Experimental Techniques

Question Paper 1

Level	IGCSE
Subject	Chemistry
ExamBoard	CIE
Topic	Experimental techniques
Sub-Topic	
Paper	(Extended) Theory
Booklet	Question Paper 1

TimeAllowed: **59 minutes**

Score: **/ 49**

Percentage: **/100**

1 Describe how to separate the following. In each example, give a description of the procedure used and explain why this method works.

(a) Copper powder from a mixture containing copper and zinc powders.

procedure .....

.....

explanation .....

.....

[3]

(b) Nitrogen from a mixture of nitrogen and oxygen.

procedure .....

.....

explanation .....

.....

[3]

(c) Glycine from a mixture of the two amino acids glycine and alanine. Glycine has the lower R_f value.

procedure .....

.....

explanation .....

.....

[2]

(d) Magnesium hydroxide from a mixture of magnesium hydroxide and zinc hydroxide.

procedure .....

.....

explanation .....

.....

[3]

[Total: 11]

2 An important aspect of chemistry is purity and methods of purifi

(a) Give an example of subta cation. used in everyday life which must be pure.

..... [1]

(b) A list of techniques used to separate mixtures is given below.

chromatography rystall diffusion

evaporation filtration fractional dis illatio simple distillation

(i) From the list, choose the most suitable technique to separate the following.

water from sea-water .....

helium from a mixture of helium and methane .....

ethanol from a mixture of ethanol and propanol .....

iron filings from a mixture of iron filings and water .....

a mixture of two amino acids, glycine and alanine .....

[5]

(ii) Describe how you would obtain a pure sample of copper(II) sulfate-5-water crystals from a mixture of copper(II) sulfate-5-water with copper(II) oxide using some of the techniques listed above.

.....

.....

.....

.....

..... [4]

[Total: 10]

3 Petroleum contains hydrocarbons which are separated by fractional distillation.

(a) **(i)** Complete the following definition of a hydrocarbon.

A hydrocarbon is a compound which .....

..... [2]

(ii) Explain what is meant by the term *fractional distillation*.

.....

.....

..... [2]

(b) Some of the fractions obtained from petroleum are given below.
State a use for each fraction.

bitumen .....

lubricating fraction .....

paraffin fraction .....

gasoline fraction ..... [4]

[Total: 8]

4 A list of techniques used to separate mixtures is given below.

filtration

diffusion

fractional distillation

simple distillation

crystallisation

chromatography

From this list, choose the most suitable technique to separate the following mixtures.
A technique may be used once, more than once or not at all.

(a) butane from a mixture of propane and butane ..... [1]

(b) oxygen from liquid air ..... [1]

(c) water from aqueous magnesium sulfate ..... [1]

(d) potassium chloride from aqueous potassium chloride ..... [1]

(e) silver chloride from a mixture of silver chloride and water ..... [1]

(f) glucose from a mixture of glucose and maltose ..... [1]

[Total: 6]

5 The following techniques are used to separate mixtures.

A simple distillation	**B** fractional distillation	**C** evaporation
D chromatography	**E** filtration	**F** diffusion

From this list, choose the most suitable technique to separate the following.

(a) methane from a mixture of the gases, methane and ethane ..... [1]

(b) water from aqueous magnesium sulfate ..... [1]

(c) glycine from a mixture of the amino acids, glycine and lysine ..... [1]

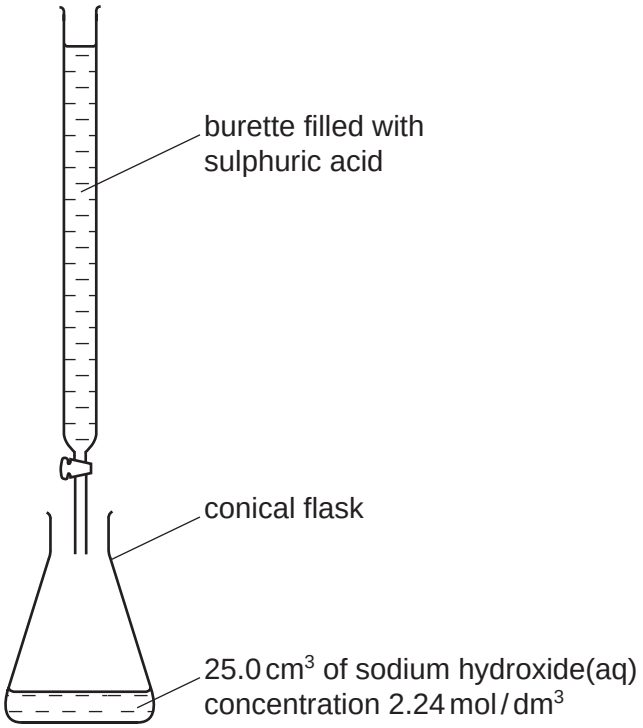
(d) iron filings from a mixture of iron filings and water ..... [1]

(e) zinc sulfate crystals from aqueous zinc sulfate ..... [1]

(f) hexane from a mixture of the liquids, hexane and octane ..... [1]

[Total: 6]

6 Crystals of sodium sulphate-10-water, $Na_2SO_4.10H_2O$, are prepared by titration.



(a) 25.0 cm^3 of aqueous sodium hydroxide is pipetted into a conical flask.
A few drops of an indicator are added. Using a burette, dilute sulphuric acid is slowly added until the indicator just changes colour. The volume of acid needed to neutralise the alkali is noted.

Suggest how you would continue the experiment to obtain pure, dry crystals of sodium sulphate-10-water.

.....

.....

.....

..... [4]

(b) Using 25.0 cm^3 of aqueous sodium hydroxide, 2.24 mol / dm^3, 3.86 g of crystals were obtained. Calculate the percentage yield.

$$2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$$

$$Na_2SO_4 + 10H_2O \longrightarrow Na_2SO_4.10H_2O$$

Number of moles of NaOH used = ...

Maximum number of moles of $Na_2SO_4.10H_2O$ that could be formed = ...

Mass of one mole of $Na_2SO_4.10H_2O$ = 322 g

Maximum yield of sodium sulphate-10-water = ... g

Percentage yield = ... % [4]

[Total: 8]