Is Matter Around Us Pure?

CHAPTER 2

EXAM DRILL

ANSWERS

1. Particle size

2. It is due to collision between particles of dispersed phase and dispersion medium.

3. **(i)** On heating, iron sulphide (FeS) *i.e.*, a compound is formed.

(ii) Air is a homogeneous mixture.

(iii) Caesium

(iv) Ice.

4. **(a)** The properties of a compound are entirely different from the properties of its constituents.

5. **(a) :** The zig-zag motion of colloidal particles is called Brownian movement.

6. **(a)**

7. **(d) :** When iodine is dissolved in alcohol, it is known as tincture of iodine and has antiseptic properties.

OR

(c) : $\text{Mass\%} = \frac{\text{Mass of NaOH}}{\text{Mass of solution}} \times 100$

$\text{Mass of NaOH} = \frac{20 \times 250}{100}\text{g} = 50\text{g}$

8. **(a) :** Iodized common salt is a homogeneous mixture since the composition of iodine and salt is fixed throughout the iodized salt and there are not visible boundaries.

9. **(d) :** Brass is a mixture of approximately 30% zinc and 70% copper.

OR

(c) When a beam of light is passed through a colloidal solution, it gets scattered.

10. **(a) :** Gel is a colloid in which liquid phase is dispersed in solid dispersion medium *e.g.* jelly, cheese, butter, etc.

11. **(b) :** Coal is a mixture of carbon and other impurities.

12. **(a)**

13. **(a) :** Light is scattered by colloidal particles, making the path of the beam visible.

14. **(c) :** A solution having same composition throughout is homogeneous.

15. (a) Blood is a negatively charged colloid. On applying ferric chloride, these negatively charged colloidal particles of blood neutralize their charge on reacting with Fe^{3+} ions furnished by ferric chloride and thus, get coagulated. Hence, bleeding stops due to the formation of a clot.

(b) A colloidal solution is a heterogeneous mixture and consists of two phases, *i.e.*, dispersed phase (colloidal particles) and dispersion medium in which colloidal particles are suspended. The size of the colloidal particles lies between 1 to 100 nm. For example, colloidal solution of sulphur or starch, milk, etc.

16. (a) Clay particles present in muddy water are negatively charged, On adding alum, positively charged Al^{3+} ions of alum neutralize the negative charge of clay particles. Hence, clay particles get precipitated and settle down at the bottom. These precipitates then can be removed by filtration to get clear water.

(b) Aerated water is carbon dioxide dissolved in water. CO_2 is the minor component, hence it is the solute and water is the major component, hence it is the solvent. The solute is gas and the solvent is liquid, so aerated water is a 'gas in liquid' type solution.

OR

(a) In colloidal solution the particles are bigger enough to scatter light hence, they show Tyndall effect. In true solution, the particle size is too small and hence, they cannot scatter light. Therefore, true solutions do not show Tyndall effect.

(b) A pure substance is one which is made up of only one kind of atoms or molecules. *e.g.* water is made up of only one kind of particles. So, water is a pure substance.

17. Paints are colloidal solutions, hence on keeping for a long time the particles of paint tend to settle down. On stirring thoroughly the particles come to the colloidal state again.

18. (a) Element

(b) Mixture (heterogeneous mixture)

(c) Mixture (homogeneous mixture)

(d) Element

(e) Compound ($CaCO_3$)

(f) Element

OR

(a) Quick lime is calcium oxide, CaO. The elements present in it are : Calcium (Ca) and Oxygen (O).

(b) Hydrogen bromide is HBr. The elements present in it are : Hydrogen (H) and Bromine (Br).
(c) Baking soda is sodium hydrogen carbonate, $NaHCO_3$. The elements present in it are : Sodium (Na), Hydrogen (H), Carbon (C) and Oxygen (O).

