

O Level Combined Chemistry Structured

Separation Techniques Test 1.0

Q1

A mixture contains the following three liquids that are completely miscible.

liquid	boiling point / °C
propanone	56
ethanol	78
water	100

The liquids can be separated using the setup shown in Fig. 1.1.

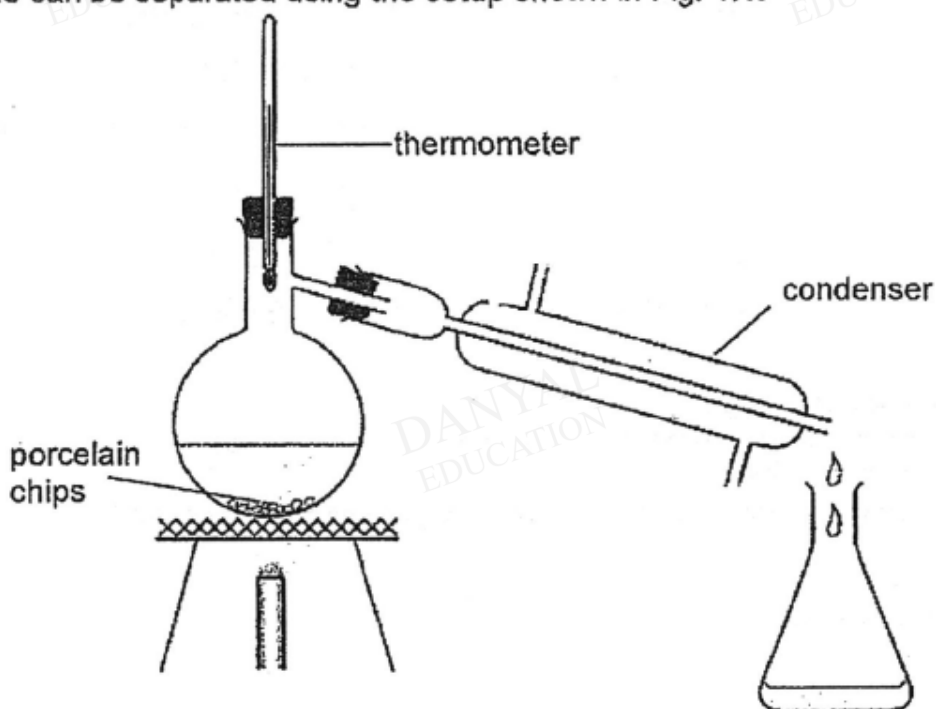


Fig. 1.1

(a) State the name for this method of separation.

[1]

.....

(b) State, with a reason which liquid will distil over first.

[2]

.....

(b) On Fig.1.1, draw arrows to show how water enters and leaves the condenser. [1]

Q2

Name a suitable process to separate

(a) three miscible liquids with different boiling points;

..... [1]

(b) a mixture of sodium chloride and iodine;

..... [1]

(c) the products from reacting potassium sulfate and barium nitrate.

..... [1]

DANYAL
EDUCATION

DANYAL
EDUCATION

Q3

- (a) Fig. 3.1 shows an experimental set-up used to separate pure water from a sample of tap water.

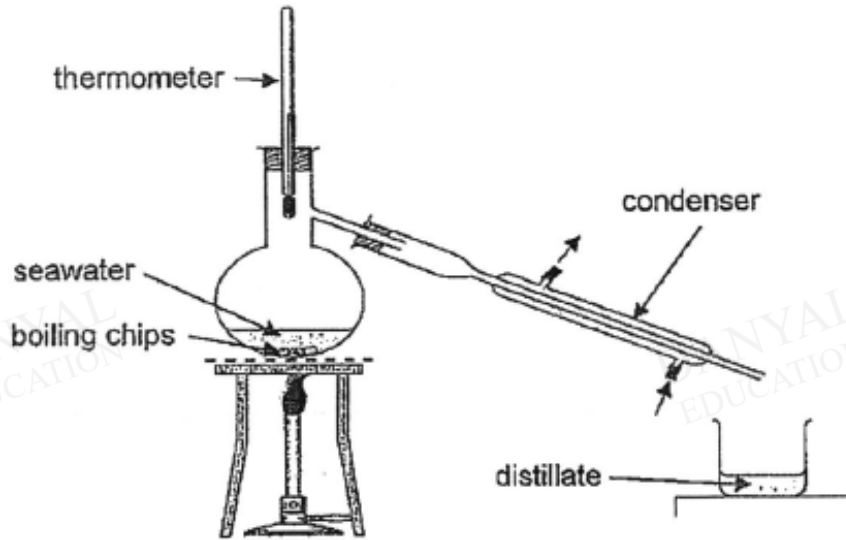


Fig. 3.1

- (i) Name this method of separation.
.....[1]
- (ii) Predict the reading on the thermometer during the separation.
.....[1]
- (iii) State the purpose of the condenser.
.....[1]

- (b) The pure water obtained is used to dilute a purple cabbage indicator.

