

Important Questions for Class 9 Science

Chapter 2 - Is Matter Around Us Pure?

Very Short Answer Questions

1 Mark

1. Try segregating the things around you as pure substances or mixtures.

Ans: Try mixing soil and water then separate them. Where soil is a mixture as it is the mix of more than one substance. And water is a pure substance because it's made up of one kind of substance.

**2. Classify each of the following as a homogeneous or heterogeneous mixture.
soda water, wood, air, soil, vinegar, filtered tea.**

Ans: Classification of the given into homogeneous or heterogeneous is enlisted below.

Homogeneous mixture	Heterogeneous mixture
Soda water Air Vinegar Filtered tea	Wood Soil

3. How would you confirm that a colorless liquid given to you is pure water?

Ans: Under the atmospheric pressure one, the boiling point of water is 100°C and freezing point is 0°C . When we boil the given colorless liquid if it boils at 100°C then it is pure water. If not boiling at 100°C temperature, then there will be impurities mixed with it hence not pure water.

4. Which of the following materials fall in the category of a “pure substance”?

- (a) Ice
- (b) Milk
- (c) Iron
- (d) Hydrochloric acid
- (e) Calcium oxide
- (f) Mercury
- (g) Brick
- (h) Wood
- (i) Air

Ans: Pure substances : ice, iron, hydrochloric acid, calcium oxide, mercury.

5. Identify the solutions among the following mixtures.

- (a) Soil
- (b) Sea water
- (c) Air
- (d) Coal
- (e) Soda water.

Ans: Solutions: sea water, air, soda water.

6. Which of the following will show “Tyndall effect”?

- (a) Salt solution
- (b) Milk
- (c) Copper sulphate solution
- (d) Starch solution.

Ans: (b)Milk and (d)starch solution

7. Classify the following into elements, compounds and mixtures.

- (a) Sodium
- (b) Soil
- (c) Sugar solution
- (d) Silver
- (e) Calcium carbonate
- (f) Tin
- (g) Silicon
- (h) Coal
- (i) Air
- (j) Soap
- (k) Methane
- (l) Carbon dioxide
- (m)Blood

Ans: Classification of the given into elements, compounds and mixtures are enlisted below.

Elements	Compounds	Mixture
Sodium	Calcium	Soil
Silver	Carbonate	Sugar
Silicon	Soap	Solution
Tin	Methane	Air
Coal	Carbon	Blood
	Dioxide	

8. Which of the following are chemical changes?

- (a) Growth of a plant

- (b) **Rusting of iron**
- (c) **Mixing of iron filings and sand**
- (d) **Cooking of food**
- (e) **Digestion of food**
- (f) **Freezing of water**
- (g) **Burning of a candle.**

Ans: Chemical changes: rusting of iron, cooking of food, digestion of food, burning of a candle.

9. Which of the following solution scatter light?

- (a) **colloidal solution**
- (b) **suspension**
- (c) **both**
- (d) **none**

Ans: (c) both

10. Which of the following methods would you use to separate cream from milk?

- (a) **fractional distillation**
- (b) **distillation**
- (c) **centrifugation**
- (d) **filtration**

Ans: (c) Centrifugation

11. Cooking of food and digestion of food:

- (a) **are both physical processes**
- (b) **are both chemical processes**
- (c) **cooking is physical whereas digestion is chemical**
- (d) **cooking is chemical whereas digestion physical**

Ans: (b) are both chemical processes

12. Mercury and Bromine are both

- (a) **liquid at room temperature**
- (b) **solid at room temperature**
- (c) **gases at room temperature**
- (d) **both (a) and (b)**

Ans: (a) liquid at room temperature

13. Blood and sea water are:

- (a) **both mixtures**
- (b) **both are compound**
- (c) **blood is a mixture whereas sea water is a compound**

(d) blood is a compound and sea water is a mixture

Ans: (a) both mixtures

14. Sol and Gel are examples of examples of

(a) Solid-solid colloids

(b) Sol is a solid-liquid colloid and Gel is liquid solid colloid

(c) Sol is a solid-solid colloid and Gel is a solid-liquid colloid

(d) Sol is a liquid-solid colloid and Gel is a solid-liquid colloid

Ans: (b) Sol is a solid-liquid colloid and Gel is liquid solid colloid

15. In a water-sugar solution:

(a) water is solute and sugar is solvent

(b) water is solvent and sugar is solute

(c) water is solute and water is also solute

(d) none of these

Ans: (b) Sol is a solid-liquid colloid and Gel is liquid solid colloid

16. Boron and carbon:

(a) are metalloids

(b) boron is metalloid and carbon is non-metal

(c) boron is metallic and carbon is a metal

(d) boron is non-metal and carbon are a metalloid

Ans: (a) are metalloids

Short Answer Questions

2 Marks

1. What is meant by a substance?

Ans: Substance will have similar chemical properties and can be defined as that kind of matter where constituent particles cannot be separated from each other by any physical process.

2. How will you separate a mixture containing kerosene and petrol (difference in their boiling points is more than 25°C), which are miscible with each other?

Ans: We can use distillation technique to separate a mixture containing kerosene and petrol since difference in their boiling points is more than 25°C .

3. Name the technique to separate

(i) butter from curd

Ans: Centrifugation method.

(ii) salt from sea-water

Ans: Evaporation method.

(iii) camphor from salt

Ans: Sublimation method.

4. What type of mixtures are separated by the technique of crystallisation?

Ans: From liquid solutions of impure samples, pure solid crystals can be separated. This method is known as crystallization.

Example: Pure sugar from impure sugar, salt from sea water.

5. What is a mixture? What are its various types?

Ans: A mixture is constituted by more than one element or compound or both mixed in any proportion. They are of two types:

- (a) Homogenous mixture
- (b) Heterogeneous mixture

6. Define solute, solvent and solution?

Ans: Solute: It is the substance of the solution which is being added to the solvent.

Solvent: It dissolves the solute. The component of the solution to which the solute is added.

Solution: It is homogeneous, constituted by solute and solvent.

7. What is a solution? What are the properties of solution?

Ans: A solution is a homogenous mixture of two or more substances. The various properties of solution are: -

- The particles of a solution cannot be seen by naked eyes because they are smaller than 1 nm.
- When the beam of light passes through a solution, it does not scatter.
- Filtration cannot be used to separate the components of a solution from each other.

8. Differentiate between elements and compounds.

Ans: The difference between elements and compounds are enlisted below.

Elements	Compounds
It is made up of only one kind of atom.	It is made up of two or more elements.
Elements cannot be separated into two or more simpler substance	Compounds can be separated by chemical or electrochemical methods.
Symbols are used to represent them.	Formulas are used to represent them.

9. What is the Tyndall effect? Which kinds of solutions show it?

Ans: Tyndall effect is a process in which the scattering of beams of light takes place in particles of a colloid, when that is directed towards them. Heterogeneous mixtures

like,
Suspension solution and colloidal solution show the Tyndall effect.

10. Differentiate between homogeneous and heterogeneous mixture?

Ans: The difference between homogeneous and heterogeneous mixture is listed below.

Homogeneous mixture	Heterogeneous mixture
They have uniform composition of elements and compounds	They have non-uniform composition of elements and compounds
The properties of the mixture are the same.	The properties of the mixture are different.

11. What is centrifugation? Where is it used?

Ans: Centrifugation is a technique used for separation of suspended particles of a substance from liquid and is based upon the principle that denser particles stay at bottom and lighter particles stay at the top when rotated at a high speed in a centrifuge application. It is used in separate butter from milk, also in washing machines for squeezing out water from clothes.

12. What is a suspension? What are the properties of suspension?

Ans: A suspension is a heterogeneous mixture in which the solute particles do not dissolve in the solvent but they remain suspended throughout the bulk of the medium. The suspension particle size is large enough to be visible from naked eyes. Properties of suspension:

- The particles are large so can be seen by naked eyes.
- They scatter a beam of light passing through it.
- When particles are left undisturbed, they settle down.

Short Answer Questions

3 Marks

1. How are sol, solution and suspension different from each other?

Ans: Difference between sol, solution and suspension is enlisted below.

Sol	solution	suspension
Sol has both dispersed and dispersion phase	Solution has soluble solute and solvent phase	Suspension has insoluble solute suspended in the solvent medium
It is heterogeneous Even though it appears as homogeneous	It is homogeneous	It is heterogeneous
Electron microscope is	Particles are not visible	Particles are visible by

used to see the particles	by all means	naked eye
10^{-7} to 10^{-5} is the particle size	Particle size is less than 10^{-7}	Particle size is more than 10^{-5} .

2. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.

Ans: In the problem it is given that to make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K.

Mass of sodium chloride (solute) is 36 g

Mass of water (solvent) is 100 g

Mass of solution is the sum of solute and solvent

$$\Rightarrow 36 + 100 = 136$$

$$\text{Therefore, concentration percentage} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100$$

$$= \frac{36}{136} \times 100$$

$$= 26.47\%$$

3. Classify the following as chemical or physical changes:

- cutting of trees
- melting of butter in a pan
- rusting of almirah
- boiling of water to form steam
- passing of electric current through water and the water breaking down into hydrogen and oxygen gases
- dissolving common salt in water
- making a fruit salad with raw fruits burning of paper and wood

Ans: When chemical properties of a substance changes then it's called chemical change.

Chemical change: rusting of almirah, passing of electric current, through water and the water breaking down into hydrogen and oxygen gases, burning of paper and wood.

Physical properties of a substance such as shape, size, color, state changes then it's called physical change.

Physical change: cutting of trees, melting of butter in a pan, boiling of water to form steam, dissolving common salt in water, making a fruit salad with raw fruits.

4. Which separation techniques will you apply for the separation of the following?

(a) Sodium chloride from its solution in water.

Ans: Evaporation method

(b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.

Ans: Sublimation method

(c) Small pieces of metal in the engine oil of a car.

Ans: Filtration method

(d) Different pigments from an extract of flower petals.

Ans: Chromatography

(e) Butter from curd.

Ans: Centrifugation method

(f) Oil from water.

Ans: By using separating funnel

(g) Tea leaves from tea.

Ans: Filtration by using strainer

(h) Iron pins from sand.

Ans: Magnetic separation

(i) Wheat grains from husk.

Ans: Winnowing method

(j) Fine mud particles suspended in water.

Ans: Centrifugation method

5. Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Ans: First, take the required amount of water as a solvent in a pan and after boiling it add a little amount of sugar which is solute to the solvent. Solute will dissolve completely in the solvent forming the true solution, then add tea leaves that are insoluble along with another soluble liquid milk. After boiling the solution allow the method of filtration with a sieve so that the filtrate obtained is tea while the residue has tea leaves that can be thrown away.

6. Pragya tested the solubility of three different substances at different temperatures and collected the data as given below (results are given in the following table, as grams of substance dissolved in 100 grams of water to form

a saturated solution)

Substance dissolved	Temperature in K				
	283	293	313	333	353
	Solubility				
Potassium nitrate	21	32	62	106	167
Sodium chloride	36	36	36	37	37
Potassium chloride	35	35	40	46	54
Ammonium chloride	24	37	41	55	66

(a) What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?

Ans: At temperature 313 K the amount of potassium nitrate required was 62 g in 100 ml of water.

Therefore, in 50 g water we will need to dissolve $62 \times \frac{50}{100} = 31$ g potassium nitrate.

(b) Pragya makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.

Ans: At 353 K saturated solution preparation needs 54 g potassium nitrate and at room temperature (293 K) saturation solution formation occurs with 35 g potassium nitrate hence $54 - 35 = 19$ g potassium nitrate will precipitate out as undissolved salt.

(c) Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?

Ans: Solubilities are (in 100 mg of water) 32, 36, 35, 37 respectively for the mentioned salts and the highest solubility is of ammonium chloride at this temperature.

(d) What is the effect of change of temperature on the solubility of a salt?

Ans: Solubility of salts is directly proportional to the temperature i.e., if temperature increases then solubility will also increase and if the temperature decreases then solubility will also decrease.

7. Explain the following giving examples.

(a) saturated solution

Ans: It is a solution in which no more solute particles can be dissolved at a particular temperature.

(b) pure substance

Ans: It is a substance that has a fixed composition and are made up of only one type of particle.

(c) Colloid

Ans: It is a substance that has a fixed composition and are made up of only one type of particle. It is a kind of heterogeneous mixture/solution in which particle size is between 1nm and 1000nm that is intermediate between true solution and suspensions. Colloids have dispersion medium and dispersed phase.

(d) suspension

Ans: It is a kind of heterogeneous mixture, in which insoluble solid particles remain suspended in the medium and dispersion particles are visible to the bare eyes.

8. Write a method to separate different gases from air.

Ans: Air is a homogeneous mixture of various gases. Fractional distillation can be used to separate its various components.

- (a) First compress air by increasing the pressure and cool the air by decreasing the temperature.
- (b) The obtained air is liquid air; now allow the liquid air to warm up slowly in a fractional distillation column.
- (c) The various gases separate from each other according to their boiling points at various heights of the fractionating column.

9. What is a colloid? What are its various properties?

Ans: The heterogeneous mixture of substances are colloids, in which the particle size is too small and cannot be seen by naked eyes.

- (1) It is a heterogeneous mixture, but appears homogeneous.
- (2) The size of particles is too small so cannot be seen by naked eyes.
- (3) They make its path visible by scattering the beam of light passing through it.
- (4) When the colloid is left undisturbed, the particles of it do not settle down.

10. A solution contains 60 g of NaCl in 400 g of water. Calculate the concentration in term of mass-by-mass percentage of the solution.

Ans: In the problem it is given that, A solution contains 60 g of NaCl in 400g of water.

Mass of solute (NaCl) is 60g

Mass of solvent (water) is 400 g

Mass of solution = Mass of solute + Mass of solvent

$$\Rightarrow 60 + 400 = 460 \text{ g}$$

Mass percentage of solution is percentage of the ratio of mass of solute to mass of solution.

$$\Rightarrow \frac{60}{460} \times 100 = \frac{300}{23}$$

$$= 13.4\%$$

11. Differentiate between metals and non-metal based upon the various properties that they show.

Ans: Difference between metals and non-metal based upon the various properties are enlisted below.

Metals	Non-metals
Metals have lustre	Non-metals do not have lustre.
Commonly in silver grey or golden yellow color.	They can show variety of colors.
Good conductors	They don't conduct heat and electricity.
They are malleable, ductile and sonorous	They are non-malleable, nonductile and no sonorous

12. Differentiate between mixtures and compound by giving appropriate examples?

Ans: Differences between mixtures and compounds are enlisted below.

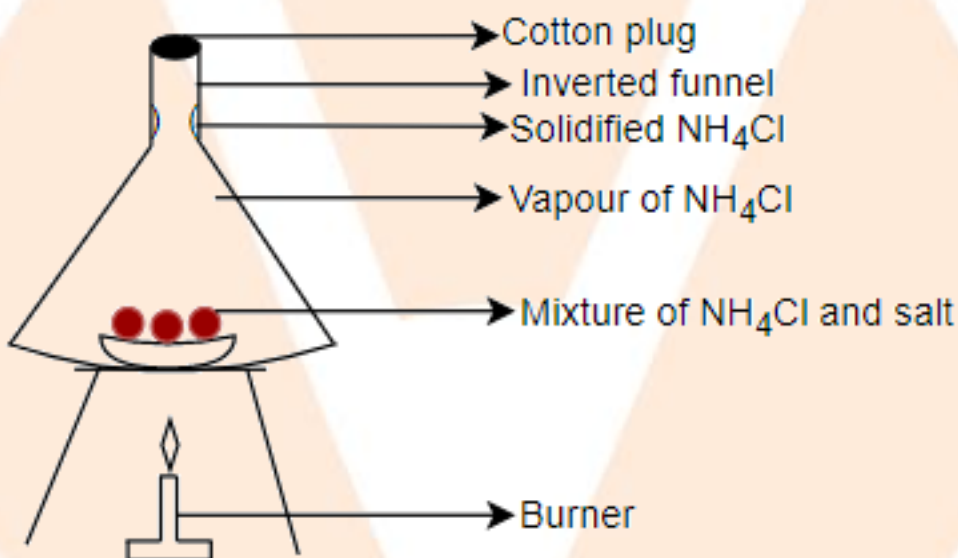
Mixture	Compounds
Mixtures are formed by mixing elements or compounds or both	Compounds can be obtained from chemical reaction of elements.
It has variable compositions	It has fixed compositions
Mixture shows the properties of the constituent substances.	New substances will have new properties.
Physical methods can be used to separate the constituents.	Chemical or electrochemical reactions are used to separate the constituents.
Eg: air, blood	Eg: NaHCO_3 , CaSO_4

13. Write a method to separate a mixture of salt and ammonium chloride?

Ans: A mixture of salt and ammonium chloride can be separated by the process of sublimation. In this process solid substance is directly converted into gaseous state. Since ammonium chloride changes directly from solid into a gaseous state on heating and salt does not have that property, this principle can be used to the mixture of two.

- The mixture of NH_4Cl (ammonium chloride) and salt is taken in a china dish inside an inverted funnel.
- The mixture is then heated using burner and because NH_4Cl sublimates thus it changes into vapours directly.
- Salt settles into the inverted funnel as it is a non-sublimely substance.

Separation of NH_4Cl salt by sublimation



14. What is crystallization? Where is it used? Why is this better than simple evaporation technique?

Ans: Crystallization is the process of the transformation of solution into pure solid in the form of crystals. It is used to purify solids. For example, salt from sea water is purified using crystallization. It is a better technique than simple evaporation because:

- Some solid may decompose or get charred on heating to dryness during evaporation.
- Some of the impurities will remain dissolved in the solution .

15. What is chromatography? What are its various applications and underline the basic principle involved

Ans: A technique used for separation of those components whose solubility is different in the same solvent is chromatography. The basic principle in chromatography is the different solutes have different solubility in the same solvent. Its various applications are:

- It is used to separate different colors in dye.
- It is used to separate pigments from natural colors.
- It is used to separate drugs from blood.

16. A solution of H_2SO_4 acid is labeled is 95%. What is the mass of this that must be diluted with water to get 5 L of solution containing 10 g of H_2SO_4 per litre?

Ans: In the problem it is given that, A solution of H_2SO_4 acid is labeled is 95% .
1 L of the diluted solution must contain 10 g of H_2SO_4 . Therefore, 5 L of the diluted solution must contain 50 g of H_2SO_4 .

The concentration of the acid in the bottle is 95% as per the problem.

This means that,

95 g of H_2SO_4 is present in 100 g of the acid solution .

50 g of H_2SO_4 will be present in $\frac{(50 \times 100)}{95} = 52.64$ g of the solution.