Rewarding Learning

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Chemistry

Unit AS1: Practical Manual

Teacher / Technician Notes

Practical 1.1

Determine the formula of a hydrated compound by weighing and heating a hydrated salt to constant mass (spec ref: 1.1.7)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- crucible and pipe-clay triangle
- spatula
- Bunsen burner
- heat mat
- tripod
- tongs
- approximately 4.0 g of hydrated copper(II) sulfate
- access to a mass balance (2 d.p)

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 2.1

Use the deflection of a stream of liquid from a burette to indicate polarity or lack of polarity within a molecule (spec ref: 1.3.9)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 5 × burettes
- 5 × 250 cm^3 beakers
- 5 × plastic rods/rulers
- cloth
- approximately 50 cm^3 water
- approximately 50 cm^3 propanone
- approximately 50 cm^3 ethanol
- approximately 50 cm^3 cyclohexane
- approximately 50 cm^3 methylbenzene

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 3.1

Carry out tests of electrical conductivity on solids and liquids and aqueous solutions of ionic and covalent substances (spec ref: 1.5.2)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- direct current 6 V power supply
- bulb
- 4 × crocodile clips
- 2 × graphite rods
- 3 × electrical wires
- 100 cm^3 beaker
- glass rod
- spatula
- 50 cm^3 measuring cylinder
- bottle of deionised water
- Bunsen burner
- tripod
- gauze
- heat mat
- evaporating basin
- approximately 3 g sodium chloride
- approximately 3 g sucrose

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 4.1

Determine the solubility of chlorine and iodine in aqueous and non-aqueous solvents (spec ref: 1.8.2)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 3 × test tubes and a test tube rack
- 3 × stoppers
- 4 × plastic dropping pipettes
- approximately 3 cm^3 chlorine water (CLEAPPS recipe)
- approximately 3 cm^3 bromine water (CLEAPPS recipe)
- approximately 3 cm^3 0.01 mol dm^{-3} iodine solution
- approximately 10 cm^3 hexane/cyclohexane

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 4.2

Produce a reactivity order of the halogens using the displacement reactions of halogens with other halide ions in solution (spec ref: 1.8.5)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 3 × test tubes and a test tube rack
- 6 × plastic dropping pipettes
- approximately 3 cm^3 chlorine water (CLEAPPS recipe)
- approximately 3 cm^3 bromine water (CLEAPPS recipe)
- approximately 3 cm^3 0.01 mol dm^{-3} iodine solution
- approximately 3 cm^3 0.1 mol dm^{-3} potassium chloride solution
- approximately 3 cm^3 0.1 mol dm^{-3} potassium bromide solution
- approximately 3 cm^3 0.1 mol dm^{-3} potassium iodide solution
- approximately 3 cm^3 hexane/cyclohexane

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 4.3

Carry out the reactions of the halides with concentrated sulfuric and phosphoric acids and perform chemical tests for the products (spec ref: 1.8.6)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 3 × test tubes and a test tube rack
- plastic dropping pipette
- spatula
- glass rod
- filter paper
- approximately 5 cm^3 concentrated sulfuric acid
- approximately 5 cm^3 concentrated phosphoric acid
- approximately 0.5 g potassium chloride
- approximately 0.5 g potassium bromide
- approximately 0.5 g potassium iodide
- access to concentrated ammonia solution
- access to acidified potassium dichromate(VI) solution
- access to universal indicator paper
- bottle of deionised water

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 5.1

Prepare solutions of known concentration
(spec ref: 1.9.8)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- access to 2.0 mol dm^{-3} hydrochloric acid
- 25.0 cm^3 graduated pipette (or 10.0 cm^3 graduated pipette)
- pipette filler
- 250 cm^3 volumetric flask & stopper
- bottle of deionised water
- 100 cm^3 beaker
- plastic dropping pipette
- sticky label

If pupils use 2 mol dm^{-3} hydrochloric acid then 12.5 cm^3 of this is required to be made up to 250 cm^3 with deionised water to give a 0.1 mol dm^{-3} solution.

