Date: 24/9/2021

Q1. What is meant by a pure substance?

Q2. Which of the following will show "Tyndall effect"?

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

Q3. List the points of difference between homogeneous and heterogeneous mixtures.

Q4. Identify the solutions among the following mixtures:

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

Q5. Arrange the gases present in air in increasing order of their boiling points.

Q6. What type of mixtures are separated by the technique of crystallisation?

Q7. Classify the following as chemical or physical changes:

(a) cutting of trees,
(b) melting of butter in a pan,
(c) rusting of almirah,
(d) boiling of water to form steam,
(e) passing of electric current, through water and the water breaking down into hydrogen and oxygen gases,
(f) dissolving common salt in water,
(g) making a fruit salad with raw fruits, and
(h) burning of paper and wood.

Q8. Try segregating the things around you as pure substances or mixtures.

Q9. How would you confirm that a colourless liquid given to you is pure water?

Q10. 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.

Q11. Classify each of the following as a homogeneous or heterogeneous mixture:

Soda, water, Wood, Air, Soil, Vinegar, Filtered tea.

Q12. Differentiate between homogeneous and heterogeneous mixtures with examples.

Q13. How are sol, solution and suspension different from each other?

Q14. Name the technique to separate

(a) butter from curd, (b) salt from sea-water, (c) Camphor from salt.

Q15. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g water at 293 K. Find its concentration at this temperature.

Q16. Write the steps you would use for making tea. Use the words:

Solution, Solvent, Solute, Dissolve, Soluble, Insoluble, Filtrate and residue.

Q17. 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.

Q18. Explain the following giving examples:

(a) Saturated solution (b) Pure substance (c) Colloid (d) Suspension.

Q19. 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?

Q20. 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.

Q21. 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 substances dissolved in 100 grams of water to form a saturated solution).

	Temperature in K				
Substance dissolved	283	293	313	333	353
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 293K. Which salt has the highest solubility at this temperature?
(d) What is the effect of change of temperature on the solubility of a salt?

Q22. Classify the following into elements, compounds and mixtures:

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

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S1. The constituent particles of a pure substance are the same in their chemical nature. Thus, a pure substance consists of a single type of particles. For example, sodium chloride or sugar is a pure substance because it contains only one kind of pure matter and its composition is the same throughout.

S2. Tyndall effect is shown by colloidal solutions. Milk and starch solution are collodial solutions. Hence (b) milk and (d) starch solution will show Tyndall effect.

S3. Differences between homogeneous and heterogeneous mixtures:

Homogeneous mixtures	Heterogeneous mixtures
1. They have a uniform composition throughout their mass.	1. They contain physically distinct parts and have non-uniform compositions.
2. They consist of only one phase.	2. They consist of more than one phase.
3. They have no visible boundaries of separation between its constituents.	3. They have visible boundaries of separation between its different constituents.

S4. A solution is a homogeneous mixture of two or more than two chemically non-reacting substances whose composition can vary within certain limits.

Hence, (b) seat water, (c) air and (e) soda water are solutions.

S5. The increasing order of the boiling points of gases present in air is:

Nitrogen (77 K) < Argon (87 K) < Oxygen (90 K)

S6. Crystallisation is a process that separates a solid in the form of its pure crystals. The crystallisation technique is used to separate a solid from its mixture which has many impurities. For examples, salt can be separated by crystallisation from sea-water which has many impurities.

S7. (a) Cutting of trees is a physical change.

(b) Melting of butter in a pan is a physical change.

(c) Rusting of almirah is a chemical change.

(d) Boiling of water to form steam is a physical change.

(e) Passing of electric current through water and the water breaking down into hydrogen and oxygen gases is a chemical change.

(f) Dissolving common salt in water is a physical change.

(g) Making a fruit salad with raw fruits is a physical change.

(h) Burning of paper and wood is a chemical change.

S8. We can segregate (separate) things around us as pure substances or mixtures as under:

Pure substances: Mineral water, ice, salt, butter, ghee, etc.

