Assignments in Science Class IX (Term I)

2 Is Matter Around Us Pure

IMPORTANT NOTES

1. **Pure substance :** A homogeneous material which contains particles of only one kind and has a definite set of properties.
2. **Mixture :** A product formed by mixing two or more substances (elements, compounds or both) in any proportion, such that the individual substances do not undergo any chemical change, but retain their properties.
3. **Homogeneous mixture :** A mixture in which different constituents are mixed uniformly.
4. **Heterogeneous mixture :** A mixture in which different constituents are not mixed uniformly.
5. **Solution :** A homogeneous mixture of two or more substances.
6. **Solvent :** The component of a solution which dissolves the other component of the solution in itself.
7. **Solute :** A component of the solution which dissolves in the solvent.
8. **True solution :** A solution in which the particles of the solute break down to such a fine state that they cannot be seen under a powerful microscope.
9. **Concentration of solution :** The amount of solute present in a given quantity of a solution.
10. **Saturated solution :** A solution, which dissolves maximum amount of solute at a given temperature.
11. **Unsaturated solution :** A solution which contains less amount of solute at a given temperature than it can actually dissolve.
12. **Super saturated solution :** A solution at higher temperature which contains more amount of solute than that required to make a saturated solution.
13. **Suspension :** A heterogeneous mixture of insoluble particles of solute spread throughout a solvent.
14. **Colloidal solution :** A heterogeneous solution in which the particle size is between 10^{-7} cm to 10^{-5} cm, such that the solute particles neither dissolve nor settle down in a solvent.
15. **Dispersed phase :** The relatively large particles suspended in the solvent of the colloidal solution.
16. **Dispersing medium :** The solvent in which colloidal particles are dispersed.
17. **Tyndall effect :** The phenomenon due to which the path of light becomes visible, due to scattering of light by the colloidal particles.
18. **Compound :** A pure substance, which is composed of two or more elements combined chemically in a definite ratio.
19. **Separation of a mixture** can be achieved by handpicking, sieving, winnowing, sedimentation, decantation, filtration, evaporation, distillation, fractional distillation, crystallisation, centrifugation and chromatography, depending upon the nature of constituents.
20. **Element :** A pure substance which cannot be subdivided into two or more simpler substances by any chemical means.
21. **Physical Change :** A change which alters some specific property of matter, without any change in the composition of its molecules is called a physical change.
22. **Chemical Change :** A change which alters the specific properties of a material, bringing about a change in its state and molecular composition is called a chemical change.

ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

I. VERY SHORT ANSWER QUESTIONS (1 Mark)

PREVIOUS YEARS' QUESTIONS

1. How is chemical change different from a physical change? **[2010 (T-I)]**
2. Identify the heterogeneous mixture from the following : Air, soda water, soap solution, brass. **[2010 (T-I)]**

3. Mention two ways to liquefy atmospheric gases. **[2010 (T-I)]**

4. Which one of the two solutions will scatter light, sugar solution or soap solution? **[2010 (T-I)]**

5. Write any one property of suspension. **[2010 (T-I)]**

6. What are homogeneous mixtures? **[2010 (T-I)]**

7. Which of the following will show Tyndall effect?
   (a) Milk
   (b) Sugar solution. **[2010 (T-I)]**

8. Identify solute and solvent in 80% solution of ethyl alcohol with water. **[2010 (T-I)]**

9. What are the two components of a solution? **[2010 (T-I)]**

10. ''The wool being knitted into a sweater is a physical change.'' Justify the statement. **[2010 (T-I)]**

