Exercise-2.1 Page: 15

1. What is meant by a substance?

Solution:

It is a pure single form of matter. A substance has definite properties and compositions. Example – Iron

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

Solution:

Homogeneous mixture	**Heterogeneous mixture**
Particles are uniformly distributed throughout the mixture	All the particles are completely mixed and can be distinguished with the bare eyes or under a microscope.
Has a uniform composition	Irregular composition
No apparent boundaries of division	Noticeable boundaries of division.

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1. Differentiate between homogenous and heterogeneous mixtures with examples.

Solution:

The following are the differences between heterogeneous and homogenous mixtures.

Heterogeneous mixture	**Homogeneous mixture**
All the particles are completely mixed and can be distinguished with the bare eyes or under a microscope.	Particles are uniformly distributed throughout the mixture
Irregular composition	Has a uniform composition
Noticeable boundaries of division.	No apparent boundaries of division
Example: seawater, blood, etc.	Example: rainwater, vinegar, etc.

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

Solution:

Attributes	**Sol**
Type of Mixture	Heterogeneous
Size of particles	10^{-7} – 10^{-5} cm
Tyndall effect	Exhibited
Appearance	Usually glassy and clear
Visibility	Visible with an ultramicroscope
Diffusion	Diffuses very slowly
Stability	Pretty stable
Settling	Get settled in centrifugation
Example	Milk, blood, smoke

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

Solution:

Solution	Suspension
Homogeneous	Heterogeneous
Less than 1nm	More than 100nm
Not exhibited	May or may not be exl
Unclouded and clear	Cloudy and opaque
Not visible	Visible with naked eye
Diffuses rapidly	Do not diffuse
Highly stable	unstable
Do not settle	Settle on their own
Salt solution, Sugar solution	Sand in water, dusty a

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

Solution:

Mass of solute (NaCl) = 36 g

Mass of solvent (H_2O) = 100 g

Mass of solution (NaCl + H_2O) = 136 g

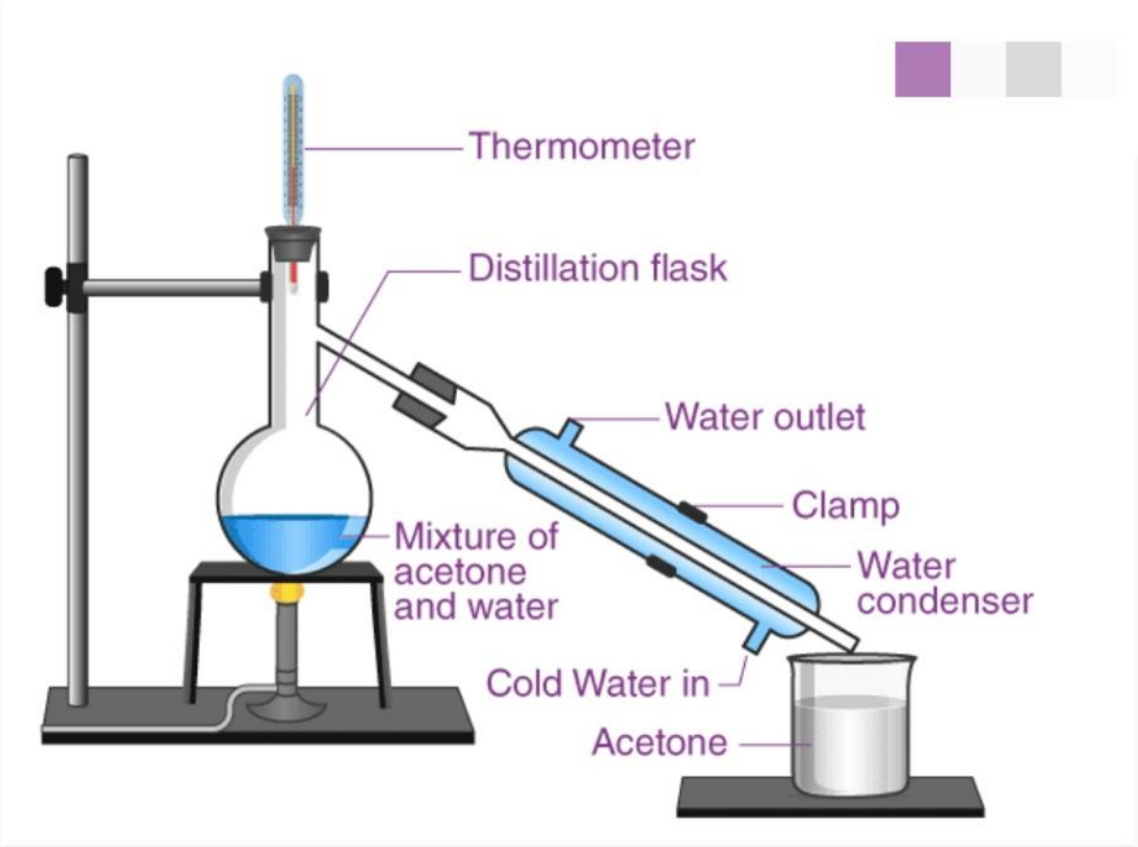
Concentration = Mass of solute/Mass of solution x 100

