

TERM II
Separation of Substances

Need for Separation(Worksheet 1)

PART A

I. Fill in the blanks:

A "pure" substance is something that is entirely made up of **substances** that are **similar** to each other. Any substance that is not pure must be a **mixture**. We are surrounded by mixtures. The air is a mixture of **gases**. The oceans are a mixture of (mainly) **salt** and **water**. The solid Earth is mostly rock, which is a mixture of different **minerals**.

II. Classify the following as pure substances or mixtures:

Perfume, pure water, carbon dioxide, salt water, salad, concrete, sand, gold

Pure substances: pure water, carbon dioxide, gold

Mixtures: perfume, salt water, salad, concrete, sand

PART B

1. On what basis will you choose a method for separating components of a mixture?

Ans. The principle used in separation of mixtures is based on components of mixture and their properties.

2. Why do we need to separate substances in a mixture?

Ans. We need to separate substances in a mixture for the following reasons:

- 1. To remove the unwanted / harmful/ non useful components or impurities.**
- 2. To separate useful components.**

Methods of Separation – Hand Picking and Sieving (Worksheet 2)

I. Choose the correct answer:

1. In a cashewnut factory cashewnuts of different sizes are separated by the process of _____.

- a. **sieving** b. winnowing c. hand –picking d. loading

2. Tiny pieces of stones are usually separated from pulses before cooking by the method called _____.

- a. sieving b. winnowing **c. hand –picking** d. loading

3. Simplest way of separating broken rice from whole rice is

- a. **sieving** b. winnowing c. hand –picking d. loading

II. Suggest the method of separation in the following.

a. Mangoes from a basket containing many kinds of fruits.

c. When harmful component is in small quantity and differ in size or colour **Hand picking**

b. Components of a mixture of different sizes having same colour. **Sieving** of the useful component. **Handpicking**

PART B

III. Define

(i) Handpicking - The method in which substances in a mixture differ in size, shape or colour are separated by picking them by hand. Eg stones from rice, mangoes from apples etc.

(ii) Sieving - Sieving is a process by which fine particles are separated from the bigger particles in a mixture by using sieve. Eg. Husk from flour in flour mills, stones from sand at construction site.

2. Which property is used to separate a mixture of two solids by hand picking, sieving

Ans. Handpicking - i. Components of a mixture are of different size, shape or colour. ii. Unwanted component and mixture should be in small quantity.

Sieving – Components should be different in size.

Methods of Separation –Threshing and winnowing (Worksheet 3)

I. Suggest the method of separation in the following.

a. Sand and sawdust. **Winnowing**

b. Seeds of paddy from its stalks. **Threshing**

II. X is a separation technique based on the difference in weights of the solids in a solid-solid mixture. What is X?

- a) Sieving b) Handpicking c) Threshing d) **Winnowing**

III. Match the following -Why do we separate substances?

Separation Process	Purpose for which we do the separation	What do we do with the separated components?
1. Separate stones from rice.	a. To separate two different but useful components. (2)	i) We throw away the solid component. (3)
2. Churning milk to obtain butter.	b. To remove non-useful components. (3)	ii) We throw away the impurities. (1)
3. Separate tea leaves.	c. To remove impurities or harmful components. (1)	iii) We use both the components. (2)

IV. Given below are some methods of separation.

X - Winnowing
Y - Threshing
Z - Sieving

Which of the following methods of separation does not require air for the process of separation?

- a) Only X **b) Only Y, Z** c) Only Z, X d) X, Y and Z

V. Why do we separate substances in a mixture?

(i) To separate two different but useful components.
(ii) To remove useless components.
(iii) To remove impurities.

- a) Only (i) and (ii) b) Only (ii) and (iii)
c) Only (i) and (iii) **d) (i), (ii) and (iii)**

PART B

1 Which property is used to separate a mixture of two solids by winnowing?

Ans. Winnowing- Components should be different in weight.

2. Define (i) Threshing (ii) Winnowing

(i) Threshing - A process in which we separate grains from stalks by beating them against a hard surface. This process is used by farmers to separate gram, wheat, rice, mustard seeds in his field.

(ii) **Winnowing** - Winnowing is a process to separate heavier and lighter components of a mixture by wind. This process is done by the farmers to separate lighter husk particles from heavier seeds of grain.

