonate powder
- copper carbonate powder

Method

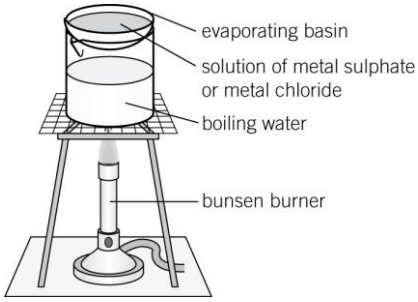
Your teacher will tell you which acid and which carbonate to use.

Record all your observations during each stage of the practical

1. Using a measuring cylinder, measure 20 cm^3 of acid into the beaker.
2. Add half a spatula of one of the metal carbonates into the acid and stir with the glass rod.
3. Continue adding the metal carbonate in small amounts until no more dissolves and there is no more fizzing (this should be most of the solid you have been provided with).
4. Set up a filter funnel and filter paper in a conical flask as shown below. Filter the mixture and discard the unreacted metal carbonate.



5. Pour the filtrate into an evaporating basin and place it on a beaker of water, as shown in the diagram below. Heat the water gently until the volume of the solution in the evaporating dish is halved.



6. Remove from the heat. When it is cool, stand the evaporating basin on a piece of paper with your name on. Your teacher will tell you where you can leave it overnight to crystallise.
7. During the next lesson, remove the crystals from the concentrated solution with a spatula and gently pat them dry between two pieces of filter paper.
8. Show your teacher your crystals, record your observations, and then answer the questions below.

CP2- C4.7 Carrying out a titration

Aims

In this activity you will carry out a titration to find the exact volume of an acid (hydrochloric acid) needed to neutralise a measured volume of an alkali (sodium hydroxide).

Equipment

- 50 cm^3 burette plus stand and burette holder
- 2 × 250 cm^3 beaker
- 250 cm^3 conical flask
- 25.0 cm^3 bulb pipette plus pipette filler
- white tile
- funnel
- phenolphthalein indicator
- 0.100 mol/dm^3 hydrochloric acid
- sodium hydroxide of unknown concentration
- wash bottle of distilled water

Method

1. Collect some hydrochloric acid in a beaker and label it.
2. Rinse your burette with distilled water and then with some of the hydrochloric acid
3. Fill a burette with the hydrochloric acid beyond the zero mark, and then let the solution run out until the bottom of the meniscus is exactly on the zero mark. All bubbles should be removed from the jet.
4. Collect some sodium hydroxide in another beaker and label it.
5. Rinse the 25.0 cm^3 pipette with distilled water and then with the sodium hydroxide.
6. Use the pipette and the pipette filler to transfer 25.0 cm^3 of the sodium hydroxide into a clean dry conical flask.
7. Add three to four drops of phenolphthalein indicator into the flask and swirl. Place the conical flask on the white tile directly below the burette.
8. Record the initial burette reading in the results table below (this should be 0.00 cm^3).
9. Carry out a rough titration by adding the acid to the alkali in small amounts at a time. Swirl the flask after every addition, and continue until the indicator changes from pink to colourless. Note the final burette reading and record it in the table. *Your teacher will show you how to read the burette.*
10. Repeat the titration accurately by adding the acid drop-wise near the end point. Make sure you record the initial and final burette readings in the appropriate column in the table.
11. Repeat the accurate titrations until you have two concordant results (within 0.10 cm^3 of each other).
12. Record all your readings in the table below.

CP3- C6.4 Investigating the electrolysis of solutions

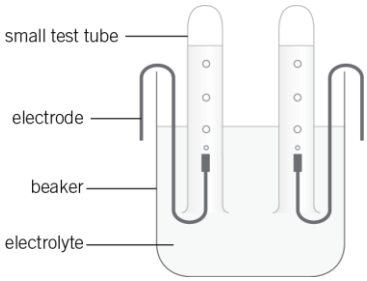
Aims

In this required practical, you will plan and carry out an experiment using electrolysis to decompose solutions of ionic compounds. You will predict the observations and products that you will make, then collect and test the gases made at the electrodes and identify them.