19. Solution : It is a homogeneous mixture of two or more substances. These solutions are also called true solutions because the particles of solutions have very small size (1 nm or 10^{-7} cm).
Suspension : It is a heterogeneous mixture which contains small insoluble particles of solute spread throughout the solvent without dissolving in it. The particle size of the solute particles is greater than 10^{-7} m or 10^{-5} cm (or 100 nm). These particles may or may not be visible to naked eye but are visible under microscope.
Colloids : A colloid is a heterogeneous mixture whose particles are not as small as solution but they are so small that cannot be seen by naked eyes.

20. (a) $$\text{Mass\%} = \frac{\text{Mass of glucose}}{\text{Mass of solution}} \times 100$$
$$= \frac{90}{360} \times 100 = 25\%$$

(b) The salt solution may have homogeneous composition but it is regarded as a mixture because :
(i) Salt can be separated from the solution by the process of evaporation.
(ii) Salt solution retains the properties of its constituents *i.e.,* it shows properties of both salt and water.
(iii) It does not have a fixed boiling point. The boiling point generally increases with increase in concentration of salt in the solution.

21. (a) Alloys are homogeneous mixtures because they have uniform composition throughout.
(b) No, a solution can be solid (alloys) or gaseous (air) also.
(c) No, a true solution is a homogeneous mixture.

22. (a) Ordinary filter paper has a larger pore size through which colloidal particles can pass hence they cannot be separated by ordinary filter paper. However a special filter paper with the smaller pore size through which colloidal particles cannot pass is used to separate colloidal particles.

23. Mass of solute = 30 g
Mass of solvent = 470 g
Mass of solution = 30 + 470 = 500 g
Mass% of solution
$$= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100 = \frac{30}{500} \times 100 = 6\%$$

24. By definition, 50% mass by volume percent solution means 50 grams of a solute dissolved in 100 mL of solution. Therefore, student '*C*' made the desired solution.
Student '*A*' dissolved 50 g of NaOH in 100 mL of water, so the solution is diluted and it is not a desired solution. By definition, 50% mass by mass percent solution means 50 grams of a solute dissolved in 100 grams of solution.
Student '*B*' dissolved 50 g of NaOH in 150 g of solution so, it is not the desired solution.
'*C*' has made the desired solution by dissolving 50 g NaOH in water to make the volume of the solution 100 mL.

$$\text{Mass by volume \%} = \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$$
$$= \frac{50}{100} \times 100 = 50\% \text{ mass by volume}$$

25. (i) Many food items used in our daily life are colloids. *e.g.* milk, custard, butter, jelly, etc.
(ii) Many industrial products like creams, paints, etc. are colloids.
(iii) Properties of colloids are used in sewage treatment plants, smoke precipitators and removing pollutants.
(iv) Many medicines are in the form of colloids.

26. These are of eight types :

S. No.	Dispersed Phase	Dispersion Medium	Type or name of colloidal solution	Examples
1.	Solid	Solid	Solid sol	Some coloured glasses
2.	Liquid	Solid	Gel	Cheese, butter
3.	Gas	Solid	Solid foam	Sponge, rubber foam
4.	Solid	Liquid	Sol	Mud, milk of magnesia
5.	Liquid	Liquid	Emulsion	Milk, hair cream
6.	Gas	Liquid	Foam	Froth, whipped cream
7.	Solid	Gas	Solid aerosol	Smoke
8.	Liquid	Gas	Liquid aerosol	Fog, mist

27. (a) Ethyl alcohol combines with water to form a single phase only and there is no boundary of separation between alcohol and water. Hence the mixture is homogeneous in nature. Oil and water are immiscible and there is a boundary of separation between the two, hence they form separate layers resulting in a heterogeneous mixture.
(b) Here, mass of solute (salt) = 110 g
And, mass of solution = 550 g
Now, we know that :
Mass% of solution (w/w%)

$$= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

$$= \frac{110}{550} \times 100 = \frac{100}{5} = 20 \text{ per cent (or } 20\%)$$

Thus, the concentration of this salt solution is 20 per cent (*w/w*) (or it is a 20% salt solution).