Fig. 3.2 shows the preparation of the coloured solution extracted from purple cabbage.

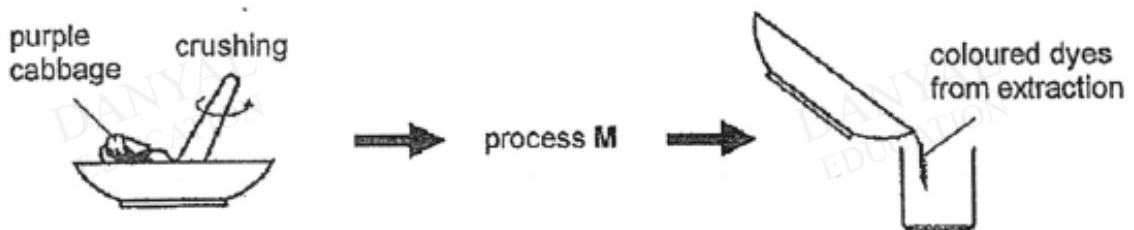


Fig. 3.2

Process M is carried out to remove any uncrushed cabbage parts.

Name process M.

.....[1]

Q4

Seawater contains a variety of dissolved salts.

- (a) The apparatus shown in Fig. 2.1 can be used to separate purified water from seawater by simple distillation.

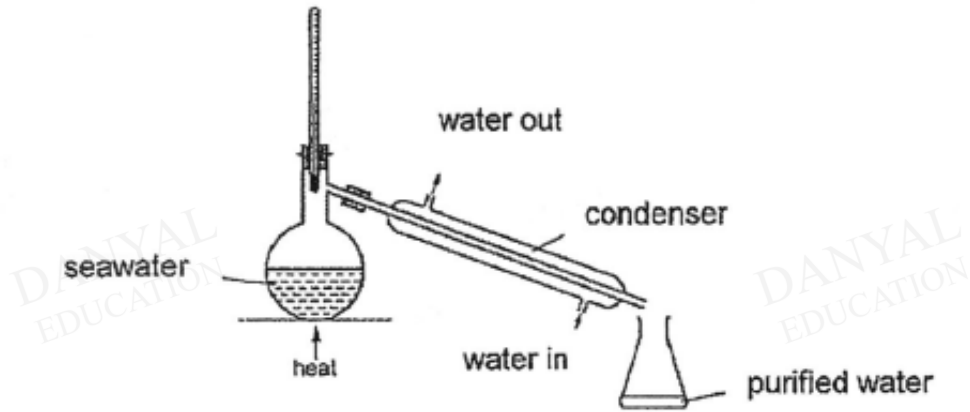


Fig. 2.1

- (i) Explain how distillation purifies seawater.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[3]

- (ii) What is the approximate reading on the thermometer during the distillation?

.....[1]

Q5

A student is investigating the dyes contained in three inks 1, 2 and 3 using the chromatography method.

He has placed spots of the inks on the start line that he has marked on a piece of chromatography paper. He has rolled the paper into a tall cylinder and placed it inside a tall beaker as shown in Fig. 2.1.

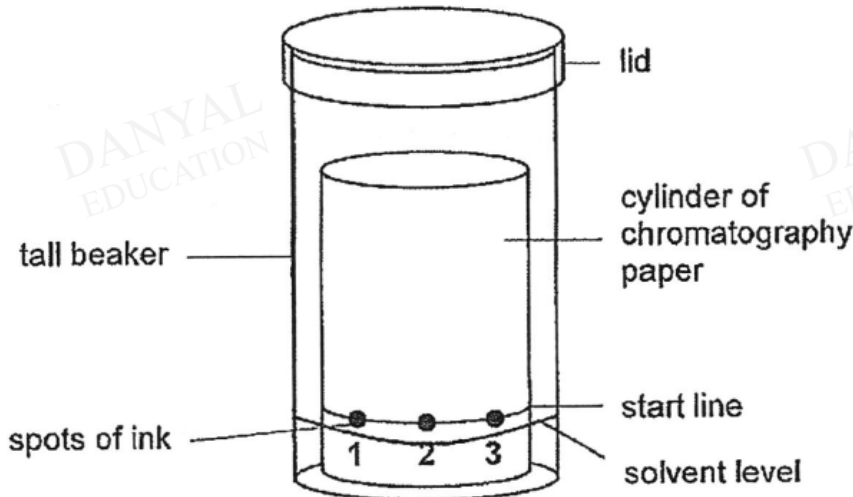


Fig. 2.1

At the end of the experiment, the chromatogram obtained is shown in Fig. 2.2.