Equipment

- 100 cm^3 measuring cylinder
- 2 × carbon electrodes
- 2 × crocodile clips
- 2 × wires
- 1 × low voltage lab pack
- Bunsen burner and safety equipment
- 1 mol/dm^3 copper(II) chloride solution
- 3 × ignition tubes with bungs
- litmus paper
- splints
- eye protection and nitrile gloves

Method



1. Half fill a beaker with the solution to be electrolysed.
2. Submerge the ends of the two electrodes, and using the crocodile clips and wires connect them to the low voltage power supply.
3. Make sure that the electrodes are not touching.
4. Turn on the power supply and observe. If you see bubbles, a gas is being made. Turn off the power supply.
5. Wearing nitrile gloves, fill three ignition tubes with the solution. Hold them upright so that the opening is still under the liquid level and over the electrode that is making the gas.
6. Turn on the power and when the ignition tube is full of gas, seal it with a bung.
7. Repeat steps 5 and 6 until three ignition tubes have been collected from each electrode that is making a gas.
8. Turn off the power supply.
9. Test each tube of gas to find out which gas it is:
    a. Put a lit splint into the ignition tube. If you hear a ‘pop’ sound, the gas is hydrogen.
    b. Put a glowing splint into the ignition tube. If it relights, the gas is oxygen.
    c. Put a piece of damp blue litmus paper into the ignition tube and replace the bung. If the litmus paper turns red and then bleaches, the gas is chlorine.

CP4- C7.1 Investigating temperature changes

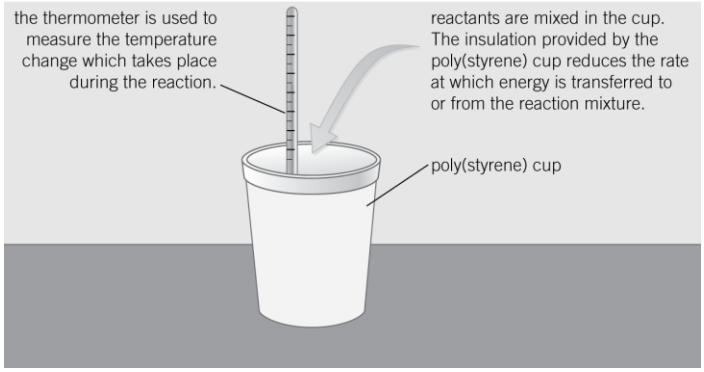
Aims

In this required practical, you will monitor the temperature change of a chemical reaction to classify it as exothermic or endothermic.

Equipment

- eye protection
- two 50 cm^3 measuring cylinders
- polystyrene cup
- 250 cm^3 beaker
- weighing boat
- balance
- spatula
- 0–110 °C thermometer
- stirrer
- stopwatch
- 1.00 mol/dm^3 hydrochloric acid
- 1.00 mol/dm^3 nitric acid
- 1.00 mol/dm^3 sodium hydroxide
- iron filings
- 1.00 mol/dm^3 potassium hydroxide
- 1.00 mol/dm^3 copper(II) sulfate solution

Method



1. Use the first measuring cylinder to measure 25 cm^3 of the sodium hydroxide solution and pour this into the polystyrene cup.
2. Stand the polystyrene cup in the 250 cm^3 beaker.
3. In the second measuring cylinder, measure 25 cm^3 of hydrochloric acid.
4. Using the thermometer, measure the temperature of the sodium hydroxide every 30 seconds whilst gently stirring.
5. After exactly 2 minutes add the hydrochloric acid and continue to stir and to record the temperature of the solution every 30 seconds for 10 minutes.
6. Repeat this experiment twice:
   - with 25 cm^3 of copper(II) sulfate then at 2 minutes add iron filings
   - with 25 cm^3 potassium hydroxide then at 2 minutes add nitric acid.

CP5- C8.4 The Effect of Concentration on Rate of Reaction

Aims

When hydrochloric acid reacts with marble chips, carbon dioxide gas is produced.

In this practical you will plan and carry out an experiment to find out how the rate of reaction changes as you change the concentration of acid.

