Chapter 4 Exploring Diversity of Matter using Separation Techniques

AfL Quiz 1

Date: …….

By the end of this quiz, I should be able to:

- explain how the constituents of a mixture can be separated based on their properties, using the following techniques: filtration, evaporation, crystallization

1 Which method is used to obtain salt crystals from salt solution?

A chromatography
B distillation
C evaporation to dryness
D filtration ( )

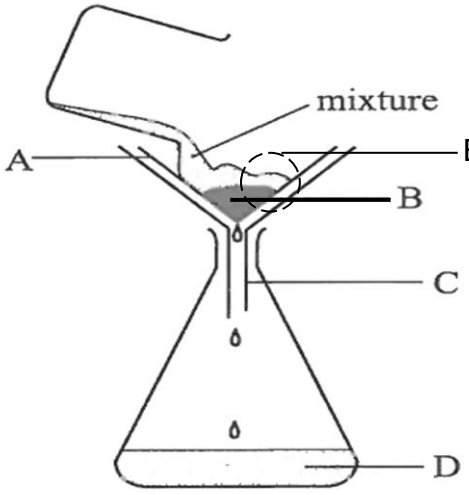
2 The table shows some information about the solidities of three solids.

Solid	Soluble in water	Soluble in ethanol
P	No	Yes
Q	Yes	No
R	No	No

By using a tick (√), choose the mixtures which can be separated by filtration.

Mixture	Solvent	Can be separated by filtration
P + Q	water	
P + R	ethanol	
P + Q	ethanol	
Q + R	water	

3 Diagram **I** shows a method of purification.



Enlarged image in Diagram **II** below

Diagram I

(a) Name the labelled parts **A, B and D only**.

A: .....

B: .....

D: .....

(a) Diagram **II** shows an enlarged view of a section from Diagram **I**.

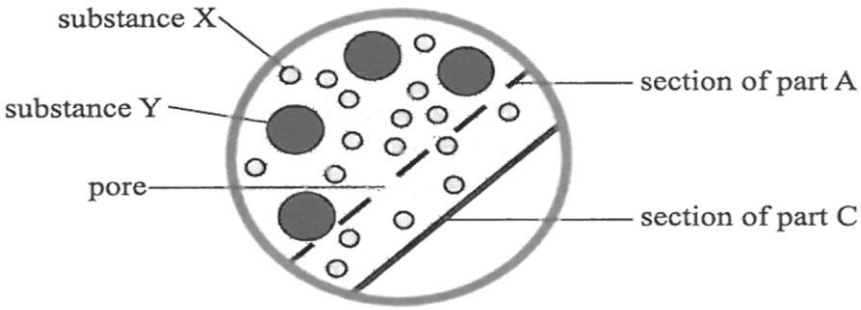


Diagram II

Based on Diagram **II**, explain how this technique is able to separate substance **X** and substance **Y**.

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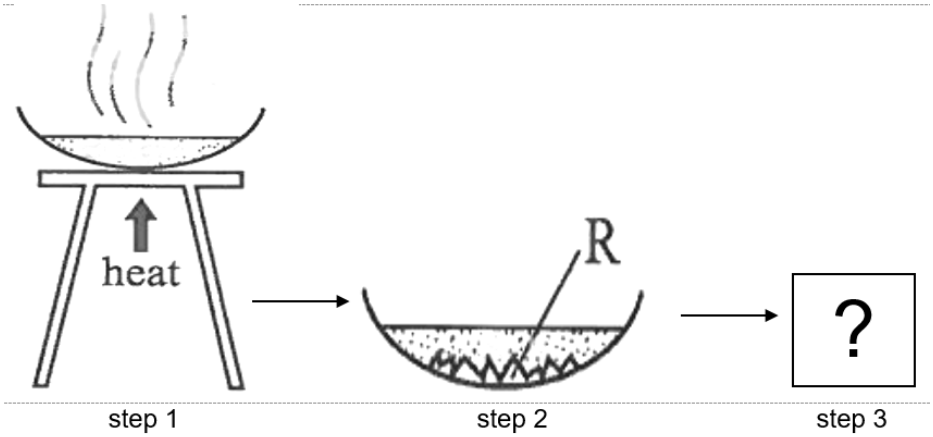
4 The diagram shows a sequence of steps to obtain solid **R** from its solution.



(a) Name this process to obtain solid **R** from its solution.

.....

(b) Explain why it may not be advisable to evaporate the solution in step **1** to dryness.

.....

(c) State whether the solution obtained after heating in step 1 is **diluted** or **saturated**.

.....

(d) Describe the step **3** that is used to obtain a dry product.

.....

5 The table gives some information about the properties of two chemicals.

Chemical	Solubility in water	Boiling point	Decomposed upon direct heating
P	Insoluble	150^{o}c	-
Q	Soluble	110^{o}C	Yes

Using the information from the table, how would you obtain **pure, dry samples of each chemical** if you started with a mixture of both solid **P** and solid **Q**? State all the steps clearly.

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.....

