

Subject:- Chemistry

Lesson no. 2

Topic:- Is matter around us pure.

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Q No 1:- What is meant by a pure substance?

Ans:- A material that is composed of only one type of particles is called a pure substance. These particles may be atoms or molecules. All the constituent particles of a pure substance have same chemical nature.

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Q No 2:- List the points of differences between homogeneous and heterogeneous mixtures.

Ans:- Some of the points of differences between homogeneous and heterogeneous mixtures are:

1. Those mixtures in which the substances are completely mixed together and are indistinguishable from one another, are called homogeneous mixtures while as those mixtures in which the substances are not completely mixed together are called heterogeneous substances.
2. Homogeneous mixture has a uniform composition throughout its mass while as heterogeneous mixture does not have a uniform composition throughout its mass.
3. Homogeneous mixture has no visible boundaries of separation b/w the various constituents while as a heterogeneous has visible boundaries of separation b/w

The various constituents.

4. All the homogeneous mixtures are called solutions while as all the suspensions and colloids are heterogeneous mixtures.
5. The constituents of a homogeneous mixture cannot be separated easily but special methods are used for this purpose while as the constituents of a heterogeneous mixture can be easily separated.
6. Examples of Homogeneous mixtures are salt solution, sugar solution, air etc while as examples of heterogeneous mixtures are chalk solution, Ink, milk, soap solution etc.

Q No 2: How are sol, solution and suspension different from each other?

Ans! Sol:- 1. It is heterogeneous.

2. The size of particles is b/w  $10\mu\text{m}$  to  $1000\text{nm}$ .

3. It can pass through an ordinary filter paper.

4. It is quite stable as its particles do not separate out on keeping.

5. Sol particles are invisible but their presence

can be detected under an ultra microscope.

6. They show Tyndall effect by scattering light.

ii) Solution:- 1. It is homogeneous.

2. Particle size is less than  $1\text{nm}$ .

3. It can pass through an ordinary filter paper as well as through animal membrane.

4. Solute particles are not visible even under a microscope.

5. It does not scatter light and hence does not show Tyndall effect.

- (ii) suspensions:
1. It is heterogeneous.
  2. Particle size is more than  $1000\text{ nm}$ .
  3. These solutions neither pass through filter paper nor through animal membrane.
  4. Its particles are seen with naked eye and also under a microscope.
  5. They also scatter light and hence show a Tyndall effect.

Q3:- To make a saturated solution, 36g of sodium chloride is dissolved in 100g of water at 293K. Find its concentration at this temperature.

Ans:- Mass of solute (NaCl) = 36g

Mass of solvent ( $\text{H}_2\text{O}$ ) = 100g

Mass of solution (NaCl &  $\text{H}_2\text{O}$ ) = 136g

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

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

$$= 26.47\%$$

Hence, the concentration of the solution is 26.47%.

Q1: How will you separate a mixture containing kerosene and petrol (difference in their boiling points is more than  $25^{\circ}\text{C}$ ), which are miscible with each other?

Ans: A mixture of kerosene and petrol which are miscible with each other can be separated by distillation.

Method: 1. Take this mixture in a distillation flask.  
2. Fit it with a thermometer with the condenser. Heat the mixture slowly keeping a close watch. Petrol vaporises first as it has lower boiling point. It condenses in the condenser and is collected from the condenser outlet.

3. Kerosene is left behind in the distillation flask.

Q2: Name the technique to separate.

a. Butter from curd: Centrifugation

b. Salt from sea water: Evaporation.

c. Camphor from salt: Sublimation

Q3: What type of mixtures are separated by the technique of crystallisation?

Ans: By the technique of crystallization, pure solid substances are obtained from impurities. E.g; impure sample of  $\text{CuSO}_4$ , salt from sea water is obtained from impurities by this technique.

Q1:- Classify the following as chemical or physical changes:

1. Cutting of trees → Physical change
2. Melting of butter in a pan → Physical change
3. Rusting of almirah → Chemical change
4. Boiling of water to form steam → Physical change
5. Passing of electric current, through water & the water breaking down into hydrogen and oxygen gases → Chemical change
6. Dissolving common salt in water, making a fruit salad with raw fruits → Physical change
7. Burning of paper and wood → Chemical change.

Q2:- Try segregating the things around you as pure substances or mixtures.

Ans:- Pure substances around us are water, salt, sugar etc and mixtures are salt water, soil, wood, air, cold drinks, rubber, sponge, fog, milk, butter, clothes, food etc.

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Q3:- Which separation techniques will you apply for the separation of the following?

a) Sodium chloride from its solution in water.

Ans: Evaporation

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

Ans: Sublimation.

