

Intermediate Science 7
Unit 3: Mixtures and Solution
Topic 5: Separating Mixtures



Student Name _____

When two or more materials or substances are mixed together but do not chemically combine. This means they retain their original properties and can be separated by physical means.



What are the different ways of separating mixtures?

1. Mechanical Sorting

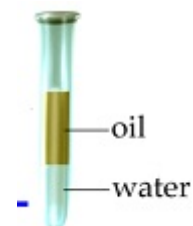
- Used to separate the parts of a mixture based on properties such as particle size, colour, shape..etc.

Examples:

Magnetism :Can be used to separate a magnetic substance from a non-magnetic substance



Floatation: used to separate substances by whether they float or sink.

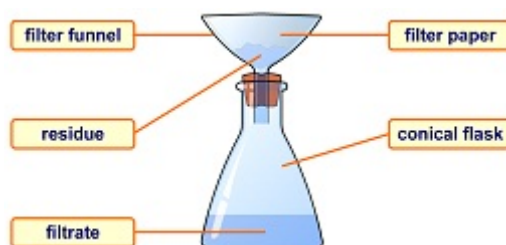


2. Filtration

-Used when separating a solid substance from a fluid (a liquid or a gas) by passing a mixture through a porous material such as a type of filter.

-Works by letting the fluid pass through but not the solid.

-Examples of filters: coffee filter, cloth, oil filter, even sand!

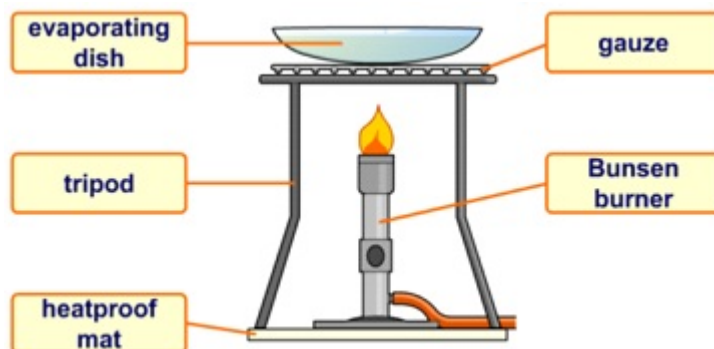


-The substance that is trapped by the filter paper is called the residue. The substance that passes through the filter paper is called the filtrate.

3. Evaporation

-Change of state from a liquid to a gas

-Used to recover a solid solute from a solution.



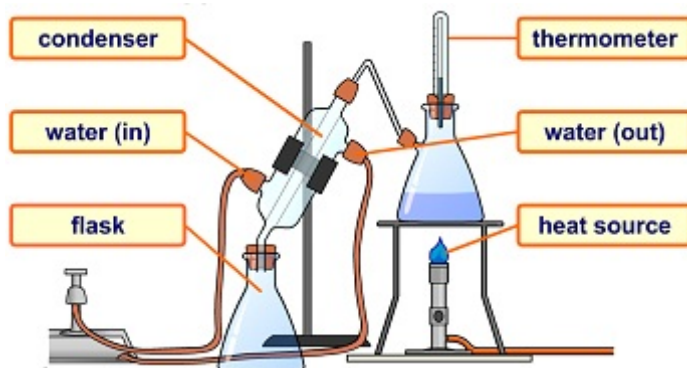
4. Distillation

-Is a method that you can use to separate and recover a single solute and a single solvent from a solution.

-Uses the property of the boiling point to separate two components of a solution (solvent and solute)

-Three key stages to distillation:

- 1) Evaporation
- 2) Condensation
- 3) Collection



5. Paper Chromatography

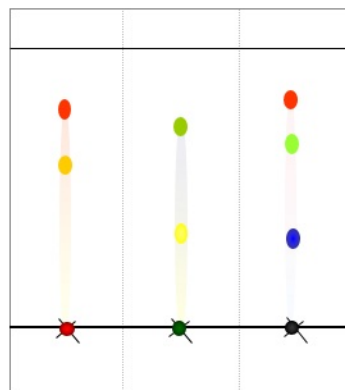
-Separates components of a mixture based on ability of each component to be drawn across the surface of another material

-Mixture is usually liquid and is usually drawn across chromatography paper

-Separation occurs because various components travel at different rates

-Components with strongest attraction for paper travel the slowest

-Different substances or different components move at different speeds through a strip of wet paper a gel or a gas.