Self-Evaluation: I am able to:	**Yes**	**No**
explain how constituents of a mixture can be separated using filtration		
explain how constituents of a mixture can be separated using crystallization		

Questions I still have:

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Chapter 4 Exploring Diversity of Matter using Separation Techniques

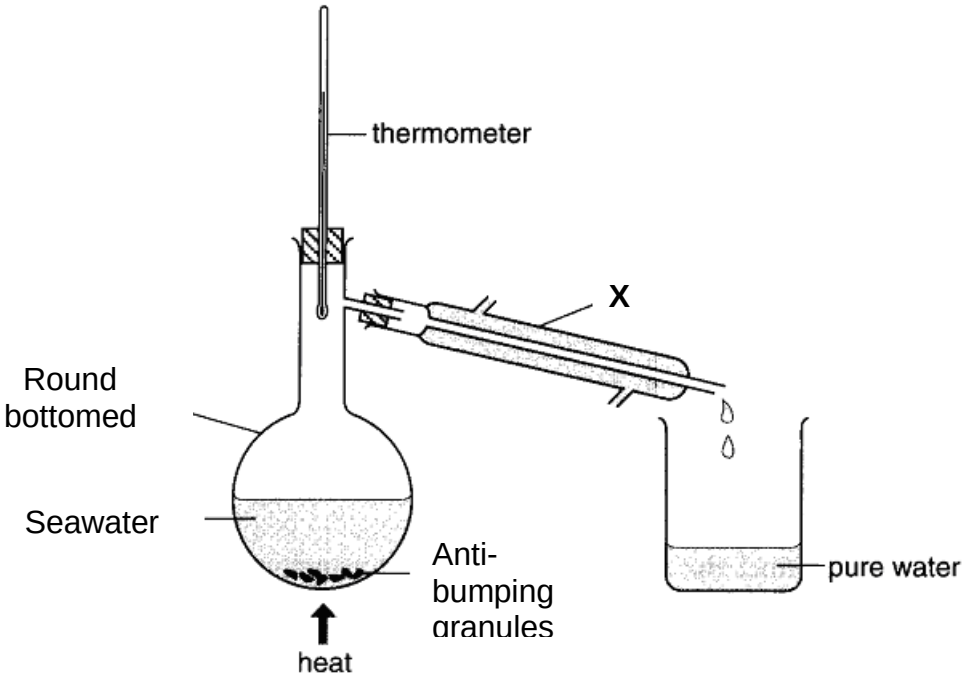
AfL Quiz 2

Date: …….

By the end of this quiz, I should be able to:

- show an awareness of basic principles involved in distillation and chromatography
- explain how the constituents of a mixture can be separated based on their properties, using distillation and chromatography

1 The figure shows the apparatus used to obtain pure water from a seawater.



(a) Name the separation process shown. …….

(b) Name apparatus **X** and state its function.

.....

.....

(c) Using arrows, label on the diagram above where the water will enter and exit apparatus **X**.

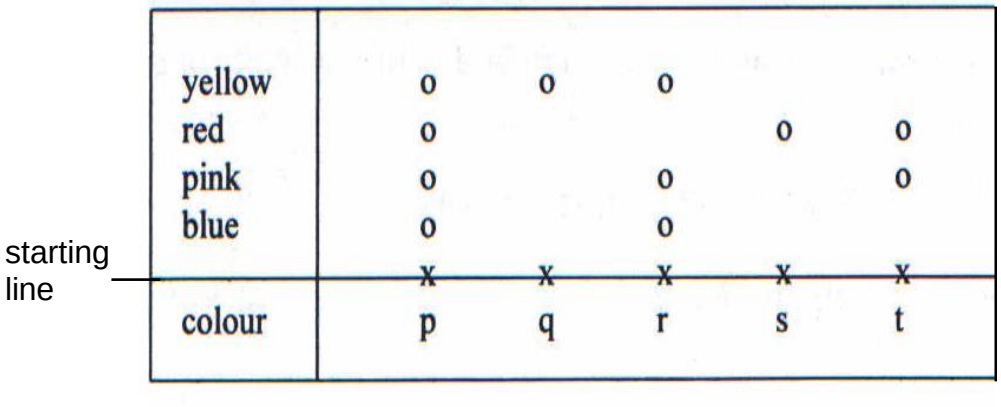
(d) State the function of adding anti bumping granules in the round-bottomed flask.

.....

(e) What will be left behind in the round bottomed flask after separation is completed?

.....

2 A sample of colour ***p*** was analysed, together with known dyes ***q***, ***r***, ***s*** and ***t*** using paper chromatography. The solvent used was ethanol. The chromatogram below was obtained.



(a) Which two dyes when added together produce colour ***p***?

.....

(b) Which dye (***q*** or ***s***) is more soluble in the solvent? Explain your answer.

.....

.....

(c) Why is the starting line drawn with a pencil and not in ink?