Mixture: Air, milk, minerals, soil, soft drings, salt in water, sugar in water.

S9. Evaporate the given colourless liquid completely. If no residue is left, then the given colourless liquid is pure water.

S10. Following materials are the pure substances:

(a) Ice (b) Milk (c) Iron

(d) Hydrochloric acid (e) Calcium oxide (f) Mercury

S11. **Homogeneous mixture:** Soda water, air, vinegar, filtered tea.

Heterogeneous mixture: Wood, soil.

S12. **Homogeneous mixtures** are those mixtures which have uniform composition throughout their mass. They consist of only one phase and have no visible boundaries of separation between their various consitutents.

Examples: Salt in water, sugar in water, ethyl alcohol mixed with water etc.

Heterogeneous mixtures are those mixtures which contain physically distinct parts and have non-uniform compositions throughout their mass. They have more than one phase and visible boundaries of separation between their constituents.

Examples: Mixtures of sodium chloride and iron filings, salt and sulphur, oil and water, dusty air, muddy water etc.

S13. Distinction between sol, solution and suspension is given in the following table:

Colloidal solutions (Sol)	True solutions	Suspension
1. They have particle size (diameter) between 1 nm to 100 nm.	1. They have particle size less than 1 nm (10^{-9} m).	1. They have particle size more than 100 nm.
2. They are heterogeneous in nature.	2. They are homogeneous in nature.	2. They are heterogeneous in nature.
3. Due to scattering of light they exhibit Tyndall effect.	3. They do not show Tyndall effect.	3. They do not show Tyndall effect.
4. Examples: Milk, smoke, gum, ink, blood.	4. Examples: Sodium chloride in water, cane sugar in water.	4. Examples: Muddy river water, dust particles in air.

S14. (a) Butter can be separated from curd by centrifugation or by milk churner.

(b) Salt can be separated from sea water by evaporation where water evaporates leaving behind the salt which is crystallised out.

(c) Camphor can be separated from salt by sublimation because camphor undergoes sublimation leaving behind the salt in the china dish.

S15. Mass of sodium chloride (solute) = 36 g

Mass of water (solvent) = 100 g

Mass of solution = Mass of solute + Mass of solvent

= 36 g + 100 g = 136 g

$\because$ 136 g solution contains solute = 36 g

$\therefore$ 100 g solution contains solute = $\frac{36}{136} \times 100 = 26.47$ g

Hence, the concentration i.e., mass percentage of solution is 26.47%.

S16. Various steps to be used for making tea are:

(a) Take two cups of water (solvent) in a saucepan. Boil water for five minutes.

(b) Add two tea-spoons of sugar, two tea-spoons of tea leaves and one cup of milk to it. Sugar, tea leaves and milk act as solute.

(c) Boil the contents again,. Sugar being soluble will dissolve.

(d) Filter the solution. Collect the filtrate in clean cups. The insoluble tea leaves will be left in the sieve as residue. Serve the filtrate as tea for drinking.

S17. Chemical changes are:

(a) Growth of a plant (b) Rusting of iron (d) Cooking of food

(e) Digestion of food (g) Burning of a candle.

S18. (a) **Saturated solution** is a solution in which no more solute can be dissolved at a particular temperature. For example, an aqueous solution of salt in which more salt cannot be dissolved at that temperature will be called a saturated solution.

Thus, a saturated solution contains the maximum amount of solute which can be dissolved in it at a particluar temperature. It is also clear that a saturated solution contains greater amount of solute than an unsaturated solution.

(b) **Pure substance** has all the constituent particles of that substance of the same chemical nature. A pure substance consists of a single type of particle. For example, sodium chloride and sugar are pure substances because they contain only one kind of particles and their composition is the same throughout.

(c) **Colloid** is a heterogeneous mixture in which the particle size (diameter) lies between 1 nm to 100 nm, where 1 nm (nanometer) = 10^{-9} m.