11. What is meant by a pure substance? **[2010 (T-I)]**

12. Name a metal that is liquid at room temperature. **[2010 (T-I)]**

13. Name the technique to separate : **[2010 (T-I)]**
   (a) salt from sea-water
   (b) butter from curd.

14. When a solution is said to be saturated? **[2010 (T-I)]**

15. Classify brass and diamond as element and mixture. **[2010 (T-I)]**

16. You have to separate a mixture of salt and ammonium chloride. Which method will you employ and why? **[2010 (T-I)]**

17. Classify soap and tin as element and mixture. **[2010 (T-I)]**

18. On which factor does a solution said to be diluted, concentrated or saturated? **[2010 (T-I)]**

19. Write the name of any two substances that sublime. **[2010 (T-I)]**

20. Mention any one use of crystallisation method? **[2010 (T-I)]**

OTHER IMPORTANT QUESTIONS

1. Why is crystallisation considered a better technique than evaporation?
2. Name a substance which dissolves in carbon disulphide.
3. What is the heterogeneous mixture of a dispersing phase and a dispersing medium known as?
4. Where is the fractionating column fitted in a distillation apparatus?
5. Name the apparatus used for separating a mixture of immiscible liquids.
6. Which process is used to obtain crystals of alum from an impure sample?
7. How can both the components of tincture of iodine be separated?
8. Which method is used to separate a gas from a liquid-gas mixture?
9. Name two methods of separation in which evaporation is followed by condensation.
10. Why are the interconversions of the states of matter considered a physical change?
11. How is pure common salt isolated from sea water?
12. Define malleability.
13. Which gas liquefies first on cooling air to very low temperatures?
14. Why are beads packed in a fractionating column of a fractional distillation apparatus?
15. Give an example of a colloid which is similar to butter.
16. What is the dispersed phase and the dispersion medium in milk?

II. SHORT ANSWER QUESTIONS – I (2 Marks)

PREVIOUS YEARS' QUESTIONS

1. The concentration of a salt solution in terms of mass by mass percentage is 20% and the mass of the solution is 550 g. Determine the mass of solute present in the solution. **[2010 (T-I)]**

2. What is Tyndall effect? ''Tyndall effect can be observed when sunlight passes through the canopy of dense forest.'' Explain how this occurs. **[2010 (T-I)]**

3. Write the two components of a colloidal solution. Give two examples for a colloidal solution. **[2010 (T-I)]**

4. Distinguish between elements and compounds with one example of each. **[2010 (T-I)]**

5. Smoke and fog are aerosols. How do they differ from each other? **[2010 (T-I)]**

6. A solution of acetone contains 30 mL of acetone in 570 mL of water. Calculate the percentage concentration of the solute in the solution. **[2010 (T-I)]**

7. What are metalloids? Give two examples. **[2010 (T-I)]**

8. Mention in tabular form any two differences between heterogeneous and homogeneous mixtures. **[2010 (T-I)]**

9. What would you observe after five minutes when you drop a deshelled raw egg in pure water? Give reasons. **[2010 (T-I)]**

10. A solution contains 60 g of sugar in 480 g of water. Calculate the concentration of solution in terms of mass by mass percentage of the solution. **[2010 (T-I)]**

11. What is saturated solution? Mention any two ways by which saturated solution can be made unsaturated. **[2010 (T-I)]**

12. Differentiate a true solution from a colloidal solution. **[2010 (T-I)]**

13. Compare in tabular form the properties of a true solution and colloids with respect to Tyndall effect and stability. **[2010 (T-I)]**

14. Suggest a suitable separation technique for the following :

    (a) Mercury and water,

    (b) Coloured components from blue ink,

    (c) Ammonium chloride and potassium chloride,

    (d) Mixture of alcohol and water. **[2010 (T-I)]**

15. Solubility of potassium nitrate at 313 K is 62 g. What mass of potassium nitrate would be needed to produce a saturated solution of KNO_3 in 52 g of water at 313 K? What is the effect of change of temperature on the solubility of a salt? **[2010 (T-I)]**

16. Among the substances given below choose the element, mixture and compound. **[2010 (T-I)]**

    (a) Air (b) Lead

    (c) Diamond (d) Calcium carbonate

17. What is pure substance? Give its one characteristic. **[2010 (T-I)]**

18. Water droplets are observed on the outer surface of a glass tumbler containing ice cold water. Give reason. **[2010 (T-I)]**

19. What is meant by concentration of a solution? A solution contains 50 g common salt in 350 g of water. Calculate the concentration of the solution. **[2010 (T-I)]**

20. Water is a compound and not a mixture, give any two points to justify your answer. **[2010 (T-I)]**

21. Distillation is method used for separation of components of a mixture containing two miscible liquids. Give two reasons. **[2010 (T-I)]**

22. Give reasons : (1 each)

    (i) path of beam of light is not visible through a solution

    (ii) particles of solution cannot be seen with a naked eye **[2010 (T-I)]**

23. Write four differences between compound and a mixture. **[2010 (T-I)]**

OTHER IMPORTANT QUESTIONS

1. Explain why particles of a colloid do not settle down when left undisturbed while in the case of a suspension they do.

2. You are given two samples of water labelled as 'A' and 'B'. Sample 'A' boils at 100°C and sample 'B' boils at 102°C. Which sample will freeze at 0°C? Explain.