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 5.2

Prepare solutions of known concentration
(spec ref: 1.9.8)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- access to white vinegar
- 25.0 cm^3 pipette
- pipette filler
- 250 cm^3 volumetric flask & stopper
- bottle of deionised water
- 100 cm^3 beaker
- plastic dropping pipette
- sticky label

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 5.3

Prepare solutions of known concentration
(spec ref: 1.9.8)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- weighing boat
- spatula
- glass rod
- funnel
- 250 cm^3 volumetric flask & stopper
- bottle of deionised water
- 100 cm^3 beaker
- plastic dropping pipette
- sticky label
- approximately 4.00 g hydrated sodium carbonate
- access to a mass balance (2 d.p)

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 6.1

Carry out an acid-base titration to determine the concentration of acid/base, the degree of hydration in a hydrated metal carbonate and the percentage of ethanoic acid in vinegar (spec ref: 1.9.2)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 50.0 cm^3 burette
- clamp and stand
- 25.0 cm^3 pipette
- pipette filler
- 2 × 250 cm^3 conical flasks
- 2 × 100 cm^3 beakers
- funnel
- bottle of deionised water
- plastic dropping pipette
- white tile
- bottle of phenolphthalein indicator
- approximately 150 cm^3 0.1 mol dm^{-3} sodium hydroxide solution
- access to 0.1 mol dm^{-3} hydrochloric acid solution from practical 5.1

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 6.2

Carry out an acid-base titration to determine the concentration of acid/base, the degree of hydration in a hydrated metal carbonate and the percentage of ethanoic acid in vinegar (spec ref: 1.9.2)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 50.0 cm^3 burette
- clamp and stand
- 25.0 cm^3 pipette
- pipette filler
- 2 × 250 cm^3 conical flasks
- 2 × 100 cm^3 beakers
- funnel
- bottle of deionised water
- plastic dropper
- white tile
- bottle of phenolphthalein indicator
- approximately 150 cm^3 0.1 mol dm^{-3} sodium hydroxide solution
- access to white vinegar solution from practical 5.2

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 6.3

Carry out an acid-base titration to determine the concentration of acid/base, the degree of hydration in a hydrated metal carbonate and the percentage of ethanoic acid in vinegar (spec ref: 1.9.2)

Teacher / Technician Notes

Each pupil/group will need:

- safety goggles
- 50.0 cm^3 burette
- clamp and stand
- 25.0 cm^3 pipette
- pipette filler
- 2 × 250 cm^3 conical flasks
- 2 × 100 cm^3 beakers
- funnel
- bottle of deionised water
- plastic dropper
- white tile
- bottle of methyl orange indicator
- approximately 150 cm^3 0.1 mol dm^{-3} hydrochloric acid
- access to hydrated sodium carbonate solution from practical 5.3

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.

Practical 7.1

Use chemical tests listed in 'Qualitative tests' to identify unknown substances (spec ref: 1.10)

Teacher / Technician Notes

The amount of apparatus/chemicals required will be dependent on how the chemical tests are conducted in the laboratory.
Pupils will require access to:

- safety goggles
- test tubes
- plastic dropping pipettes
- delivery tubes with bungs attached
- flask and thistle funnel
- water trough
- beehive shelf
- gas collection jar
- glass rod
- nichrome wire
- Bunsen burner
- spatula(s)
- wooden splint(s)
- bottle of deionised water
- sodium carbonate
- 1.0 mol dm^{-3} hydrochloric acid
- limewater
- magnesium ribbon
- manganese dioxide
- 100 vol hydrogen peroxide
- chlorine water
- universal indicator paper
- concentrated hydrochloric acid
- concentrated ammonia solution
- lithium chloride

Practical 7.1

Use chemical tests listed in 'Qualitative tests' to identify unknown substances (spec ref: 1.10)

- sodium chloride
- potassium chloride
- calcium chloride
- barium chloride
- copper(II) chloride
- potassium bromide
- potassium iodide
- 0.1 mol dm^{-3} silver nitrate solution
- 1.0 mol dm^{-3} ammonia solution
- sodium sulfate
- 0.1 mol dm^{-3} barium chloride solution
- sodium hydrogencarbonate
- 1.0 mol dm^{-3} sodium hydroxide solution
- ammonium chloride
- 0.01 mol dm^{-3} iodine solution
- starch solution

Centres are responsible for their own hazard analysis and risk assessment before beginning this practical work with pupils.