28. (a) Mercury

(b) Iron

(c) Hydrogen

(d) Oxygen and nitrogen

(e) Copper and zinc

29. (a) A saturated solution can be made unsaturated in the following two ways :

(i) By increasing the temperature of the solution: When a saturated solution is heated, solubility of the solute increases and hence the solution becomes unsaturated.

(ii) By adding more solvent or by diluting, a saturated solution is made unsaturated.

(b) (i) and (iv) are physical changes and (ii) and (iii) are chemical changes.

OR

(a) A solution in which more quantity of solute can be dissolved without raising its temperature, is called an unsaturated solution. For example, if in an aqueous solution of salt, more of salt can be dissolved without raising its temperature, then this salt solution will be an unsaturated solution.

A solution in which no more solute can be dissolved at that temperature, is called a saturated solution. For example, if in an aqueous salt solution, no more salt can be dissolved at that temperature, then that salt solution will be a saturated solution.

In order to test whether a given solution is saturated or not, we should add some more solute to this solution and try to dissolved it by stirring (keeping the temperature constant). If more solute does not dissolve in the given solution, then it will be a saturated solution; but if more solute gets dissolved, then it will be an unsaturated solution.

(b) To prepare a saturated solution of a substance, say sodium chloride, we take some water in a beaker and heat it slowly with the help of a burner. Now, we start adding sodium chloride salt to the hot water with a spoon and stir it with a glass rod continuously so that sodium chloride goes on dissolving in water. We take the temperature of water up to 25°C and then keeping this temperature constant, go on adding sodium chloride till no more sodium chloride dissolves in it and some sodium chloride is also left undissolved at the bottom of the beaker. The contents of the beaker are now filtered through a filter paper arranged in a funnel. The clear solution obtained in the form of "filtrate" is the saturated solution of sodium chloride at 25°C.

If a saturated solution of sodium chloride is allowed to cool, then the crystals of solid sodium chloride will reappear in the solution.

30. (a) The solubility of a solute at a particular temperature is the maximum amount of solute in grams that will saturate 100 g of the solvent at that temperature.

Thus, solubility of a solute (at t °C) =

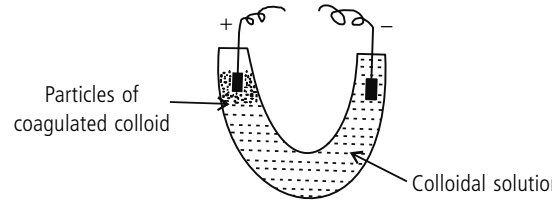
$$\frac{\text{Weight of solute (g)}}{\text{Weight of solvent (g)}} \times 100$$

(b) It means that a maximum of 20.7 g of copper sulphate can be dissolved in 100 g of water at a temperature of 20°C.

(c) The solubility of solids in liquids usually increases on increasing the temperature and decreases on decreasing the temperature.

OR

(a) The colloidal solutions contain either positively or negatively charged particles and therefore when an electric field is applied on them, the particles move towards the oppositely charged particles. This migration of colloidal particles under the influence of an electric field is known as electrophoresis.



(b) Hydrogen and oxygen are elements and have their characteristic properties. But water is a compound of hydrogen and oxygen combined together in a fixed ratio of 1:8 by mass. The properties of a compound are entirely different from those of its constituent atoms from which it is formed. Therefore, water has different properties than hydrogen and oxygen.