Choose The Appropriate Separation Technique:

Technique	Solvent	Solute	Process
Colander	water	Spaghetti	Filtration
Clothes dryer	Water	Clothes	Evaporation
Window screen	Air	Bugs	Filtration
Coffee percolators	Water	Coffee beans	Filtration
Vacuum cleaners	Carpet	Dust	Filtration
Skimming fat from soup	Soup	Fat	Floatation
Refining oil	Water	Oil	Distillation
Toxic screen	Blood	Alcohol	Chromatography
Separating	Sand	Iron fillings	Magnetism
Drinking apparatus	Water	Salt	Distillation

Separating Mixtures And Solutions :

Separating heterogeneous mixtures

- Mechanical sorting
- Magnetism
- Floatation
- Filtration

Separating homogeneous mixtures

- Evaporation
- Distillation
- Separating a solution by paper chromatography

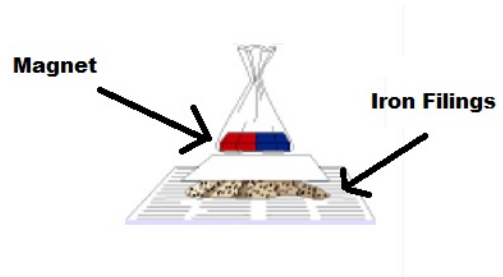
PART A: MULTIPLE CHOICE

Instructions: Shade the letter of the correct answer on the computer scorable answer sheet provided.

- Which one of the following is NOT an example of a separation technique?
 - Boiling an egg
 - Fishing net
 - Surgical mask
 - Tea strainer
- How could a mixture of iron filings and copper filings be separated?
 - Distillation
 - Evaporation
 - Filtration
 - Magnetism
- What separation technique can be used separate a mixture of two insoluble liquids like oil and water.
 - Distillation
 - Evaporation
 - Flotation
 - Magnetism

4. What separation technique is shown below?

- (A) Distillation
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting
- (E) Paper Chromatography

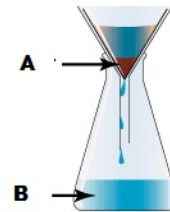


5. What separation technique is shown below?

- (A) Distillation
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting
- (E) Paper Chromatography



6. What is labeled A and B in the picture below?



	A	B
(A)	Filtrate	Residue
(B)	Filtrate	Filtrate
(C)	Residue	Filtrate
(D)	Residue	Residue

7. Which statement describes the filtration of muddy water.

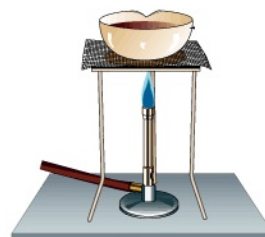
- (A) Water passes through filter paper and is called residue
- (B) Water is retained on filter paper and is called filtrate.
- (C) Mud is retained on filter paper and is called filtrate.
- (D) Water passes while mud is retained on filter paper.

8. What part(s) of the mixture (sugar, sand and water) passes through the filter paper?

- (A) Sand
- (B) Sugar
- (C) Sugar and water
- (D) Water

9. What separation technique is shown below?

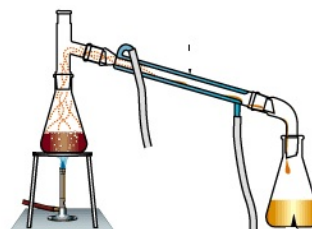
- (A) Distillation
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting
- (E) Paper Chromatography



10. Which separation technique involves heating a solution until the liquid changes into a gaseous state, leaving behind a solid?
- (A) Distillation
 - (B) Evaporation
 - (C) Filtration
 - (D) Mechanical Sorting
 - (E) Paper Chromatography

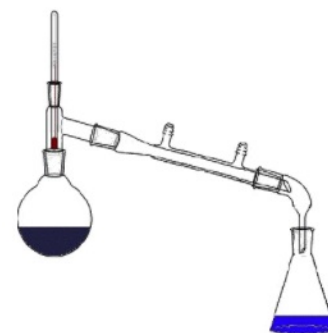
11. What separation technique is shown below?