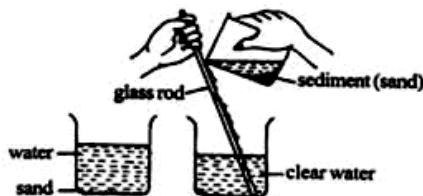
3. Give reason:

a. If there is no wind winnowing is not possible.

Ans. This is because wind helps in blowing away lighter particles from heavier particles.

Separation of Substances – Sedimentation and Decantation (Worksheet 4)

I. Observe the following activity and answer the following questions?



a. Name the processes involved in the above activity- **Sedimentation and Decantation**

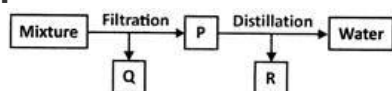
b. What is separated in this process? **Sand and other heavier impurities from water**

II. True or False:

1. During sedimentation, lighter particles settle down forming sediments. **False**

2. Rice and water can be separated by sedimentation and decantation. **True**

III. The following flow chart gives the techniques a student adopted to separate the constituents of a mixture.



What could the mixture be?

- a) Water + sand + glass b) Oxygen + hydrogen + salt
c) Stones + rice + water **d) Chalk powder + sugar + water**

IV. Nisha poured a mixture of salt, iron filings, sand and flour into a container.



Which of the following substances can be separated from the mixture by using a Magnet?

- a) Salt b) Flour c) Sand **d) Iron filings**

PART B

1. Define Sedimentation, Decantation

a. Sedimentation – The process of settling down of heavier impurities in a liquid in a beaker.

b. Decantation – The process of pouring a liquid after sedimentation into another beaker without disturbing the sediments.

2 How will you separate husk or dirt particles from pulses before cooking?

Ans. Husk or dirt particles can be separated by winnowing method or Sedimentation and decantation.

Separation of Substances –Filtration (Worksheet 5)

I. How can you separate the following mixtures?

1. Sawdust and water. **Filtration**

2. Pulp from orange juice. **Filtration**

3. Tea leaves from tea. **Filtration**

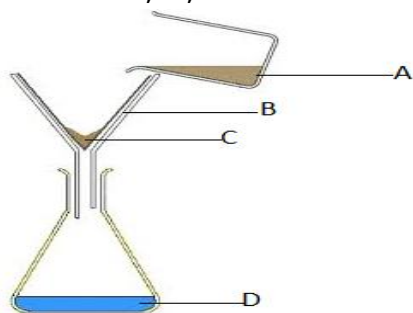
II. Name the following:

1. A mixture where a solid is dissolved in a liquid - **Solution**

2. The solid which is dissolved and the liquid part - **Solid – Solute, Liquid - Solvent**

3. The liquid which is collected after filtration. – **Filtrate**

III. Label A, B, C & D. Which type of substances can be separated using this method?



A- Insoluble impurities

B- Filter paper

C- Residue

D- Filtrate

Filtration: When I looked at my mixture of soil and water, I noticed that some of the soil settled to the bottom of the water. Soil does not dissolve in water. Soil is insoluble in water. We can separate soil from water using filter paper. If you look at filter paper under a microscope, you can see that it is full of tiny pores. The soil particles are too big to pass through the holes in the filter paper.

PART B

1. Define filtration

The **process** of removing insoluble impurities from a liquid by passing it through the filter paper.

2. How can you separate a mixture of salt, chalk powder and iron filings?

Explain.

Ans. i) Add water to the mixture. Only salt will dissolve in water.

ii) Pass the mixture through a filter paper. Chalk powder and iron filings will remain on the filter paper, dry it.

iii) Bring a magnet near to the mixture of chalk powder and iron filings. This will attract all the iron filings from the mixture, thus separating the two.

iv) Salt is separated by heating the salt water collected after filtration in a dish till all the water evaporates.