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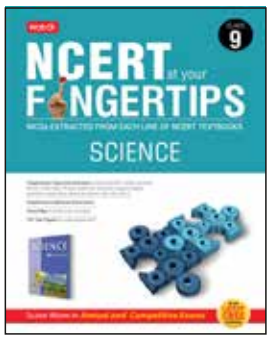

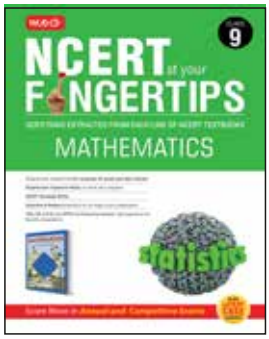

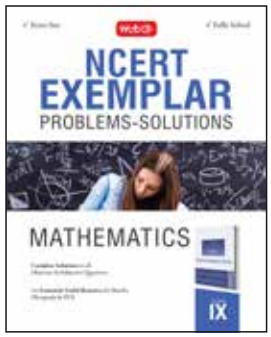

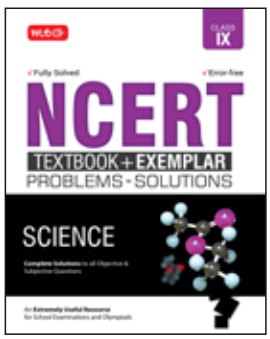

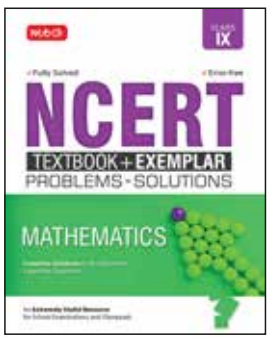

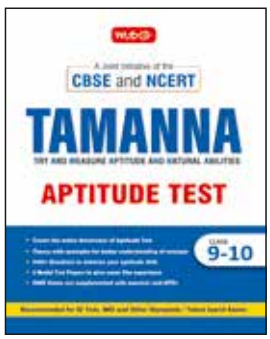

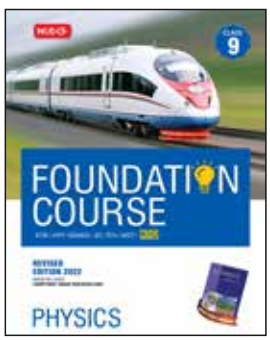

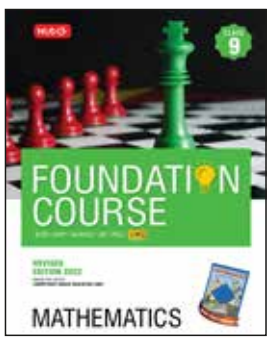

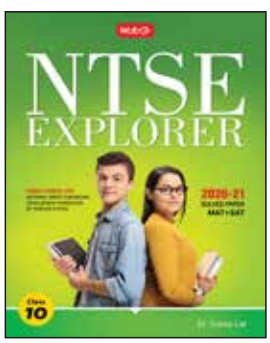

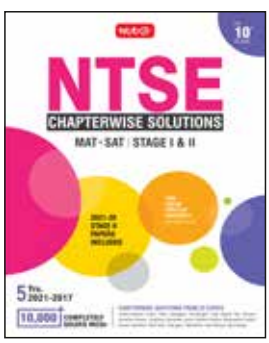

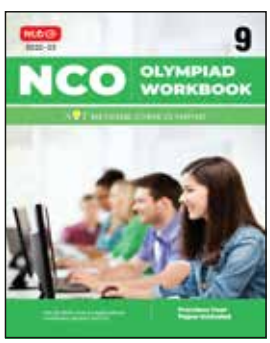

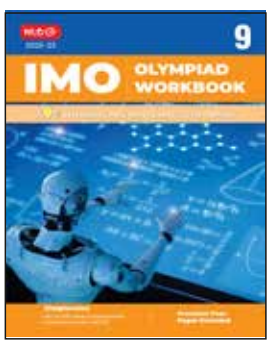

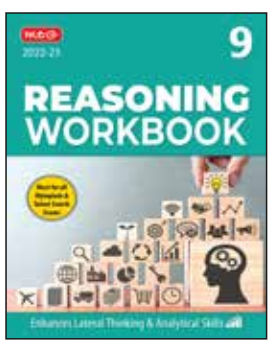

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