- (A) Distillation
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting
- (E) Paper Chromatography



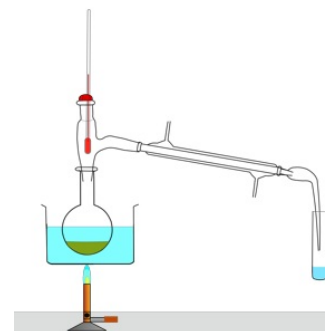
12. Why is water and alcohol easily separated by distillation?

- (A) Different melting points
- (B) Different colours
- (C) Different densities
- (D) Different boiling points



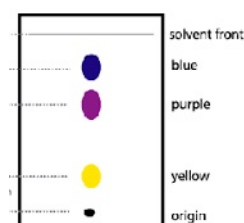
13. Two changes of state occur during distillation. What are these changes of state?

- (A) Liquid to gas and gas to solid
- (B) Liquid to gas and gas to liquid
- (C) Solid to gas and gas to liquid
- (D) Solid to liquid and liquid to gas



14. What separation technique is shown below?

- (A) Distillation
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting
- (E) Paper Chromatography

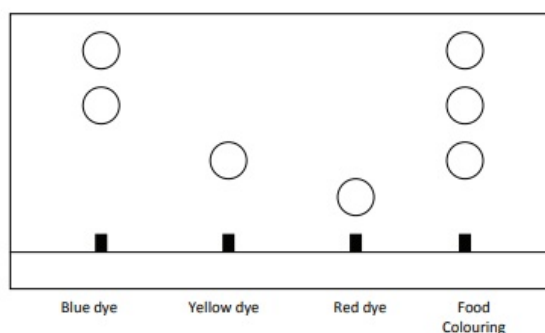


15. Which one of the following methods would NOT be used to separate an insoluble solid and a liquid?





- (A) Chromatography
- (B) Evaporation
- (C) Filtration
- (D) Mechanical Sorting

16. The figure below shows the chromatogram produced by three dyes and a food colouring. What dye(s) would you expect to be found in the food colouring?

- (A) Blue
- (B) Blue and yellow
- (C) Yellow
- (D) Yellow and red



Use the table below to answer questions 17 to 20:

A	B	C	D
			

17. What separation technique would be used to separate water and alcohol?

- (A) A
- (B) B
- (C) C
- (D) D

18. What separation technique would be used to separate sand and water?

- (A) A
- (B) B
- (C) C
- (D) D

19. What separation technique would be used to separate salt and water?

- (A) A
- (B) B
- (C) C
- (D) D

20. What separation technique would be used to separate iron filings and sand?

- (A) A
- (B) B
- (C) C
- (D) D

PART B : MATCHING

Match each thermometer on the left with the best Descriptor on the right. Each Descriptor may be used only once. Place your answer on the scantron

Term	Descriptor
21. ___ Chromatography	A. to separate the colours in food dyes
22. ___ Magnetism	B. Separates soluble solids by boiling off
23. ___ Evaporation	C. to separate a mixture of liquids with different boiling points
24. ___ Distillation	D. Separate magnetic material from nonmagnetic material.
25. ___ Filtration	E. Separate insoluble solid from a liquid

PART C: WRITTEN RESPONSE

1. Describe mechanical sorting, using magnetism as an example.

2. Why is it easier to separate the parts of a heterogeneous mixture than the parts of a homogeneous mixture (a solution)?

3. Why is the size of the holes in a filter important for filtration?

4. Which part or parts of a solution does evaporation recover: the solute, the solvent, or both?

5. Which part or parts of a solution does distillation recover: the solute, the solvent, or both?

6. What is chromatography?

7. Explain how you could separate each of these mixtures.

(A) wood chips and pieces of granite rock

(B) iron filings and wood sawdust

(C) salt and pepper

8. Explain how evaporation and distillation are similar and how they are different.