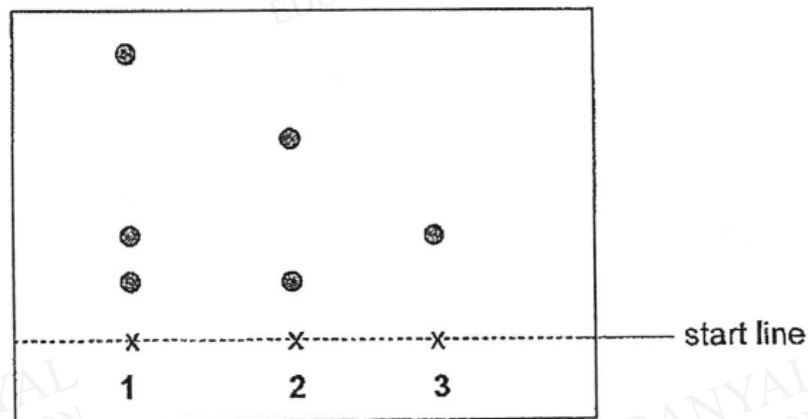


Fig. 2.2

(a) How many dyes are present in inks 1, 2 and 3?

..... [1]

(b) Suggest why the starting line should be drawn with a pencil rather than with ink.

.....
..... [1]

(c) What can the student conclude about the purities of inks 1, 2 and 3?

Explain your choice of answers.

.....
.....
.....
.....

[3]

(d) The student repeated the experiment using a dye he extracted from a marker pen.

Ten minutes after the chromatography paper is placed in the solvent, the spot of dye remained at the starting line.

Explain the above observation.

.....
.....

[1]

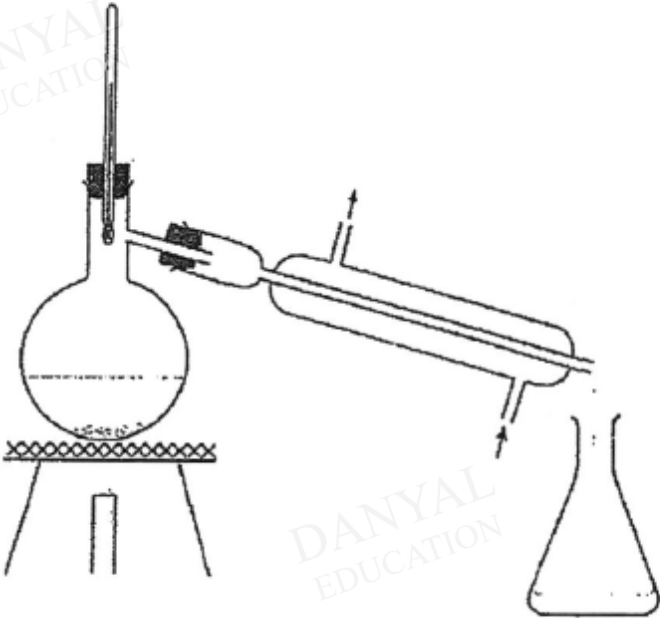
DANYAL
EDUCATION

DANYAL
EDUCATION

Answers

Separation Techniques Test 1.0

Q1

(a)	Fractional distillation Accept : simple distillation & distillation	[1]
(b)	Propanone. It has the lowest boiling point thus it distils over first.	[1] [1]
(b)	 <p>½ mark if one of the arrow is correct.</p>	[1]

Q2

(a)	<u>fractional</u> distillation (reject: distillation)	1m
(b)	sublimation	1m
(c)	filtration	1m

Q3

3(a)(i)	Simple distillation	[1]
(a)(ii)	100 °C	[1]
(a)(iii)	It is to <u>cool and condense vapour into liquid.</u>	[1]
(b)	Filtration	[1]

Q4

(a)(i)	<p>Water boils/ vaporises, steam rises and enters the condenser. In the condenser, the water vapour is cooled. Pure water can be collected in the conical flask OR The salts / residues / impurities / solids left in round-bottomed flask</p> <p>R: water evaporates into vapour R: water vapour is converted into water in the condenser R: evaporated seawater condenses</p>	<p>[1] [1] [1]</p>
a)(ii)	100 °C	[1]

Q5

(a)	4 dyes	[1]
(b)	Ink is a <u>mixture of dyes</u> , thus it will also <u>separate up</u> and <u>interfere with the results</u> on the chromatogram.	[1]
(c)	<p>Inks <u>1 and 2</u> are <u>impure</u>. Ink 1 forms <u>three spots</u> upon separation [1] while Ink 2 forms <u>two spots</u> upon separation. [1] Ink <u>3</u> is <u>pure</u> as it forms <u>only 1 spot</u> upon separation. [1]</p> <p>Award 1m if student comments about the purity of ink 1, 2 and 3 without giving explanation.</p>	[3]
(d)	The spot of dye is <u>insoluble in the solvent used</u> .	[1]