3. An element is sonorous and highly ductile. Under which category would you classify this element? What other characteristics do you expect this element to possess?

4. What are the favourable qualities given to gold when it is alloyed with copper or silver for the purpose of making ornaments?

5. Give two reasons, why an alloy is regarded as a mixture'.

6. How can you distinguish between a salt solution and a pure liquid without tasting it?

7. Why is the product formed on heating a mixture of 7g of iron and 4g of sulphur called a compound? Give two reasons.

8. Classify the following as physical and chemical properties.

(a) Zinc dissolves in hydrochloric acid with the evolution of hydrogen gas.

(b) Metallic sodium is soft enough to be cut with a knife.

9. Can we separate a mixture of alcohol and water by using a separating funnel? Why? Why not?

III. SHORT ANSWER QUESTIONS – II (3 Marks)

PREVIOUS YEARS' QUESTIONS

1. (a) What separation technique will you apply for separation of the following?

(i) Ammonium chloride from sodium chloride.

(ii) Different pigments from the extract of flower petals.

(b) What is crystallization? List two ways in which crystallization technique is better than simple evaporation technique. **[2010 (T-I)]**

2. Observe the apparatus shown below and answer the following questions. **[2010 (T-I)]**

(a) Name the apparatus.

(b) State one use of the apparatus.

(c) State the principle involved in this process.

3. (a) Define element.

(b) Identify non-metals from the following elements. Carbon, Potassium, Silicon, Chlorine, Mercury.

(c) In what way is a mixture different from a compound? **[2010 (T-I)]**

4. Name the type of colloids in each in which dispersed phase and the dispersing medium are respectively.

(a) liquid and gas.

(b) liquid and liquid.

(c) liquid and solid.

Give one example of each. **[2010 (T-I)]**

5. Name the following :

(a) a lustrous liquid metal.

(b) a liquid non-metal

(c) a metal which can be cut with a knife

(d) a non-metal which is good conductor of electricity.

(e) an element which melts when kept on the palm.

(f) the best conductor of heat. **[2010 (T-I)]**

6. Mention any three properties of suspension. **[2010 (T-I)]**

7. Define sublimation. Draw a labelled diagram to illustrate the process of sublimation. **[2010 (T-I)]**

8. (a) Dry ice is compressed at high pressure. What happens to it when the pressure is released?

(b) Suggest a method to liquefy atmospheric gases.

(c) What type of clothes should we wear in summer? **[2010 (T-I)]**

9. Mention any three properties of colloids. **[2010 (T-I)]**

10. Elements are classified as metals, non-metals and metalloids. Give any one property of each. Also give one examples of each. **[2010 (T-I)]**

11. Identify the dispersed phase and dispersing medium in the following examples of colloids.

(a) Fog

(b) Cheese

(c) Coloured gem stone **[2010 (T-I)]**

12. (i) Name the process or the separation technique you would follow :

(a) Dyes in black ink

(b) Butter from cream

(c) Ammonium chloride and common salt

(d) Iron filings and sand

(ii) Which principle is used in separation in centrifugation? **[2010 (T-I)]**

13. What separation technique will you apply for separation of the following? **[2010 (T-I)]**

(a) Sodium chloride from its solution water

(b) Tea leaves from tea

(c) Iron pins from sand

(d) Different pigments from an extract of leaves

(e) Butter from curd

(f) Fine mud particles suspended in water.

OTHER IMPORTANT QUESTIONS

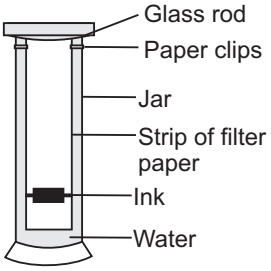
1. What would you observe when :

(a) a saturated solution of potassium chloride prepared at 60°C is allowed to cool to room temperature?

(b) an aqueous sugar solution is heated to dryness?

(c) a mixture of iron filings and sulphur powder is heated strongly?

2. A child wanted to separate the mixture of dyes constituting a sample of ink. He marked a line with the ink on a filter paper and placed the filter paper in a glass containing water as shown in the figure. The filter paper was removed when the water moved near the top of the filter paper.



(i) What would you expect to see, if the ink contains three different coloured components?

(ii) Name the technique used by the child.

(iii) Suggest one more application of this technique.

