NCERT solutions for class 9 science chapter 2 Is Matter around us pure

Q 1. What is meant by a substance?

Answer:

Substance-

A substance is a matter which consists of a single type of particles and has specific properties. For example tin, sulphur, pure sugar (sucrose) etc.

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

Answer:

The differences between homogeneous and heterogeneous mixtures-

HOMOGENEOUS	**HETEROGENOUS**
1. It has uniform compositions. 2. No visible boundaries of separation. 3. It consists of only one phase. examples- sugar + water = sugar solution	1. It does not have a uniform composition 2. Visible boundaries of separation 3. They consist of more than one phase. examples- sugar +sand = sugar + sand

NCERT free solutions for class 9 science chapter 2 Is Matter around us pure?

Topic 2.2 What is a solution?

Q 1. Differentiate between homogeneous and heterogeneous mixtures with examples.

Answer:

Homogeneous Mixture: It is a mixture in which different constituents are mixed uniformly and these constituents cannot be easily separated.

Example: Sugar solution, soda, water, soft drinks, vinegar, air, etc.

But,

Heterogeneous mixtures: It is a mixture in which different constituents are not mixed uniformly and the constituents can be easily seen and can be easily separated.

Example: Sugar and sand mixture, milk, ink, paint, wood, blood, etc.

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

Answer:

Difference between sol, solution and suspension are given below:

Sol(Colloids)	**Suspension**	**Solution**

1. Heterogeneous mixture	1. Heterogeneous mixture	1.Homogeneous mixture
2. We cannot see the size of the particle with a naked eye.	2. Particles are visible by the human naked eye	2. the particles are not visible to a naked eye.
3. They can scatter the beam of light passing through them	3. scatters the beam of light passing through them	3. unable to scatter the beam of light.
4. Solute particles cannot be separated by filtration and sedimentation.	4. Solute particles can be separated by filtration	4. solute particles cannot be separated by filtration and sedimentation.

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

Answer:

Given that,

Mass of solute (sodium chloride) = 36 g = w_1

Mss of water (as a solvent) = 100 g = w_2

Therefore, the total mass of solution = 100 + 36 = 136 g = W

According to question,

Concentration = $\frac{w_1}{W} \times 100$

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

$= 26.47$ %

Hence the concentration of the solution at 293 K is 26.47%

CBSE NCERT solutions for class 9 science chapter 2 Is Matter around us pure?

Topic 2.3 Separating the components of a mixture

Q 1. How will you separate a mixture containing kerosene and petrol (difference in their boiling points is more than 25ºC), which are miscible with each other?

Answer:

The mixture of kerosene and petrol which are miscible with each other can be separated by the distillation method.

Take the mixture in a distillation flask and fit it with the thermometer. Heat the mixture slowly. As the boiling point of petrol is lower than that of kerosene, so, petrol vaporizes first. It condenses in the condenser and is collected from the outlet.

And thus kerosene is left in the flask.

Q 2. Name the technique to separate

(i) butter from curd,

(ii) salt from sea-water

(iii) camphor from salt.

Answer:

The following techniques are used to separates them-

(i) Centrifugation method

(ii) Evaporation and

(iii) Sublimation.

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

Answer:

The crystallization technique is used to purify solids.

In this method, pure solids can be separated in the form of its crystals from the solution. For example- salts from seawater can be separated by this method.

NCERT textbook solutions for class 9 science chapter 2 Is Matter around us pure?

Topic 2.4 Physical and Chemical changes

Q 1. Classify the following as chemical or physical changes:

- cutting of trees,

• melting of butter in a pan,

• rusting of almirah,

• boiling of water to form steam,

• passing of electric current, through water and the water breaking down into hydrogen and oxygen gases,

• dissolving common salt in water,

• making a fruit salad with raw fruits, and

• burning of paper and wood

Answer:

Physical changes-

- cutting of trees
- melting of butter in a pan
- boiling of water to form steam
- dissolving common salt in water
- making a fruit salad with raw fruits

Chemical changes-

- rusting of almirah,
- passing of electric current, through water and the water breaking down into hydrogen and oxygen gases,
- burning of paper and wood

Q 2. Try segregating the things around you as pure substances or mixtures.

Answer:

Pure substance - Water, sugar and gold

Mixtures- plastics papers, air and milk

NCERT solutions for class 9 science chapter 2 Is Matter around us pure?: Solved Exercise Questions

Q 1. 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.

Answer:

The following separation techniques are used to separate-

a) Sodium chloride from its solution in water. **by Evaporation, method**

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

c) Small pieces of metal in the engine oil of a car. **by filtration.**

d) Different pigments from an extract of flower petals. **by chromatography,**

e) Butter from curd. **by centrifugation,**

f) Oil from water. **by separation funnel**

g) Tea leaves from tea. **by filtration,**

h) Iron pins from sand. **by magnetic separation,**

i) Wheat grains from husk. **by winnowing or sedimentation,**

j) Fine mud particles suspended in water. **by decantation and filtration** .

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

Answer:

The steps for making a tea-

1. Use water as a solvent and boil it for few minutes.
2. Now, add some tea leaves and sugar and milk (if you want) as a solute.
3. Again, boil it for few minutes so that sugar will dissolve in it.

4. At last filter the solution. Collect the filtrate in a cup. The insoluble tea leaves left behind as a residue.

Q 3. (a) 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 a substance dissolved in 100 grams of water to form a saturated solution).

What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?

Substance Dissolved	Temperature in K				
	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

Answer:

We have,

Mass of potassium nitrate = 62g in 100 g of water

Therefore, according to question,

Mass of potassium nitrate in 50 g of water at 313K

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

Q 3.(b) 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 a substance dissolved in 100 grams of water to form a saturated solution).

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.

Substance Dissolved	Temperature in K				
	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

Answer:

Pragya will observe that, on cooling the saturated solution, the crystals of potassium chloride will be obtained.

Q 3. (C) 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 a substance dissolved in 100 grams of water to form a saturated solution).

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

Substance Dissolved	Temperature in K				
	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

Answer:

The solubility of each salt at 293K is

- Potassium nitrate = 32g
- Sodium chloride = 36g
- Potassium chloride = 35 g
- Ammonium chloride = 37g

Q 3. (d) 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 a substance dissolved in 100 grams of water to form a saturated solution).

What is the effect of change of temperature on the solubility of a salt?

Substance Dissolved	Temperature in K				
	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

Answer:

Solubility is directly proportional to the temperature.

Therefore, on increasing temperature, the solubility of salt increases.

Q 4.(a) Explain the following giving examples.

saturated solution

Answer:

Saturated solution - In a given solvent, when no more solute can be dissolved in a solution at a given temperature is called a saturated solution.

Q 4.(b) Explain the following giving examples

pure substance

Answer:

Pure substance -

A pure substance is a matter which consists of a single type of particles and has specific properties. For examples tin, sulphur, pure sugar (sucrose) etc.

Q 4.(c) Explain the following giving examples.

colloid

Answer:

colloid -

A colloid is a solution in which the solute particle is bigger in size as compare to the true solution. It is a heterogeneous mixture. Because of the small size of colloidal particles, we cannot see them with naked eyes. For example milk and blood.

Q 4.(d) Explain the following giving examples.

(d) suspension

Answer:

Suspension-

It is a heterogeneous solution in which the solute particles do not dissolve in solvent but remain suspended throughout the bulk of the medium. Particles are visible by naked eyes. Chalk-water is an example of this type of solution.

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

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

Answer :

The mixture of following are homogeneous in nature-
Soda water, vinegar, and filtered tea. as there are no separation boundaries in their solution.

Heterogeneous - Wood, air and soil. As we can easily see the separation boundaries.

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

Answer:

By boiling the give colourless water we can check that it is pure or not. If it is pure then the water boils at 100 ^{0}C at atmospheric pressure.

This is because the melting and boiling point of pure substance doesn't change.

Q 7. 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

Answer:

A pure substance is a matter which consists of a single type of particles and has specific properties-

Therefore, the following given substances are " *pure substance* " -

- Ice
- Iron
- Hydrochloric acid
- calcium oxide and
- mercury

Q 8. Identify the solutions among the following mixtures.

(a) Soil

(b) Seawater

(c) Air

(d) Coal

(e) Soda water

Answer:

A solution is a homogeneous mixture of two or more than two substances.

So, according to the definition, out of the given seawater, air and soda water are examples of solutions.

Q 9. Which of the following will show the “Tyndall effect”?

(a) Salt solution

(b) Milk

(c) Copper sulphate solution

(d) Starch solution.

Answer:

Tyndall effect is shown by the colloidal solution and suspension and it is not shown by a true solution.

Therefore, in the above-given solution only milk and starch solution will be able to scatter the light and hence show Tyndall effect.

Q 10. Classify the following into elements, compounds, and mixtures.

(a) Sodium

(b) Soil

(c) Sugar solution

(d) Silver

(e) Calcium carbonate

(f) Tin

(g) Silicon

(h) Coal

(i) Air

(j) Soap

(k) Methane

(l) Carbon dioxide

(m) Blood

Answer:

Elements cannot be broken down into any simpler substance. and the compounds have fixed composition can be broken down into elements by chemical or electrochemical reaction. Mixtures have no fixed composition they are either homogeneous or heterogeneous.

Therefore, Sodium, Silver, Tin, and Silicon are elements.

Q 11. 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.

Answer:

Out of given following are the examples of chemical changes-

- Growth of plants
- Rusting of iron
- cooking of food
- Digestion of food
- Burning of candle