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Self-Evaluation: I am able to:	**Yes**	**No**
show an awareness of basic principles involved in distillation		
explain how the constituents of a mixture can be separated based on their properties using distillation		
show an awareness of basic principles involved in chromatography		
explain how the constituents of a mixture can be separated based on their properties using chromatography		

Questions I still have:

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Chapter 4 Exploring Diversity of Matter using Separation Techniques

AfL Quiz 3

Date: …….

By the end of this quiz, I should be able to:

- explain how constituents of a mixture can be separated using filtration
- explain how constituents of a mixture can be separated using crystallization
- explain how constituents of a mixture can be separated using distillation
- apply the different separation techniques to solve problems

1 Three common techniques of separating mixtures are: filtration, crystallization and distillation.

(a) Write down the purpose of each of the three separation techniques.

(i) Filtration

.....

.....

(ii) Crystallization

.....

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(iii) Distillation

.....

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(b) Given your knowledge of filtration, crystallization and distillation, choose an appropriate technique to separate the constituents from the following mixtures.

(i) Water and sand: …….

(ii) Water and sugar: ……

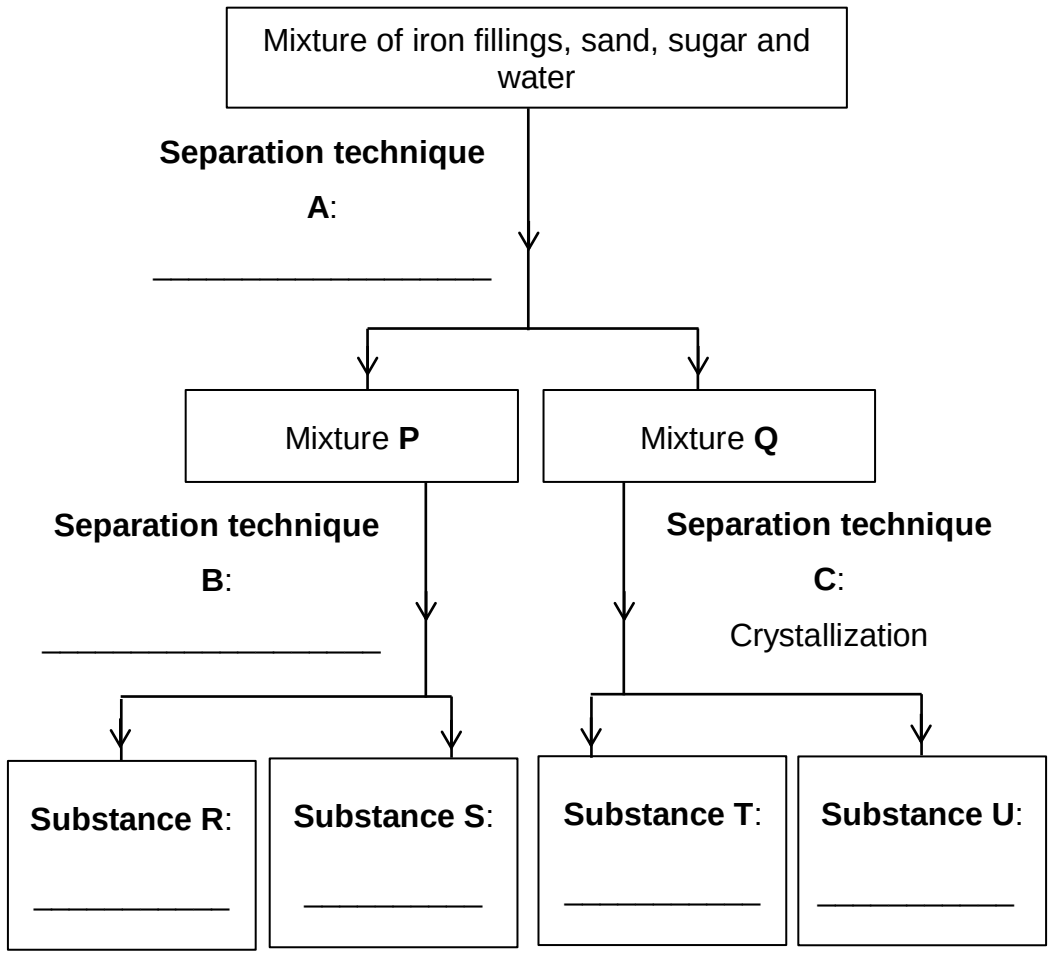
(iii) Water and coal: ……..

(iv) Gasoline from crude oil: ……

(v) Water and Zinc Sulfate (not to dryness): …….

(vi) Water and salt: …….

2 Tom plans to separate a mixture of iron fillings, sand, sugar and water as shown in the flow chart.



Complete the flowchart by filling in the blanks with the appropriate separation techniques **A** and **B**, as well as the substances **R**, **S**, **T** and **U** obtained.

Self-Evaluation: I am able to:	**Yes**	**No**
explain how constituents of a mixture can be separated using filtration		
explain how constituents of a mixture can be separated using crystallization		
explain how constituents of a mixture can be separated using distillation		
apply the different separation techniques to solve problems		

Questions I still have:

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