

Separation of Mixtures Questions with Solutions

Q1: What is the basis of the Separation of Mixtures?

Answer: The constituents of mixtures differ in terms of their physical properties. Hence, the basis of their separation is their physical properties, based on which the physical methods of separation can be applied.

Q2. Write the different methods of Separation of Mixtures.

Answer: There are seven physical methods for the Separation of Mixtures. They are:

1. Separating Funnel
2. Distillation
3. Evaporation
4. Winnowing
5. Filtration
6. Handpicking
7. Threshing

Q3. What is the principle of the Distillation Separation Technique?

Answer: The principle of Separation by Distillation is that different substances have different boiling points. As the mixture is boiled, its constituents boil and convert into vapours at different temperatures. These vapours generated at different temperatures are condensed separately. Hence, in this way, the mixture is separated by Distillation.

Q4. How does the Evaporation Technique separate Mixtures?

Answer: A solid dissolved in a liquid can be separated by boiling off the liquid from the mixture. The vapours of the evaporated liquid can be condensed in a separate beaker to restore the liquid.

Q5. How can the solid-solid mixtures be separated?

Answer: As discussed above, the mixtures can be separated based on their properties. The solid-solid mixtures can be separated by adding a suitable solvent based on their solubilities.

For example, a mixture of sugar and sand can be separated by adding water. As the mixture is stirred in water, the sugar becomes soluble, while the sand remains unchanged. As the solution is passed through a filter paper, sand is left behind, and sugar solution passes through the filter paper. The sugar can be separated from water by evaporation. Therefore, solid-solid mixtures can be separated based on their solubilities by adding a suitable solvent.

Q6. How are the Grains separated from the Chaff?

Answer: The Grains are separated from the Chaff by Winnowing. This process is used by the farmers to separate the lighter husk particles from the heavier seeds of Grains. The method involves the use of large types of machinery.

Q7. Name the different types of mixtures.

Answer: There are two types of mixtures, namely:

1. Homogeneous Mixtures
2. Heterogeneous Mixtures

Q8. Explain what a Method of Separation is and its importance.

Answer: The Method of Separation is a process by which a mixture is separated into two or more elements or compounds. In this process, two or more new substances are formed by which the mixture was formed. Separation Methods have many advantages in our day-to-day life. For example, we keep the air inside our homes clean by filtering out the dust and mites from the air that we breathe. The food that we eat is purified by applying various methods of separation.

Q9. Why is the Separation of Mixtures necessary?

Answer: The Separation of Mixtures is necessary so as to obtain the pure useful compound from the impure useless compounds. The Methods of Separation are mostly incorporated in the big manufacturing firms in order to reduce waste and restore useful materials from the mixtures of compounds received at the end of the manufacturing process.

Q10. Write the names of different Methods of Separation of Mixtures.

Answer: The different methods of Separation of Mixtures include, Chromatography, Distillation, Evaporation, Sublimation, Crystallisation, Adsorption, Absorption, Oxidation, and Filtration.

Q11. The Separation Method that depends on the Volatility of the compound is:

- a. Distillation
- b. Filtration
- c. Handpicking
- d. None of the above

Answer: (a)

Explanation: The process of Distillation separates the mixture due to the differences in their boiling points. As Distillation is based on the boiling points of the substances to be separated, it depends on the Volatility of the compound.

Q12. The Separation Technique that exploits Electric Charge and Diffusivity is:

- a. Electrophoresis
- b. Distillation
- c. Condensation
- d. None of the above

Answer: (a)

Explanation: Electrophoresis is used to separate DNAs, RNAs, and other protein molecules based on their size and electric charges. In Electrophoresis, the constituents are separated based on their electric charge and diffusivity.

Q13. Which of the following methods is suitable to separate the mixture containing the oxygen-rich compounds and the nitrogen-rich compounds?

- a. Distillation
- b. Sublimation
- c. Chromatography
- d. None of the above

Answer: (a)

Explanation: As there is a great difference between the boiling points of Oxygen (-1830°C) and Nitrogen (-195.8°C), the mixture can be separated by the Distillation method.

Q14. The Mixture of Oil and Hexane can be separated by:

- a. Distillation
- b. Boiling
- c. Handpicking
- d. Separating Funnel

Answer: (d)

Explanation: The mixture containing the Oil and Hexane cannot be separated by the Distillation method as this process might harm the properties of the Oil. The mixture can be separated by using the Separating Funnel. This is because Oil and Hexane have huge differences between their Molecular Weights. Therefore, the heavier layer settles down and can be separated using the Separating Funnel.

Q15. How can the mixture of Iron Fillings and Copper Fillings be separated?

Answer: The Mixture containing the Iron Fillings and the Copper Fillings can be separated by using the Magnetic Separation Method, as the two metals have different magnetic properties. An Electronic

magnet is hovered on the mixture containing the Iron and the Copper fillings. Iron Filings get separated as they get attracted to the magnet. Copper fillings are left behind and can be separated.

Practice Questions on Separation of Mixtures

Q1. Write a Separation Method that can be used to separate the DNA Fragments from the DNA.

Answer: The DNA Fragments can be separated by using the Gel Electrophoresis method of separation. By this method, the DNA Fragments are separated based on their sizes. The DNA samples to be separated are filled into wells that have gel on one side of the well. The DNA sample is pulled through the gel as some external electricity is passed through it. The DNA Fragments being negatively charged move to the positive electrode in the presence of an electric field. Hence, this way, the DNA Fragments can be separated from the sample of DNA by using the Gel Electrophoresis method.

Q2. Isopropyl Alcohol (IPA) and Water can be separated by _____.

- a. Distillation
- b. Electrophoresis
- c. Two-step Distillation
- d. Two-step Crystallisation

Answer: (c)

Explanation: A mixture containing IPA and Water can be separated by the Two-step Distillation Method. The Two-step Distillation Method is employed when there is a presence of Benzene in the mixture. Benzene is soluble in IPA; hence, after getting dissolved, Benzene and IPA form a layer over Water. The two layers of (Benzene + IPA) and Water can be separated by using a Separating Funnel. The Benzene and IPA solutions can then be separated by the Distillation method.

Q3. The Extent of Separation does not depend on:

- a. Radius of Gyration
- b. Vapour Pressure
- c. Polarisability
- d. Temperature

Answer: (d)

Explanation: The Temperature only governs the method of separation to be employed depending on the temperature of the mixture to be separated. Temperature, however, does not determine the Extent of Separation.

Q4. Explain the method Separation by Polymer Membrane.

Answer: This method depends on the pore size of the Polymer Membrane used. The Polymer membrane is a semi-permeable membrane which gives the basis of this separation. The method uses a Polymer Membrane that allows only specific substances to pass through it, and the rest are left behind and hindered at the Membrane interface. The method is mostly used to separate a mixture of gases. The Polymer Membrane method is very specific in nature.

Q5. Write five characteristics of a Mixture.

Answer: The five important characteristics of Mixtures are given below:

1. The composition of a Mixture is not fixed.
2. A Mixture does not have a fixed Melting or Boiling Point.
3. The constituting substances of a Mixture can be separated by simple means, such as the Physical Methods of Separation.
4. As no chemical bonds are formed or broken during the formation of a mixture, the mixtures do not produce or absorb any heat energy.
5. The Mixtures assume the properties of their components.