3. Fractional distillation is suitable for separation of miscible liquids with a boiling point difference of about 25 K or less. What part of the fractional distillation apparatus makes it efficient and possess an advantage over a simple distillation process. Explain by using a diagram.

4. (a) Under which category of mixtures will you classify alloys and why?

(b) A solution is always a liquid. Comment.

(c) Can a solution be heterogeneous?

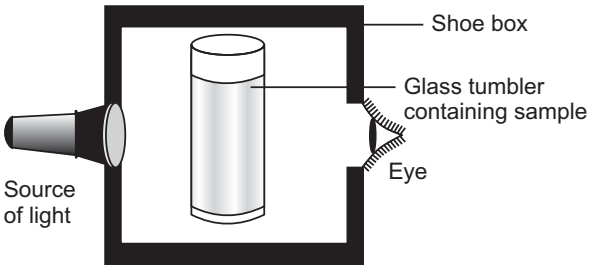
5. On heating calcium carbonate gets converted to calcium oxide and carbon dioxide.

(a) Is this a physical or a chemical change?

(b) Can you prepare one acidic and one basic solution by using the products formed in the above process? If so, write the chemical equations involved.

6. Give three differences between a colloidal solution and a true solution.

7. A group of students took an old shoe box and covered it with a black paper from all sides. They fixed a source of light (a torch) at one end of the box by making a hole in it and made another hole on the other side to view the light. They placed a milk sample contained in a beaker/tumbler in the box as shown in the figure. They were amazed to see that milk taken in the tumbler was illuminated. They tried the same activity by taking a salt solution but found that light simply passed through it?



(a) Explain why the milk sample was illuminated. Name the phenomenon involved.

(b) Same results were not observed with a salt solution. Explain.

(c) Can you suggest two more solutions which would show the same effect as shown by the milk solution?

IV. LONG ANSWER QUESTIONS (5 Marks)

PREVIOUS YEARS' QUESTIONS

1. (a) What is meant by crystallisation? How is impure copper sulphate purified by the process? **[2010 (T-I)]**

(b) What is fractional distillation? How is it different from simple distillation?

2. Show diagrammatically how water is purified in the waterworks system and list the processes involved. **[2010 (T-I)]**

3. (a) Draw a flow diagram to show the process of obtaining constituent gases from air.

(b) Which gas condenses first? Why?

(c) Differentiate between simple distillation and fractional distillation. **[2010 (T-I)]**

4. (a) Define an element.

(b) Name a non-metallic element found in (i) liquid, (ii) gaseous state.

(c) Pick metalloid from the following carbon, silicon, phosphorus, gold.

(d) Which two properties of metals enable us to get the desired shape to metals?

(e) Name a metal which is liquid at room temperature. **[2010 (T-I)]**

5. (a) Compare true solution, suspension and colloids in terms of : **[2010 (T-I)]**

(i) filterability (ii) stability

(b) List two factors which bring about a change in the state of matter say, gas to liquid.

6. (a) Write any three differences between a physical change and a chemical change.

(b) When is a solution said to be saturated? How can you change a saturated solution to unsaturated without adding any more solvent to it? **[2010 (T-I)]**

7. (a) List three differences between a physical change and a chemical change. **[2010 (T-I)]**

(b) Identify the following as mixtures or compounds :

(i) blood (ii) table salt (iii) sugar (iv) brass

8. (a) Write any three differences between a compound and a mixture.

(b) Classify the following into physical or chemical change.

(i) burning of a candle

(ii) freezing of water

(iii) mixing of iron filings and sand

(iv) fading of clothes. **[2010 (T-I)]**

9. (a) What is distillation? List the two conditions essential for using this as a method of separation of components of a mixture.

(b) Draw a labelled diagram of the apparatus used to separate a mixture of two miscible liquids. **[2010 (T-I)]**

10. Based on the following characteristics distinguish in tabular form the behaviour of true solution, suspension and colloidal solution.

(a) appearance (b) visibility

(c) filterability (d) Tyndall effect

(e) particle size **[2010 (T-I)]**

11. (a) Why crystallisation technique is better than evaporation?

(b) Write any two physical properties of each of metals and non-metals.

(c) Name the technique used to separate (i) butter from curd. **[2010 (T-I)]**

12. (a) Calculate the amount of water required to prepare 500 g of 2.5% solution of sugar.

(b) Why colloids show Tyndall effect not true solutions?