Equipment and materials

- a range of conical flasks (100 cm^3, 250 cm^3)
- rubber bung and delivery tube to fit conical flask
- water trough
- clamp stand, boss and clamp
- a range of measuring cylinders (25 cm^3, 100 cm^3, 250 cm^3)
- stopwatch
- marble chips
- dilute hydrochloric acid at different concentrations (between 0.25 and 2.0 mol/dm^3)
- 2 dp balance
- weighing boat

Method

1. Fill the water trough with water, fill the measuring cylinder with water, and clamp the cylinder upside down in the water trough.
2. Set up the conical flask, bung and delivery tube so that the exit of the delivery tube is under the measuring cylinder.
3. Add 50 cm^3 of 2 mol/dm^3 hydrochloric acid into the conical flask.
4. Add 1 g of marble chips into the conical flask, put the bung back into the flask as quickly as you can, and start the stopwatch.
5. Record the time taken to collect 25 cm^3 of gas. Record this time in the first blank column in the table.
6. Repeat steps 1 to 5, but **in step 3** use different concentrations of acid. Try to make sure that similar sizes of marble chips are used in each case:
    - 1 mol/dm^3 hydrochloric acid
    - 0.5 mol/dm^3 hydrochloric acid
    - 0.25 mol/dm^3 hydrochloric acid
7. Repeat the **whole investigation** (steps 1–6) twice more and record the results in the second and third blank columns of the table.
8. Calculate the **mean** time for each of the acid concentrations, leaving out any anomalous values from your calculations. Record it in the fourth blank column, giving your answer to the nearest second.

CP6- C12.2 Calculating R_f values

Aims

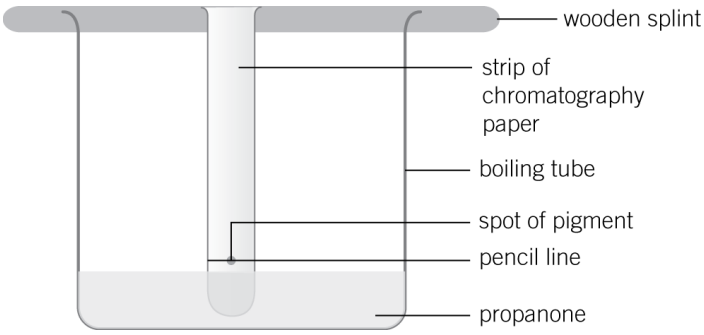
Chromatography is a separation technique that is used to separate mixtures of soluble chemicals, like those in colouring pens or food colourings.

In this required practical, you will plan and carry out an experiment to separate the substances in food colourings.

Equipment

- food colourings
- fine paint brush or capillary tube
- chromatography paper
- pencil
- ruler
- water
- boiling tube
- boiling tube rack
- paper clip
- splint

Method



1. Make sure that the chromatography paper can fit into the boiling tube.
2. Use a pencil to draw a horizontal base line, 1 cm from the bottom of the paper.
3. Use a pencil to draw a cross on the centre of the base line.
4. Use a paint brush or capillary tube to add some of the food colouring onto the cross and allow to dry.
5. Fold the top edge of the chromatography paper over a wooden splint and keep in place with a paper clip.
6. Add 0.5 cm depth of water into the boiling tube and place in a boiling tube rack.
7. Carefully lower the chromatography paper into the boiling tube, taking care to keep the pencil line above the water level. Leave until the water line (solvent front) is past the last coloured spot.
8. Remove the chromatogram.
9. Allow the chromatogram to dry.

CP7- C12.5 Identifying unknown ionic compounds

Aims

In this required practical, you will complete a series of chemical tests to identify the ions in compounds and solutions.

Equipment

- dimple dish
- lots of dropping pipettes
- nichrome wire loop with handle
- Bunsen burner and safety equipment
- dilute sodium hydroxide
- dilute hydrochloric acid
- two test tubes
- bung with n-shaped delivery tube
- test-tube rack
- stand
- boss
- clamp
- limewater
- dilute nitric acid
- silver nitrate solution
- barium chloride solution
- solutions to test

Method

Flame test

1. Put a clean, dry nichrome wire loop into a blue Bunsen flame to ensure the loop is clean.
2. Put the clean loop into the sample mixture.
3. Put the loop back into the blue Bunsen flame and note the colour.
4. If the flame is:
    - crimson red, lithium ions were present
    - yellow, sodium ions were present
    - lilac, potassium ions were present
    - orange red, calcium ions were present
    - green, copper ions were present.

Metal ion precipitation test

1. Add two drops of the solution to be tested into a dimple.
2. Then add two drops of sodium hydroxide solution (use a different dropping pipette for each solution).
3. Note the colour of the precipitate.
4. If the precipitate is:
    - white, aluminium, calcium, or magnesium ions were present
    - blue, copper(II) ions were present
    - green, iron(II) ions were present
    - brown, iron(III) ions were present.