Due to small size of colloidal particles, they cannot be seen with naked eyes. The colloidal particles can scatter a beam of light and this phenomenon is known as Tyndall effect.

Examples: Milk, smoke, ink, rubber, face cream, clouds etc.

(d) **Suspension** is a heterogeneous mixture in which solids are dispersed in liquids. The solute particles in a suspension do not dissolve but remain suspended throughout the bulk of the medium. The particles of a suspension are larger than 100 nm. They are visible to the naked eye.

Examples: Muddy river water, dust particles in air.

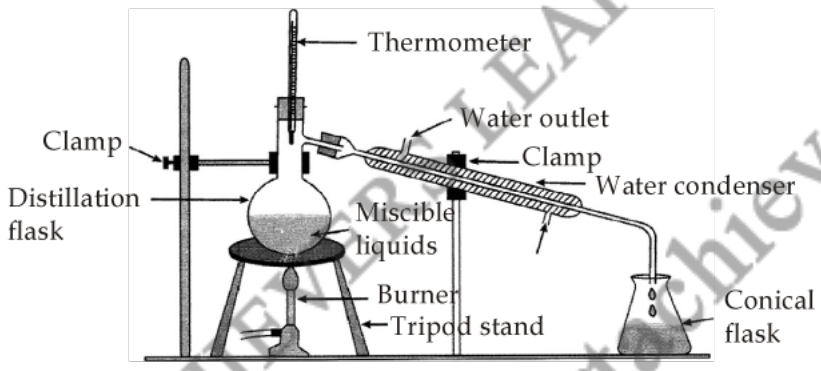
S19. Kerosene and petrol are miscible with each other. The difference in their boiling points is more than 25 °C. Hence, they can be separated from their mixture by simple distillation method.

In order to separate kerosene and petrol from their mixture, the following procedure is adopted:

(a) Take the mixture in a distillation flask. Fit it with a thermometer.

(b) Arrange the apparatus as shown in the figure.

(c) Heat the mixture slowly keeping a close watch at the thermometer.



Separation of two miscible liquids by distillation

Petrol which has lower boiling point than kerosene, will vaporise first. It condenses in the condenser and is collected in the receiver (conical flask) as distillate.

Kerosene is left behind in the distillation flask.

S20. (a) Evaporation (b) Sublimation

(c) Filtration (d) Chromatography

(e) Centrifugation (f) Using separating funnel

(g) Filtration (h) Magnetic separation

(i) Winnowing/Sedimentation (j) Sedimentation.

S21. (a) 100 g of water dissolves potassium nitrate = 62 g

$\therefore$ 50 g of water dissolves potassium nitrate = $\frac{62 \times 50}{100}$ = 31 g

Hence, 31 g of potassium nitrate would be needed to produce a saturated solution of potassium nitrate.

(b) On cooling saturated solution from 353 K to room temperature, solubility of potassium chloride will decrease due to cooling. Consequently, the crystals of potassium chloride will be observed in the solution.

(c) The solubility of a solute is the maximum amount of solute that can be dissolved in 100 g of the given solvent to obtain a saturated solution at a particular temperature. Hence, the solubilities of different salts at 293 K are:

	Salt		Solubility at 293 K
(i)	Potassium nitrate	:	32 g per 100 g of water.
(ii)	Sodium chloride	:	36 g per 100 g of water.
(iii)	Potassium chloride	:	35 g per 100 g of water.
(iv)	Ammonium chloride	:	37 g per 100 g of water.

Thus, ammonium chloride has the highest solubility at this temperature of 293 K.

(d) The solubility of a salt increases with an increase in temperature. The solubility of a salt decrease with a decrease in temperature.

S22. **Elements** : (a) Sodium, (d) Silver, (f) Tin and (g) Silicon.

Compounds : (e) Calcium carbonate, (k) Methane and (l) Carbon dioxide.

Mixtures : (b) Soil, (c) Sugar solution, (h) Coal (as percentage of carbon varies), (i) Air, (j) Soap and (m) Blood.