(c) Name a method of separation used to separate two miscible liquids. **[2010 (T-I)]**

13. (a) 5 g of sugar is dissolved in 250 mL of solution. Calculate its mass percentage by volume. **[2010 (T-I)]**

(b) Give any two characteristics of compound.

(c) Which method of separation is used to separate two immiscible liquids?

14. (a) A solution contains 40g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

(b) Identify solute and solvent in 'tincture of iodine'

(c) Why Tyndall effect is not seen in true solution? **[2010 (T-I)]**

15. (a) Calculate the amount of glucose required to prepare 250 g of 5% solution of glucose by mass.

(b) What is dispersed phase and dispersed medium in colloids? **[2010 (T-I)]**

16. Define distillation. What type of mixture can be separated by distillation? Draw a labelled diagram of the apparatus used for fractional distillation. **[2010 (T-I)]**

17. How will you separate dyes in black ink using chromatography? Explain it with the help of a diagram. **[2010 (T-I)]**

18. How will you separate a mixture of two miscible liquids having difference in boiling points of more than 25°C? Describe with the help of a neat labelled diagram. **[2010 (T-I)]**

19. Explain an activity with a neat labelled diagram for the separation of a mixture of ammonium chloride and sodium chloride. **[2010 (T-I)]**

20. Describe the method with the help of a diagram to separate a mixture of two immiscible liquids-kerosene oil and water. **[2010 (T-I)]**

21. How can we obtain different gases from air.
[2010 (T-I)]

22. (a) Identify solute and solvent in the following solutions : **[2010 (T-I)]**

(i) aerated drinks

(ii) tincture of iodine

(iii) lemon water

(b) State the principle of each of the following methods of separation of mixtures.

(i) centrifugation method.

(ii) separation using separating funnel.

23. (a) Write any two points of differences between chemical and physical change?

(b) State one instance where water undergoes a physical change and one in which undergoes a chemical change.

(c) Mention any two applications of chromatography. **[2010 (T-I)]**

24. (a) Define solution. If 10 mL of H_2SO_4 is dissolved in 90 mL of H_2O, Calculate the concentration of solution.

(b) Rain water stored in a tank contains sand grains, unfilterable clay particles, calcium carbonate salt, pieces of paper and some air bubbles. Select from these one example each of a solvent, solute, a colloid and a suspension. **[2010 (T-I)]**

25. (a) 110 g of salt is present in 550 g of solution. Calculate the concentration of solution.

(b) Give any three points of differences between true solution, colloidal solution and suspension. **[2010 (T-I)]**

26. (a) How much water should be mixed with 12 mL of alcohol so as to obtain 12% of alcohol solution?

(b) Given a solution of substance 'A', how will you test whether it is saturated or unsaturated with respect to 'A' at given temperature?

(c) What is the main difference between aqueous and non aqueous solution? **[2010 (T-I)]**

27. (a) How much water should be added to 15 g of salt to obtain 15% salt solution?

(b) Give any two example of pure substances.

(c) What is dispersed phase and dispersed medium in a colloid? **[2010 (T-I)]**

28. (a) You are given a mixture of sand, water and mustard oil. How will you separate the components of this mixture? Explain it with the help of different separation methods involved in it.

(b) Give flow diagram showing the process of obtaining gases from air. **[2010 (T-I)]**

OTHER IMPORTANT QUESTIONS

1. Give an example each for the mixture having the following characteristics. Suggest a suitable method to separate the components of these mixtures.

(a) A volatile and a non-volatile component.

(b) Two volatile components with appreciable difference in their boiling points.

(c) Two immiscible liquids.

(d) One of the components which changes directly from solid to gaseous state.

(e) Two or more coloured constituents soluble in the same solvent.

2. Non-metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured.

(a) Name a lustrous non-metal.

(b) Name a non-metal which exists as a liquid at room temperature.

(c) The allotropic form of a non-metal is a good conductor of electricity. Name the allotrope.

(d) Name a non-metal which is known to form the largest number of compounds.

(e) Name a non-metal which is required for combustion.

3. Classify each of the following as a physical or a chemical change. Give reasons.

(a) Drying a shirt in the sun.

(b) Rising of hot air over a radiator.

(c) Burning of kerosene in a lantern.

(d) Changes in the colour of black tea on adding lemon juice to it.

(e) Churning of milk cream to get butter.

4. Name the process associated with the following.

(a) Dry ice is kept at room temperature and at one atmospheric pressure.

(b) A drop of ink placed on the surface of water contained in a glass spread throughout the water.

(c) An acetone bottle is left open and the bottle becomes empty.

(d) Milk is churned to separate cream from it.

(e) Fine beam of light entering through a small hole in a dark room, illuminates the particles in its paths.

5. (i) The teacher instructed three students 'A', 'B' and 'C' respectively to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). 'A' dissolved 50 g of NaOH in 100 ml of water, 'B' dissolved 50 g of NaOH in 100 g of water while 'C' dissolved 50 g of NaOH in water to make 100 ml of solution. Which one of them has made the desired solution and why?

(ii) During an experiment the students were asked to prepare a 10% (mass/mass) solution of sugar in water. Ramesh dissolved 10 g of sugar in 100 g of water while Sarika prepared it by dissolving 10 g of sugar in water to make 100 g of the solution.

(a) Are the two solutions of the same concentration?

(b) Compare the mass % of the two solutions.

(iii) Calculate the mass of sodium sulphate required to prepare its 20% (mass percent) solution in 100 g of water?

ASSIGNMENTS FOR FORMATIVE ASSESSMENT

A. Science Quiz

1. You are given a mixture of ammonium chloride, sand and common salt for separation. A student first dissolved the mixture in water then filtered to remove sand.

(i) Will the student be able to separate ammonium chloride from sodium chloride?

(ii) Give a reason for your answer in (i).

(iii) Suggest an alternative procedure to separate the constituents of the mixture.

2. On a cold morning, Abhay noticed that the smoke coming out of the chimney of a mill is bluish in colour.

(i) Is the smoke really blue in colour?

(ii) Which phenomenon makes the smoke blue?

(iii) Who discovered the phenomenon in (ii)?

3. Which is the dispersed phase and dispersing medium in the following in terms of solid, liquid and gas?

(i) mist, (ii) smoke, (iii) shaving cream (iv) mud (v) rubber (vi) butter (vii) gemstone.

4. Examples of solid sol are (i) ..... (ii) ..... (iii) .....

Examples of solid-gas aerosol are (i) ..... (ii) .....

Example of foam is .....

Examples of emulsion are (i) ..... (ii) .....

Examples of sol are (i) ..... (ii) .....

Examples of gel are (i) ..... (ii) .....

B. Project

Make a simple water purifier, using one earthen pitcher, some broken pieces of stone, pebbles and coarse sand.

Answer the following questions :

(i) Is the clear water obtained fit for drinking.

(ii) If yes, give your reasons. If no, then suggest two methods by which you can make the water fit for drinking.

C. Visits

Visit a sugar factory nearest to your place and find out how sugar is obtained from sugarcane.
Make a complete report and present it to your teacher.

D. Group Activity

Make, true solutions, collodial solutions and suspensions from the following :
(i) egg (ii) mud (iii) sugar (iv) common salt (v) chalk powder (vi) starch.

E. Seminar

1. The process of purification of water in the water works of cities before its supply as drinking water is not foolproof. Newer and more scientific methods should be followed to isolate/remove the different chemicals that are associated with river water due to increased levels of pollution.

(Hint : Discuss the following points]

(i) Two types of contaminants – physical/ chemical and microbial.

(ii) Physical/chemical parameters include heavy metals like lead, mercury, nitrates/nitrites, arsenic, aluminium and traces of organic compounds.

(iii) Microbial parameters include *Coliform bacteria*, *E. coli*, some specific cholera causing bacteria, viruses and protozoan parasites.

(iv) Diseases caused by each of the above parameters.

(v) Various methods, chemicals which can be used on a large scale, middle/domestic scale – solar distillation, ultraviolet radiation, activated carbon, iodine, ozone, hydrogen peroxide, ion exchange, activated alumina, reverse osmosis and last but not the least, boiling.

F. Charts

Make charts for the :

(i) City water supply (ii) Fractional distillation (iii) Sublimation.

G. Demonstration

1. Objective

To prepare a saturated solution of common salt in distilled water and determine its solubility at room temperature.

Materials Required :

(i) Common salt, (ii) distilled water, (iii) three beaker (100 ml), (iv) glass rod for stirring (v) filter paper (vi) funnel, (vii) china dish (viii) tripod stand (ix) burner (x) spring balance (0 - 250g having a least count of 1 g) (xi) a very thin polythene bag (xii) measuring cylinder (100 ml) (xii) Celsius thermometer (– 10°C - 110°C).