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

Ans: Filtration

d) Different pigments from an extract of flower petals.

Ans: Chromatography

e) Butter from curd.

Ans: Centrifugation

f) oil from water.

Ans: separating funnel

g) Tea leaves from tea.

Ans: Filtration

h) Iron pins from sand.

Ans: Magnetic Separation.

i) Wheat grains from husk.

Ans: Winnowing.

j) Fine mud particles suspended in water.

Ans: Centrifugation

Q No 2: Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Ans: Take 2 or 3 cups of solvent (water) in a pan and heat it on a gas burner. Allow this solvent to boil.

2. During heating, <sup>sugar</sup> milk and tea leaves are added to the solvent as solutes.

3. Now stir it with a spoon. As a result, sugar will dissolve and will mix with water. A solution will be formed with insoluble tea leaves.
4. Pour the solution through a strainer. The insoluble part of the solution remain on the strainer as a residue & the tea is obtained as filtrate.

Q No 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).

Substances	temp in K				
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?

Ans: At 313 K, in saturated solution, amount of  $KNO_3$  dissolved in 100g of  $H_2O$  is 62 grams.

Amount of  $KNO_3$  dissolved in 50g of  $H_2O$

$$\frac{62 \text{ g}}{100} \times 50 \text{ g} = 31 \text{ g}$$

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

Ans: When the saturated solution of KCl at 353K is cooled at room temperature, the solubility of KCl in  $H_2O$  decreases. As a result, the amount of KCl exceeds its solubility at lower temperature and thus crystals of it are formed.

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

Ans: At 293K, solubility of  $KNO_3 = \frac{32g}{100g}$  of water

solubility of NaCl =  $\frac{36g}{100g}$  of water

solubility of KCl =  $\frac{35g}{100g}$  of water

solubility of  $NH_4Cl = \frac{37g}{100g}$  of water

$\therefore NH_4Cl$  has the highest solubility.

Q4: Explain the following giving examples.

Ans: 1. Saturated solution: A solution which contains the maximum solute dissolved at a given temperature and which can not dissolve any more solute at that temperature.



is called saturated solution.

b) Colloid:- These are the heterogeneous solutions in which the size of particles lie b/w those of true solutions and suspensions.

c) Suspension:- It can be defined as a heterogeneous mixture in which the solute particles are spread throughout the liquid without dissolving in it. And if kept undisturbed, the solute particles will settle down as precipitate.

Q1051- Classify each of the following as homogeneous or heterogeneous mixture. Soda water, wood, air, soil, vinegar, filtered tea.

Ans: Homogeneous mixtures are soda water, air, vinegar, filtered tea.

Heterogeneous mixtures are wood and soil.

Q106:- How would you confirm that a colourless liquid given to you is pure water?

Ans: There are different ways to confirm that a colourless liquid is pure water or not: Here are a

i) Filter that colourless liquid through a very fine filter paper. If no residue is left, then the liquid is pure water and has no suspended impurities in it.

ii) Evaporate the colourless liquid in china dish.

9 In case no residue is left, then the liquid is pure water.

10 iii) Determine the boiling point, if it comes out to be nearly 373 K (100°C), then the liquid is pure water.

11 Q8:- Which of the following materials fall in the category of a "pure substance"?

12 Ice, milk, iron, HCl, calcium oxide, Mercury, Bricks, wood, and Air.

1 Ans:- Ice, iron, hydrochloric acid, calcium oxide and mercury fall in the category of a pure substance.

2 Q8:- Identify the solutions among the following mixtures: soil, sea water, Air, coal and soda water.

3 Ans:- Sea water, Air and soda water are solutions.

4 Q9:- Which of the following will show "Tyndall effect",  
5 a) salt solution b) milk c) copper sulphate sol. d) starch sol.  
Ans:- Milk and starch solution will show the "Tyndall effect".

6 Q10:- Classify the following into elements, compounds and mixtures. Sodium, soil, sugar solution, silver, calcium carbonate, Tin, Silicon, coal, air, soap, methane, carbon dioxide, blood.

7 Ans:- Elements:- sodium, silver, ~~calcium~~, Tin, Silicon

Compounds :- Calcium Carbonate, Methane & Carbon dioxide

Mixtures :- Soil, sugar solution, coal, air, soap, blood.

Q11:- Which of the following are chemical changes?

- a) Growth of a plant ✓ Chemical change
- b) Rusting of iron ✓ Chemical change
- c) Mixing of iron filings and sand x
- d) cooking of food ✓ Chemical change
- e) Digestion of food ✓ Chemical change
- f) Freezing of water x
- g) Burning of a candle ✓ Chemical change.

Ans: