

**CBSE class IX Science**  
**NCERT Solutions**  
**Chapter 2**  
**Is Matter around Us Pure**

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**1. What is meant by a Pure substance?**

**Ans:** Such substance that has a uniform composition i.e. has particles with identical properties is called pure substance. eg. sugar, salt, water, nitrogen etc.

**2. List the points of differences between homogeneous and heterogeneous mixtures.**

**Ans.**

Homogeneous mixture	Heterogeneous mixture
(i) They have uniform composition throughout the mixture.	(i) They do not have a uniform composition throughout the mixture.
(ii) Their components cannot be separated by filtration but separation takes place by distillation method only.	(ii) Their components can be separated by filtration method.
(iii) examples are salt & water mixture, sugar & water mixture.	(iii) examples are a mixture of Sulphur powder and iron fillings, kerosene oil and water.

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**1. Differentiate between homogeneous and heterogeneous mixtures with examples.**

**Ans.**

Homogeneous mixture	Heterogeneous mixture
(i) They have uniform composition throughout the mixture. (ii) Their components cannot be separated by filtration but separation takes place by distillation method only. (iii) examples are salt & water mixture, sugar & water mixture.	(i) They do not have a uniform composition throughout the mixture. (ii) Their components can be separated by filtration method. (iii) examples are a mixture of Sulphur powder and iron fillings, kerosene oil and water.

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

Ans.

Sol=kind of colloidal solution	Solution= true solution	Suspension
(i) It has dispersed phase and dispersion phase. (ii) It appears homogeneous but is heterogeneous. (iii) Particles are visible with the help of electron microscope. (iv) Particle size is $10^{-7}$ to $10^{-5}$ cm. E.g. gold sol, milk of magnesia etc.	(i) It has soluble solute and solvent phase. (ii) It is homogeneous. (iii) Particles are not visible by all means. (iv) Particle size is less than $10^{-7}$ cm. E.g. sugar solution, salt solution	(i) It has insoluble solute suspended in the solvent medium. (ii) It is heterogeneous. (iii) Particles are visible by naked eyes. (iv) Particles size is more than $10^{-5}$ cm E.g. muddy river water, dust storm.

## 3. 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.

Mass of solute (sodium chloride) = 36g

Mass of solvent (water) = 100g

Mass of solution = Mass of Solute + Mass of solvent

= 36g + 100g = 136g

$$= \frac{\text{mass of solute}}{\text{mass of solution}} \times 100 = \frac{36}{136} \times 100 = 26.47\% (w/w)$$

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**1. 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 separate a mixture containing kerosene and petrol by distillation technique since difference in their boiling points is more than 25° C. Therefore, they can be easily separated by the technique of simple distillation.

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**2. Name the technique to separate**

**(i) butter from curd,**

**(ii) salt from sea-water,**

**(iii) camphor from salt.**

**Ans. (i)** centrifugation method.

**(ii)** evaporation method or crystallisation method

**(iii)** sublimation method.

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

**Ans.** From impure samples of solids, pure solid crystals can be obtained by the method of crystallization for eg to obtain pure sugar from impure sample of the same.

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**1. 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, and
- burning of paper and wood.

**Ans.** Cutting of trees = chemical change

Melting of butter in a pan = physical change

Rusting of almirah = chemical change

Boiling of water to form steam = physical change

Passing of electric current through water and the water breaking down into hydrogen and oxygen gases = chemical change

Dissolving common salt in water = physical change

Making a fruit salad with raw fruits = physical change

Burning of paper and wood = chemical change

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## **2. Try segregating the things around you as pure substances or mixtures.**

**Ans.** Distilled water, diamond, graphite, raw rubber are pure substances that can be found around us. In contrast, curd, ice cream, cooking oil, vulcanized rubber are some of the examples of mixtures.

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**(Chapter – end)**

## **1. Which separation techniques will you apply for the separation of the following?**

- (a) Sodium chloride from its solution in water.**
- (b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.**
- (c) Small pieces of metal in the engine oil of a car.**
- (d) Different pigments from an extract of flower petals.**
- (e) Butter from curd.**
- (f) Oil from water.**
- (g) Tea leaves from tea.**
- (h) Iron pins from sand.**
- (i) Wheat grains from husk.**
- (j) Fine mud particles suspended in water.**

**Ans. (a)** Evaporation

**(b)** Sublimation

**(c)** Filtration

**(d)** Chromatography

**(e)** Centrifugation

**(f)** Separating funnel

**(g)** Filtration

**(h)** with the help of a magnet

**(i)** Blowing air or sieving

**(j)** using alum

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

**Ans.** Take some amount of solvent (water) in a pan and after heating it add little amount of solute (sugar) to the solvent. Solute will dissolve completely in the solvent forming true solution, then add tea leaves that are insoluble along with another soluble liquid milk. After boiling allow filtration with a sieve so the filtrate you obtain is tea while the residue has tea leaves that are thrown away.

3. 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?

(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.

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

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

**Ans. (a)** At 313 K temperature the amount of potassium nitrate required was 62g in 100ml of water so in 50g water we will need to dissolve =  $62 \times 50/100 = 31\text{g}$  potassium nitrate.

**(b)** When a saturated solution of potassium chloride at 353 K is cooled, the solubility of potassium chloride in water decreases. As a result, the amount of potassium chloride which exceeds its solubility at lower temperature separates out as crystals.

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

**(d)** Solubility of salts is directly proportional to the temperature i.e. if temperature increases then solubility will increase and if the temperature decreases solubility will also decrease.

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**4. Explain the following giving examples.**

**(a) saturated solution**

**(b) pure substance**

**(c) colloid**

**(d) suspension**

**Ans. (a) Saturated solution :-** It is a solution in which no more solute particles can be dissolved at a particular temperature.

**(b) pure substance :-** Such substance that has a uniform composition i.e. has particles with identical properties is called pure substance eg sugar, salt, water, nitrogen etc.

**(c) colloid :-** It is a kind of heterogeneous mixture/solution in which particle size is between 1nm and 1000nm. Colloids have dispersion medium and dispersed phase. eg smoke, milk, shaving cream, jelly, cheese etc.

**(d) suspension :-** It is a kind of heterogeneous mixture in which insoluble solid particles remain suspended in the medium and dispersion particles are visible to the unaided eyes. eg muddy river water, chalk powder in water, dust storm, sand in water etc.

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**5. Classify each of the following as a homogeneous or heterogeneous mixture.**

**soda water, wood, air, soil, vinegar, filtered tea.**

**Ans.**

**Homogeneous mixture**

Soda water, air, vinegar, filtered tea.

**Heterogeneous mixture**

Wood, soil.

\* Air is also a homogeneous mixture if dust particles and other suspended impurities are excluded.

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**6. How would you confirm that a colourless liquid given to you is pure water?**

**Ans.** If the boiling point and freezing point of the given liquid comes out to be 100 degrees celsius (373 K) or 0 degree celsius (273 K) respectively under one atmosphere pressure, it confirms that the given liquid is pure water.

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**7. 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 are: ice, iron, calcium oxide, mercury since they contain particles of only one kind of matter.

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**8. Identify the solutions among the following mixtures.**

(a) Soil

(b) Sea water



(c) Air

(d) Coal

(e) Soda water.

**Ans.** Sea water and soda water are solutions.

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

(a) Salt solution

(b) Milk

(c) Copper sulphate solution

(d) Starch solution.

**Ans.** Milk and starch solution are colloidal solutions. Their particles are big enough to scatter light and hence they show Tyndall effect.

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**10. 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 substances in elements, compounds and mixtures :

**Elements:** Sodium, Silver, Tin and Silicon.

**Compounds:** Calcium carbonate, Methane and carbon dioxide.

**Mixtures:** Soil, Sugar, Coal, Air, Soap and Blood.

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**11. 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.** Growth of a plant, Rusting of iron, cooking of food, digestion of food, burning of a candle are chemical changes.