Concentration = 36/136 x 100 = 26.47%

Hence, the concentration of the solution is 26.47%

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?

Solution:



According to the question, kerosene and petrol are miscible, and their boiling points differ by more than 25 degrees Celsius, which is a significant difference, therefore they can be separated using a simple distillation procedure.

Distillation can separate kerosene and petrol since their boiling points differ by more than 25 degrees Celsius. The kerosene and petrol combination will be poured into a hot distillation flask. Because petrol has a lower boiling point, it will evaporate and create vapours first as the temperature of the mixture rises. A condenser condenses the vapours of gasoline and collects them through the condenser output. In the distillation flask, kerosene with a higher boiling point will be left behind.

Because their vapours will develop within the same temperature range if the difference in boiling points of two liquids is not great, a simple distillation procedure cannot be utilised to separate them. Fractional distillation separates these liquids by passing the vapours through a fractionating column before condensation.

2. Name the techniques used to separate the following:

(a) Butter from curd.

(b) Salt from seawater

(c) Camphor from salt

Solution:

a) A process known as centrifugation is used to separate butter from curd. The process is governed on the principle of density.

b) We can use the simple evaporation technique to separate salt from seawater. Distillation causes water to evaporate leaving solid salt behind, hence the production of salt.

c) Sublimation can be used to separate camphor from salt as during the phase change, camphor does not undergo a liquid phase.

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

Solution:

The technique of crystallization is used to separate solids from a liquid solution. It is linked to precipitation, but in this technique, the precipitate is achieved in a crystal form which exhibits extremely high levels of purity. The principle of crystallization can be applied to purify impure substances.

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

Solution:

(a) Into a vessel, add a cup of milk which is the solvent, supply it with heat.

(b) Add tea powder or tea leaves to the boiling milk, which acts as a solute. Continue to heat

(c) The solute i.e., the tea powder remains insoluble in the milk which can be observed while it is still boiling.

(d) At this stage, add some sugar to the boiling solution while stirring

(e) Sugar is a solute but is soluble in the solvent

(f) Continuous stirring causes the sugar to completely dissolve in the tea solution hence reaching saturation.

(g) Once the raw smell of tea leaves is vanished and tea solution is boiled enough, take the solution off the heat, filter or strain it to separate tea powder and the tea solution. The insoluble tea powder remains as a residue while the solute (sugar) and the solvent (essenced milk solution) strain through the filter medium which is collected as the filtrate.

4. Explain the following giving examples.

(a) Saturated solution

(b) Pure substance

(c) Colloid

(d) suspension

Solution:

(a) Saturated solution: It is that state in a solution at a specific temperature when a solvent is no more soluble without an increase in the temperature. Example: Excess carbon leaves off as bubbles from a carbonated water solution saturated with carbon.

(b) Pure substance: A substance is said to be pure when it comprises of only one kind of molecules, atoms or compounds without adulteration with any other substance or any divergence in the structural arrangement. Example: Sulphur, diamonds

(c) Colloid: A Colloid is an intermediate between solution and suspension. It has particles of various sizes, that ranges between 2 to 1000 nanometers. Colloids can be distinguished from solutions using the Tyndall effect. Tyndall effect is defined as the scattering of light (light beam) through a colloidal solution. Example: Milk, gelatin.

(d) Suspension: It is a heterogeneous mixture that comprises of solute particles that are insoluble but are suspended in the medium. These particles that are suspended are not microscopic but visible to bare eyes and are large enough (usually larger than a micrometre) to undergo sedimentation.

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

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

Solution:

The following is the classification of the given substances into homogenous and heterogenous mixture.

Homogenous mixture	**Heterogeneous mixture**
Soda water	wood
vinegar	soil
Filtered tea	
Air	

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

Solution:

We can confirm if a colourless liquid is pure by setting it to boil. If it boils at 100°C it is said to be pure. But if there is a decrease or increase in the boiling point, we infer that water has added impurities hence not pure.