3. IS MATTER AROUND US PURE?

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. Milk is a _____ solution while vinegar is a _____ solution.
A) Suspension, colloidal B) Colloidal, suspensionC) True, colloidal D) Colloidal, true
Answer:D
Solution:Milk is a colloidal solution (fat globules dispersed in water).
Vinegar is a true solution (acetic acid completely dissolved in water).
2. A liquid and a solid together consisting a single phase is known as :
A) Solution B) Solute C) Solvent D) Emulsion
Answer:A
Solution:When a solid dissolves completely in a liquid (e.g., sugar in water), it forms a homogeneous single-phase system called a solution.
3. Which of the following is a homogeneous system ?
A) Muddy water B) Bread C) Concrete D) A solution of sugar in water
Answer:D
Solution:Homogeneous systems have uniform composition throughout.
Sugar solution: Uniform mixture (true solution).
Others:Muddy water (suspension),Bread (heterogeneous),Concrete (heterogeneous)
4. The zig-zag movement of dispersed phase particle in a colloidal system is known as
A) Transitional motion B) Circular motion C) Linear motion D) Brownian motion
Answer:D
Solution: The zig-zag movement of dispersed phase particles in a colloidal system is known as Brownian motion Caused by random collisions of colloidal particles with solvent molecules.
5. An emulsion is a colloidal system of :
A) Solid dispersed in solid B) Liquid dispersed in liquid
C) Gas dispersed in liquid D) Brownian motion
Answer:B
Solution:. An emulsion is a colloidal system of:Liquid dispersed in liquid
Examples: Milk (fat in water), mayonnaise (oil in water).
6. Milk is :
A) Fat dispersed in water B) Fat dispersed in milk
C) Fat dispersed in fat D) Water dispersed in milk
Answer:A

Solution:Milk is an oil-in-water (O/W) emulsion (fat globules dispersed in aqueous medium).

7. Scattering of light takes place in :

A) Electrolytic solutions B) Colloidal solutions C) Electrodialysis D) Electroplating

Answer:B

Solution:Scattering of light takes place in Colloidal solutions.Tyndall effect is observed in colloids (e.g., milk, fog).

8. Foam is a colloidal solution of :

A) Gaseous particles dispersed in gas B) Gaseous particles dispersed in liquid

C) Solid particles dispersed in liquid D) Solid particles dispersed in gas

Answer:B

Solution:Foam is a colloidal solution of Gaseous particles dispersed in liquid
Examples: Whipped cream (air in liquid), soap bubbles.

9. Which of the following forms a colloidal solution in water ?

A) Salt B) Glucose C) Starch D) Barium nitrate

Answer:C

Solution:Starch forms a colloid (large molecules disperse but don't dissolve completely).
Others form true solutions (salt, glucose, barium nitrate).:

10. Movement of colloidal particles under the influence of electrical field is called

A) Electrophoresis B) Dialysis C) Ionisation D) Electrodialysis

Answer:A

Solution: Movement of colloidal particles under the influence of an electrical field is called Electrophoresis. Used to separate charged colloidal particles (e.g., in DNA analysis).

11. Gelatin is also called as :

A) Protective 1colloid B) Hydrophilic colloid C) Emulsion D) None of these

Answer:B

Solution:Gelatin is a hydrophilic (water-loving) colloid that forms stable colloidal solutions in water.

12. The sky looks blue due to :

A) Dispersion effect B) Reflection C) Scattering D) Transmission

Answer:C

Solution:The blue color of the sky is due to Rayleigh scattering of sunlight by air molecules (shorter blue wavelengths scatter more).

13. In colloidal state, particle size ranges from :

A) 1A° to 10A° B) 20A° to 50A° C) 10A° to 100A° D) 1A° to 280A°

Answer:C

Solution: In colloidal state, particle size ranges from (10Å–100Å).
14. Tyndall effect is observed in :
A) Solution B) Precipitate C) Sol D) Vapour
Answer:C
Soution:The Tyndall effect (light scattering) is characteristic of colloidal solutions (sols).
15. Brownian movement is due to :
A) Temperature fluctuations within the liquid phase
B) Attraction and repulsion between the charges on the colloidal particles
C) Impact of molecules of the dispersion medium on the colloidal particles
D) Convention currents
Answer:C
Solution:Random collisions of solvent molecules with colloidal particles cause Brownian motion.
16. Difference between a crystalloid and a colloid is in :
A) Particle size B) The nature of solute
C) Diffusion through a membrane D) All of the above
Answer:D
Solution:Particle size (Crystalloids: <1 nm; Colloids: 1–1000 nm).
Diffusion (Crystalloids diffuse faster; colloids slower).
Membrane passage (Crystalloids pass through; colloids don't).
17. Blood is _____ charged sol.
A) Negatively B) Positively C) Neutral D) None of these
Answer:A
Solution:Blood cells and plasma proteins are negatively charged at physiological pH (7.4).
18. Ice cream is an example of :
A) True solution B) Emulsion C) Colloid D) Suspension
Answer:C
Solution:Ice cream is a colloid more specifically emulsion, which contains liquids such as milk fats and milk proteins dispersed in liquids such as water.
19. Water loving colloids are called :
A) Hydrophobic colloids B) Reversible colloids
C) Irreversible colloids D) Hydrophilic colloids
Answer:D
Solution: Water-loving colloids are called Hydrophilic colloids

20. The technique used in ultra-microscope is :
A) Adsorption B) Coagulation C) Tyndall effect D) Electrophoresis
Answer:C
Solution:An ultramicroscope detects colloidal particles by their light scattering (Tyndall effect).
21. Calculate the percentage composition of solute in terms of mass of a solution obtained by mixing 300 g of a 25% and 400 g of a 40% solution by mass.
A) 78.8 % B) 65.5 % C) 84.8 % D) 35.5 %
Answer:D
Solution:Solute in 300g of 25% solution = 75g.
Solute in 400g of 40% solution = 160g.
Total solute = 235g; Total solution = 700g.
Mass % = (235/700) × 100 ˜ 33.57%.
22. A solution was prepared by dissolving 25 g of sugar in 100 g of water. Calculate the mass percentage of solute.
A) 10 % B) 20 % C) 30 % D) 40 %
Answer:B
Solution:Mass % = (Mass of solute / Total mass) × 100

= (25g / (25g + 100g)) × 100 = 20%.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS

1. Coagulation occurs due to :
A) The scattering of light B) The presence of charges
C) The neutralization of charges D) Unequal bombardment by solvent molecules
Answer:C
Solution:Coagulation (precipitation of colloids) happens when the charges on colloidal particles are neutralized
2. Sol is :
A) Solid dispersed in liquid B) Liquid dispersed in gas
C) Gas dispersed in liquid D) Gas dispersed in solid
Answer:A
Solution: Sol is Solid dispersed in liquid
Examples: Gold sol (gold particles in water), paint (pigments in liquid).

3. The separation of colloidal particles from those of molecular dimensions is called

A) Dialysis B) Pyrolysis C) Peptization D) Photolysis

Answer:A

Solution:Dialysis uses a semipermeable membrane to separate colloids from smaller ions/molecules.

4. Liquid dispersed in gas is called :

A) Aerosol B) Solid sol C) Sol D) Solid foam

Answer:A

Solution:Liquid dispersed in gas is called Aerosol

Examples: Fog (water droplets in air), mist.

5. Drinking soda is an example of a solution of :

A) Gas in liquid B) Liquid in gas C) Gas in gas D) Solid in liquid

Answer:A

Solution: Drinking soda is an example of a solution of Gas in liquid

CO_2 gas dissolved in water (under pressure).

6. Amalgam is a solution of :

A) Solid in solid B) Solid in liquid C) Liquid in solid D) Liquid in liquid

Answer:B

Solution: Amalgam is a solution of: Solid in liquid

Amalgam = Metal (e.g., sodium) dissolved in mercury (liquid).

7. Which of the following is a true solution ?

A) NaCl in sulphur dioxide B) Copper in silver C) Salt in petrol D) Mud in water

Answer:A

Solution:NaCl dissolves completely in liquid SO_2 to form a homogeneous true solution.

8. Which of the following statements is correct ?

A) Compounds can be sepearated into constituents by physical processes

B) The boiling points and melting points of compounds are not fixed

C) The composition of compounds are not fixed

D) The properties of compounds are entirely different from those of its constituents

Answer:D

Solution:Compounds have unique properties distinct from their elements

9. Water is :

A) A compound B) A mixtureC) True solution D) All of these

Answer:A

Solution:H_2O is a pure compound with fixed composition (2:1 H:O ratio).

10. Milk of Magnesia is an example of :
A) Emulsion B) True solution C) Colloid D) Suspension
Answer:D
Solution:It is a heterogeneous mixture of $Mg(OH)_2$ solid particles in water (settles on standing).
JEE MAIN LEVEL QUESTIONS
11. Solid foam is
A) Solid dispersed in solid B) Liquid dispersed in solid
C) Gas dispersed in solid D) Solid dispersed in liquid
Answer:C
Solution: Solid foam is Gas dispersed in solid
Example: Styrofoam (air bubbles trapped in solid polymer).
12. What is the property used in sewage disposal ?
A) Coagulation B) Adsorption C) Electrophoresis D) Tyndall effect
Answer:A
Solution:Alum is added to sewage to coagulate colloidal particles for easy removal.
13. The size of a colloidal particle is :
A) 10^{-1} to 10^{-3} cm B) 10^{-5} to 10^{-7} cm C) 10^{-8} to 10^{-5} cm D) 10^{-6} to 10^{-8} cm
Answer:B
Solution:Colloids range from 1 nm to 1000 nm (10^{-7} cm to 10^{-5} cm).
14. Which of the following is not a compound ?
A) Sugar B) Common salt C) Diamond D) Plaster of Paris
Answer:C
Solution:Diamond is a pure element (carbon)
15. Which of the following is an example of a mixture ?
A) Sugar B) Brass C) CO_2 D) NO_2
Answer:B
Solution:Brass is a homogeneous mixture (alloy) of copper and zinc. Others are pure substances.
16. The most abundant metal in the earth's crust is :
A) Fe B) Cu C) Al D) Au
Answer:C
Solution:Aluminium is 8.1% by mass, followed by iron (5.0%).
17. The most abundant element in the earth's crust is :
A) Si B) C C) O D) Ca
Answer:C
Solution:Oxygen constitutes 46.6% by mass (mainly in silicates and oxides).

18. Which of the following gives a true solution in water
A) Starch B) Sugar C) Chalk powder D) Egg albumin
Answer:B
Solution:Sugar forms a true solution (fully dissolves). Others form colloids/suspensions.
19. Which of the following statements is not correct
A) A compound is a pure substance
B) Compound is homogeneous in nature
C) Compound always contains two or more elements
D) Compound can be separated into constituent elements by some physical process.
Answer:D
Solution:Compounds require chemical processes (e.g., electrolysis) for separation
20. Which of the following statements is not true -
A) True solutions are homogeneous in nature
B) Suspensions are heterogeneous in nature
C) Solute particles in a colloidal solution can be separated by filtration
D) True solutions are transparent to light
Answer:C
Solution:Colloidal particles pass through filter paper (ultrafiltration is needed).
21. Which of the following is the second most abundant metal in the earth's crust
A) Copper B) Aluminium C) Iron D) Zinc
Answer:C
Solution:Iron (5.0%) is second after aluminium (8.1%).
22. Which of the following will show Tyndall effect
A) Starch solution B) Sodium chloride solution
C) Copper sulphate solution D) Sugar solution
Answer:A
Solution:Starch forms a colloid (scatters light). Others are true solutions (no Tyndall effect).
23. When a beam of light is passed through a true solution, it gets
A) Reflected B) Absorbed C) Scattered D) Path of light does not visible
Answer:D
Solution:. Light passed through a true solution: Path of light is not visible
True solutions are optically clear (no scattering).
24. A solution made by dissolving 50gm of glucose in 250gm of water. Calculate the concentration of solute and solvent in solution in mass?
A) 20, 80 B) 80,20 C) 60, 40 D) 40,60
Answer:A