Separation of Substances –Evaporation and condensation

(Worksheet 6)

I. True or False:

1. Evaporation can be used to separate salt from sea water. **True**

2. Filtration is used to separate sugar from sugar solution. **False**

3. Condensation is the reverse of evaporation. **True**

II. Match the following and choose the answer from the code given below.

A. Separate sand from water

(i) Filtration

B. Separate salt from water

(ii) Evaporation

C. Separate kiwi seed from its juice

(iii) Churning

D. Separate butter from curd

(iv) Sedimentation, Decantation

(a) A- (iv), B-(ii), C-(i), D-(iii)

(b) A- (ii), B-(iv), C-(iii), D-(i)

(c) A- (iii), B-(iv), C-(ii), D-(i)

(d) A- (i), B-(iv), C-(iii), D-(ii)

III. There are 4 mixtures A, B, C and D. The mixture A contains sand and sugar, mixture B contains chalk powder and salt, mixture C contains salt and sugar, whereas mixture D contains sugar and charcoal powder. Which one of these mixtures cannot be separated by using water as solvent? Why?

Ans. Mixture C as both salt and sugar are soluble in water

IV. Observe the following activity and answer the following questions:



a. Name the process involved? **Condensation**

b. Why do tiny droplets of water begin to form on the outside of the glass?

Ans. The water vapour in the air condenses on touching cold can and forms tiny water droplets on the can.

PART B

1 Define a) Evaporation b) Condensation

a. Evaporation – The process of liquid changing into vapour on heating.

b. Condensation – The process of gas changing to water on cooling.

Can Water Dissolve Any Amount Of Substance(Worksheet 7)

I. Choose the most appropriate answer:

1. The substance that dissolves in water is called –

a. solution b. solvent **c. solute** d. mixture

2. The substance in which another substance dissolves is called –

a. solution **b. solvent** c. solute d. mixture

3. When sugar dissolves in water it forms –

a. mixture b. solvent c. solute **d. homogenous mixture**

II. Fill in the blanks:

1. The substances that dissolve in water are called **soluble** substances and the substances that do not dissolve in water are called **insoluble** substances.

2. A solution is said to be **saturated** if it cannot dissolve any more of the substance in it.

3. Chalk and water forms a **heterogenous** mixture. (heterogenous/homogenous)

Activity:

Take two glasses and pour half a cup of water in each of them. Add a teaspoon of salt to one glass and stir till the salt dissolves. Go on adding salt, one teaspoon at a time, till the solution saturates. Record the number of spoons of salt that dissolved in the water, in Table given below. Now, repeat the same activity with sugar. What do you notice from Table given below? Do you find that water dissolves different substances in different amounts?

Observation:

Substance	Number of spoons of substance that dissolved in water
Salt	
Sugar	

PART B

1. Differentiate between saturated and unsaturated solution.

Saturated Solution	Unsaturated Solution
Solution in which no more solute can dissolve in the given amount of solvent at the same temperature.	Solution in which more solute can dissolve in the given amount of solvent at the same temperature.

Factors that affect solubility (Worksheet 8)**I. Fill in the blanks:**

1. The ability of a substance to dissolve in a liquid is called **solubility**
 2. **Temperature** is the factor that can increase solubility of a substance.

II Coffee powder will dissolve faster in hot milk or cold milk? Justify

Ans. Coffee powder will dissolve faster in hot milk because temperature increases solubility.

III. Take a glass half filled with water. Add sugar to the water till no more of it dissolves. You will see that sugar particles start to settle down at the bottom of the glass.

a. Why is the sugar not dissolving anymore?

Ans. This is because all spaces between the molecules of water are occupied by sugar molecules.

b. Write down ~~two~~ one way in which you can make more sugar dissolve.

Ans. – Heat the solution

IV. Lemonade is prepared by mixing lemon juice and sugar in water. You wish to add ice to cool it. Should you add ice to the lemonade before or after dissolving sugar? In which case would it be possible to dissolve more sugar? Why?

Ans. * We should add ice after dissolving sugar.

*** More sugar will dissolve before adding ice to lemonade. This is because the dissolving power of water decreases with decrease in temperature.**

V. A mixture contains three different substances X, Y and Z. They are of the same size, cubical in shape and yellow in colour. X particles are very heavy, insoluble, non-magnetic and contribute 50% of the mixture. Y particles are very light, insoluble, non-magnetic and contribute 40% of the mixture. And Z particles are iron pieces. Which of the following methods can separate X, Y and Z?

- a) **Winnowing, Magnetic separation** b) Magnetic separation, Winnowing
 c) Sieving, Magnetic separation. Filtration d) Handpicking, Sublimation, Sieving

PART B

1. Write the factors that can increase solubility of a substance.

Ans Temperature, size of the solute and stirring