# Experimental Techniques and Chemical Analysis

*(Past Year Topical Questions 2010-2015)*

May/June 2011 (31)

1 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]

Oct/Nov 2012 (31)

**1** 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]

Oct/Nov 2014 (31)

1 An important aspect of chemistry is purity and methods of purification.

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

..... [1]

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

**chromatography crystallisation diffusion dissolving**

**evaporation filtration fractional distillation 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.

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..... [4]

[Total: 10]

Oct/Nov 2015 (31)

2 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 .....

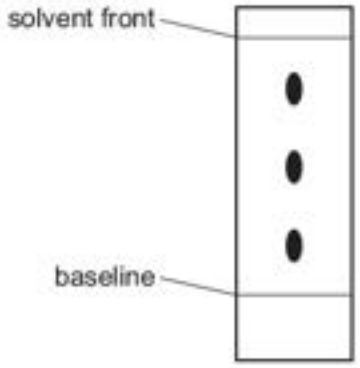
.....

[3]

[Total: 11]

Oct/Nov 2016 (42)

**(c)** A colourless mixture of amino acids was separated by chromatography.
Amino acid **X** has an $R_f$ value of 0.8.
The chromatogram of the mixture after treatment with a locating agent is shown.




**(i)** How is an $R_f$ value calculated?

$R_f$ =

[1]

**(ii)** On the diagram put a ring around the spot caused by amino acid **X**. [1]





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**(iii)** Describe how you would perform a chromatography experiment to produce the chromatogram shown in **(c)**. Assume you have been given the mixture of amino acids and a suitable locating agent. You are provided with common laboratory apparatus.

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.....

.....

..... [3]

May/June 2015 (31)

1 (a) State the name of the process that is used to

(i) separate oxygen from liquid air,

..... [1]

(ii) separate the individual dyes in ink,

..... [1]

(iii) produce ethanol from simple sugars,

..... [1]

(iv) obtain water from aqueous sodium chloride,

..... [1]

(v) separate the precipitate formed when aqueous silver nitrate is added to aqueous sodium chloride.

..... [1]