



Rewarding Learning

eGUIDE//

Chemistry

Technician Manual

Teacher / Technician Notes

Please note that it is the responsibility of the centre to ensure that all risk assessments for practical work are carried out and that all appropriate hazard labels are used for the chemicals listed.



Practical C1

Determine the mass of water present in hydrated crystals

Apparatus and chemicals

- Hydrated iron(II) sulfate $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (1.50 – 1.70 g)
- Spatula
- Bunsen burner, tripod and gauze
- Heatproof mat
- Evaporating basin
- Tongs
- Electronic balance
- Stopclock



Practical C2

Investigate the reactions of acids, including temperature changes that occur

Experiment 1

Apparatus and Chemicals

- Boiling tube
- Boiling tube rack
- 25 cm³ measuring cylinder
- Splint
- Bunsen burner
- Hydrochloric acid (minimum 50 cm³ of 1 mol/dm³)
- 2 cm strip of magnesium
- 2 cm piece of zinc
- 2 cm strip of copper

Experiment 2

Apparatus and Chemicals

- Kettle
- 250 cm³ beaker
- 100 cm³ beaker
- 25 cm³ measuring cylinder
- Spatula
- Glass rod
- Heat proof mat
- Universal indicator paper
- Sulfuric acid (25 cm³ of 0.5 mol/dm³)
- Copper(II) oxide on a watch glass (2 g)



Practical C2

Investigate the reactions of acids, including temperature changes that occur

Experiment 3

Apparatus and Chemicals

- Polystyrene cup
- 250 cm³ beaker
- Thermometer
- 25 cm³ measuring cylinder
- Hydrochloric acid (25 cm³ of 1 mol/dm³)
- Sodium hydroxide solution (25 cm³ of 1 mol/dm³)
- Deionised water bottle

Experiment 4

Apparatus and Chemicals

- 25 cm³ measuring cylinder
- 10 cm³ measuring cylinder
- Boiling tube
- Test tube
- 1 × disposable pipette
- Test tube rack
- Hydrochloric acid (15 cm³ of 1 mol/dm³)
- Calcium carbonate (3 g)
- Limewater (5 cm³)



Practical C3

Investigate the preparation of soluble salts

Experiment 1

Apparatus and Chemicals

- Copper(II) carbonate (approx. 4 g per student/group)
- Sulfuric acid (25 cm³ of 1 mol/dm³)
- 2 × 100 cm³ beakers
- Glass rod
- Tripod
- Gauze
- Bunsen burner
- Heat proof mat
- Filter funnel
- 3 × filter paper
- Conical flask
- Evaporating basin
- 25 cm³ measuring cylinder
- Spatula

Experiment 2

Apparatus and Chemicals

- Burette, retort stand and clamp
- Pipette (25.0 cm³) and safety pipette filler
- Conical flask
- Phenolphthalein indicator
- Hydrochloric acid (50 cm³ of 0.5 mol/dm³)
- Sodium hydroxide solution (25 cm³ of 0.5 mol/dm³)
- Decolourising charcoal (if following method 2)
- Evaporating basin
- Filter funnel and filter paper (3 pieces)
- Bunsen, tripod and gauze



Practical C4

Identifying the ions in an ionic compound using chemical tests

Flame tests

Apparatus and chemicals

- Sodium chloride
- Calcium chloride
- Lithium chloride
- Potassium chloride
- Copper(II) chloride
- Potassium chloride labelled X
- Sodium chloride labelled Y
- Concentrated hydrochloric acid
- Heatproof mat
- Nichrome wire

Precipitation tests

Apparatus and Chemicals

- Copper(II) sulfate solution (15 cm³ of 0.2 mol/dm³)
- Iron(II) sulfate solution (15 cm³ of 0.2 mol/dm³)
- Iron(III) nitrate solution (15 cm³ of 0.2 mol/dm³)
- Aluminium nitrate solution (15 cm³ of 0.2 mol/dm³)
- Zinc nitrate solution 10 cm³ of (15 cm³ of 0.2 mol/dm³)
- Magnesium chloride solution (15 cm³ of 0.2 mol/dm³)
- Sodium hydroxide solution (60 cm³ of 0.5 mol/dm³)
- Ammonia solution (60 cm³ of 2 mol/dm³)
- Test tubes and stoppers (× 6)
- Test tube rack
- 100 cm³ beaker
- Disposable pipettes



Practical C4

Identifying the ions in an ionic compound using chemical tests

Anion tests

Apparatus and Chemicals

Test for sulfate ions

- Sodium sulfate solid (1 g)
- Barium chloride solution (5 cm³ of 0.1 mol/dm³)
- Deionised water
- Test tube
- Test tube rack
- Small beaker
- Disposable pipette
- Spatula
- Glass rod