Solution:Mass % of glucose = (50g / 300g) × 100 = 16.67% (closest to 20%).
Note: Exact calculation gives 16.67% solute, 83.33% solvent.
25. Solder flux, available at hardwood stores, contains 16 g of zinc chloride in 50ml of solution. The solvent is HCl (aq.). What is the percentage mass by volume of zinc chloride in the solution?
A) 32 B) 24 C) 16 D) 36
Answer:A
Solution:% (w/v) = (Mass of solute/Volume of solution) × 100
= (16g / 50mL) × 100 = 32%.

JEE ADVANCED LEVEL QUESTIONS

One or more than one answer type
26. Which of the following statement is incorrect
A. Steam is a compound.
B. Mercury is a liquid non-metal.
C. Mass percentage of a solution containing 10 g of solute in 100g of water is 10%.
Answer:B,C
Solution:A. Steam is a compound.
Correct: Steam (gaseous H_2O) is a compound, not a mixture.
B. Mercury is a liquid non-metal.
Incorrect: Mercury is a liquid metal (transition metal).
C. Mass percentage of a solution containing 10 g of solute in 100g of water is 10%.
Incorrect: Mass % = (10g / 110g) × 100 = 9.09% (not 10%).
27. Which of the following statement is correct
A. Mixture of salt and ammonium chloride can be separated by cyrstallisaion process.
B. Constituents of a mixture can be separated by physical methods.
C. Milk, coffee and brass are example of mixtures.
Answer:B,C
Solution:A. Mixture of salt and ammonium chloride can be separated by crystallization process.
Incorrect: They are separated by sublimation (NH4Cl sublimes, NaCl doesn't).
B. Constituents of a mixture can be separated by physical methods.
Correct: Examples: Filtration, distillation, chromatography.
C. Milk, coffee and brass are example of mixtures.
Correct:
Milk: Colloid (fat in water).
Coffee: Solution (solutes in water).
Brass: Homogeneous mixture (Cu + Zn alloy).

28. Which of the following statement is correct
A. Digestion of food is a physical change.
B. Solutions cannot be separated by the process of filtration.
C. Fog is an example of liquid dispersed in gas.
Answer:B,C
Solution:
A.Incorrect: Digestion involves chemical changes (enzymatic breakdown).
B.Correct: Solutions are homogeneous; solutes pass through filter paper.
C. Correct: Fog is a liquid aerosol (water droplets in air).
Comprehension type
29. This type of zig-zag motion of colloidal particles is called Brownian movement
A) Brownian movement B) Tyndall effect C) Both D) None
Answer:A
Solution:Brownian movement refers specifically to the random, zig-zag motion of colloidal particles caused by collisions with solvent molecules.
30. Scattering of light by the colloidal particle
A) Brownian movement B) Tyndall effect C) Both D) None
Answer:B
Solution:The Tyndall effect is the scattering of light by colloidal particles, making the light path visible.
Matrix Matching type
31. **Answer:a-3,b-2,c-4,d-1**

Column - A	Column - B
a) Liquid in Gas	3) Mist
b) Solid in Liquid	2) Milk of magnesia
c) Liquid in Liquid	4) Emulsion
d) Gas in Liquid	1) Shaving cream

KEY

			TEACHING TASK						
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
D	A	D	D	B	A	B	B	C	A
11	12	13	14	15	16	17	18	19	20
B	C	C	C	C	D	A	C	D	C
21	22								
D	B								
			LEARNERS TASK						
		CONCEPTUAL UNDERSTANDING QUESTIONS							
1	2	3	4	5	6	7	8	9	10
C	A	A	A	A	B	A	D	A	D
			JEE MAIN LEVEL QUESTIONS						
11	12	13	14	15	16	17	18	19	20
C	A	B	D	B	C	C	B	D	C
21	22	23	24	25					
C	A	D	A	A					
			JEE ADVANCED LEVEL QUESTIONS						
26	27	28	29	30	31				
B,C	B,C	B,C	A	B	a-3,b-2,c-4,d-1				