Carbonate test

1. Half fill a test tube with limewater and put in a test-tube rack.
2. Half fill a second test tube with the solution to be tested, and mount at a 45° angle using the stand, boss, and clamp.

3. Add about 2 cm^3 of dilute hydrochloric acid and quickly insert the bung and delivery tube end so that any gas that is made is bubbled through the limewater.
4. Observe to see if the limewater goes cloudy.

Halide test

1. Add two drops of the solution to be tested into a dimple.
2. Then add two drops of nitric acid solution and two drops of silver nitrate solution. Note the colour of any precipitate formed.
3. If the precipitate is:
   - white, chloride ions were present
   - cream, bromide ions were present
   - yellow, iodide ions were present.

Sulfate test

1. Add two drops of the solution to be tested into a dimple.
2. Then add two drops of hydrochloric acid solution and two drops of barium chloride solution.
3. If a white precipitate is formed then sulfate ions were present in the starting sample.

CP8- C14.2 Analysis and purification of water samples

Aims

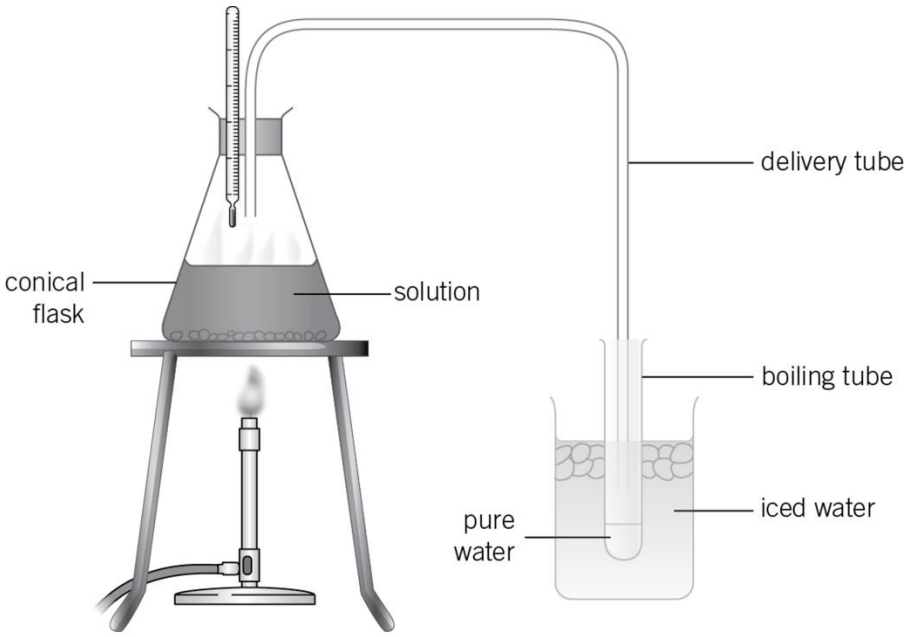
In this required practical you will plan and carry out an experiment that uses distillation to collect pure water from a solution. You will then test the water to show that it is pure.

Equipment

- solution to separate
- Bunsen burner
- flame proof mat
- conical flask
- two-hole bung
- tripod
- gauze
- pH meter
- spirit thermometer – 10–110 °C
- 'n' shape delivery tube
- boiling tube
- large beaker
- crushed ice
- anti-bumping granules or broken pottery

Method

1. Half fill a beaker with tap water and add some crushed ice to make an ice bath.
2. Put a boiling tube into the ice bath.
3. Add 100 cm^3 of solution and a few anti-bumping granules (or broken pottery) into a 250 cm^3 Pyrex conical flask.
4. Push a thermometer and an 'n' shape delivery tube through two holes in a bung.
5. Put the bung into the conical flask.
6. Adjust the height of the thermometer so that the bulb is in line with the opening of the delivery tube.
7. Put the conical flask on top of a tripod and gauze.
8. Put the end of the delivery tube into the test tube in the ice bath.
9. Ignite the Bunsen burner, with the air hole closed onto the safety flame.
10. Open the air hole of the Bunsen burner so the flame turns blue and move the Bunsen burner under the tripod to heat the solution.
11. Note the temperature on the thermometer when it is a constant value. This is the boiling point of the distillate.
10. Once half a boiling tube of distillate has been collected, remove the delivery tube and then turn off the Bunsen burner. Use a pH probe to test the pH of the distillate.


delivery tube
conical flask
solution
boiling tube
iced water
pure water