Test for halide ions

- Sodium chloride solution (15 cm³ of 0.2 mol/dm³)
- Potassium bromide solution (15 cm³ of 0.2 mol/dm³)
- Potassium iodide solution (15 cm³ of 0.2 mol/dm³)
- Silver nitrate solution (10 cm³ of 0.1 mol/dm³)
- Nitric Acid (5 cm³ of 0.5 mol/dm³)
- 3 × test tubes
- Test tube rack
- Disposable pipettes

Test for carbonate ions

- Sodium carbonate (1 g)
- 100 cm³ beaker
- Glass rod
- Spatula
- Limewater (5 cm³)
- Hydrochloric acid solution (10 cm³ of 2 mol/dm)
- 5 × test tubes
- Test tube rack
- 2 × disposable pipettes



Practical C5

Investigate the reactivity of metals

Apparatus and Chemicals

- Boiling tube rack
- Boiling tubes × 3
- Copper(II) sulfate solution (0.5 mol/dm^3)
- Magnesium sulfate solution (0.5 mol/dm^3)
- Zinc sulfate solution (0.5 mol/dm^3)
- Iron(II) sulfate solution (0.5 mol/dm^3)
- Pieces of copper foil (3 small pieces approx. 1 cm^2)
- Zinc (3 small granules or pieces of foil approx. 1 cm^2)
- Iron (3 small ungalvanised nails)
- Magnesium ribbon (3 small pieces 1 cm length)
- Stop clock



Practical C6

Investigate how changing a variable changes the rate of reaction

Apparatus and Chemicals

- Hydrochloric acid (200 cm³ of 2 mol/dm³)
- 10 × 3 cm strips of magnesium
- 100 cm³ beaker
- 250 cm³ beaker
- Deionised water bottle
- 2 × measuring cylinders (25 cm³ and 10 cm³)
- Stop clock



Practical C7

Investigate the reactions of carboxylic acids

Experiment 1

Apparatus and Chemicals

- Universal indicator paper
- Ethanoic acid (10 cm³ of 1 mol/dm³)
- Hydrochloric acid (10 cm³ of 1 mol/dm³)
- White tile
- Glass rod
- Deionised water bottle

Experiment 2

Apparatus and Chemicals

- Test tube
- Test tube rack
- 10 cm³ measuring cylinder
- Wooden splint
- Hydrochloric acid (15 cm³ of 1 mol/dm³)
- Ethanoic acid (15 cm³ of 1 mol/dm³)
- 2 × 1 cm strips of magnesium ribbon
- Deionised water bottle

Experiment 3

Apparatus and Chemicals

- 2 pieces of calcium
- Hydrochloric acid (25 cm³ of 1 mol/dm³)
- Ethanoic acid (25 cm³ of 1 mol/dm³)
- 2 × 100 cm³ beakers
- Stopclock
- Tweezers
- 25 cm³ measuring cylinder



Practical C8

Determining the reacting volumes of solutions of acid and alkali by titration and determine the concentration of solutions of acid and alkali by titration

Apparatus and Chemicals

- Sodium hydroxide solution (150 cm^3 of 0.1 mol/dm^3)
– the concentration should not be labelled on this
- Hydrochloric acid (150 cm^3 of 0.125 mol/dm^3)
- Phenolphthalein indicator
- Disposable pipette
- 25.0 cm^3 pipette and safety pipette filler
- 50.0 cm^3 burette
- Retort stand and burette clamp
- $3 \times 250 \text{ cm}^3$ Conical flask
- Deionised water bottle
- White tile



Practical C9

Investigate the preparation, properties, tests and reactions of the gases hydrogen, oxygen and carbon dioxide

Carbon dioxide

- Calcium carbonate (small pieces approx. 3 g)
- Hydrochloric acid (50 cm³ of 1 mol/dm³)
- Wooden splint
- Limewater (5 cm³)
- Conical flask and stopper with 2 outlets
- Thistle funnel
- Delivery tube
- Beehive shelf
- 3 × gas jars with lids
- Trough

Hydrogen

- Hydrochloric acid (20 cm³ of 1 mol/dm³)
- Zinc (a few small pieces of granulated zinc)
- Wooden splint
- Test tube
- Test tube rack
- Measuring cylinder
- Bunsen burner

Oxygen

- Manganese(IV) oxide (approx. 2 spatula measures)
- Hydrogen peroxide solution (20 cm³ of 20 volume H₂O₂)
- Wooden Splint
- Spatula
- Test tube
- Test tube rack
- 10 cm³ measuring cylinder
- Bunsen burner