Procedure

Suspend the thermometer freely in the laboratory. Read and record the room temperature.

Preparation of a saturated solution of sodium chloride (common salt).

1. Measure 50 ml of distilled water with the help of a measuring cylinder. Transfer the water in a 100 ml beaker.

2. Dissolve common salt in water till some amount of it is left undissolved and can be seen clearly settling on the base of the beaker.

3. Filter the solution in another beaker, so as to remove the undissolved common salt. The solution so collected is a saturated solution of common salt at room temperature.

Determination of solubility by evaporation method.

1. Take the china dish and place the polythene bag in it. By using a spring balance find the weight of the china dish, by suspending the polythene bag from its hook. Record the weight of the empty china dish.

2. Using the measuring cylinder, measure 25 ml of the saturated salt solution and transfer it to the china dish.

3. With the help of the spring balance find the weight of the china dish and the saturated salt solution. Record the weight.

4. Heat the china dish on a gentle flame, by placing it over a tripod stand, till all the water evaporates and dry common salt is left behind.

5. Allow the china dish to cool to room temperature. Again weigh the china dish along with common salt. Record the weight.

Observations

Room temperature
= - - - - - - - - - - - - - -°C

Weight of empty china dish
= - - - - - - - - - - g (say m_1g)

Weight of empty china dish + saturated solution
= - - -- - - - - - g (say m_2g)

Weight of empty china dish + dry common salt
= - - - - - - - - - - g (say m_3g)

Calculations

Weight of saturated salt solution
= $(m_2 - m_1)$g = (- - - - - -) g

Weight of salt dissolved in saturated solution
= $(m_3 - m_1)$g = (- - - - - -) g

∴ Weight of water in saturated solution of salt
= $\{(m_2 - m_1) - (m_3 - m_1)\}$ g

= $(m_2 - m_3)$ g = (- - - - -) g

∴ Solubility of common salt at room temperature

$$= \frac{\text{Weight of common salt}}{\text{Weight of water}}$$

$$= \frac{(m_3 - m_1)}{(m_2 - m_3)} \times 100$$

$$= \frac{(\ldots\ldots - \ldots\ldots)}{(\ldots\ldots - \ldots\ldots)} \times 100$$

Class IX Chapter 2 – Is Matter Around Us Pure Science

Question 1:

What is meant by a pure substance?

Answer:

A pure substance is the one that consists of a single type of particles, i.e., all constituent particles of the substance have the same chemical nature. Pure substances can be classified as elements or compounds.

Question 2:

List the points of differences between homogeneous and heterogeneous mixtures.

Answer:

A homogeneous mixture is a mixture having a uniform composition throughout the mixture. For example: salt in water, sugar in water, copper sulphate in water

A heterogeneous mixture is a mixture having a non-uniform composition throughout the mixture. For example: sodium chloride and iron fillings, salt and sulphur, oil and water

Exercise Question 1:

Differentiate between homogeneous and heterogeneous mixtures with examples.

Answer:

A homogeneous mixture is a mixture having a uniform composition throughout the mixture. For example, mixtures of salt in water, sugar in water, copper sulphate in water, iodine in alcohol, alloy, and air have uniform compositions throughout the mixtures.

On the other hand, a heterogeneous mixture is a mixture having a non-uniform composition throughout the mixture. For example, composition of mixtures of sodium chloride and iron fillings, salt and sulphur, oil and water, chalk powder in water, wheat flour in water, milk and water are not uniform throughout the mixtures.

Question 2:

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

Answer:

Sol is a heterogeneous mixture. In this mixture, the solute particles are so small that they cannot be seen with the naked eye. Also, they seem to be spread uniformly throughout the mixture. The Tyndall effect is observed in this mixture. For example: milk of magnesia, mud

Solution is a homogeneous mixture. In this mixture, the solute particles dissolve and spread uniformly throughout the mixture. The Tyndall effect is not observed in this mixture. For example: salt in water, sugar in water, iodine in alcohol, alloy

Suspensions are heterogeneous mixtures. In this mixture, the solute particles are visible to the naked eye, and remain suspended throughout the bulk of the medium. The Tyndall effect is observed in this mixture. For example: chalk powder and water, wheat flour and water Question 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:

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

Mass of solvent (water) = 100 g (Given)

Then, mass of solution = Mass of solute + Mass of solvent

= (36 + 100) g

= 136 g

Therefore, concentration (mass by mass percentage) of the solution

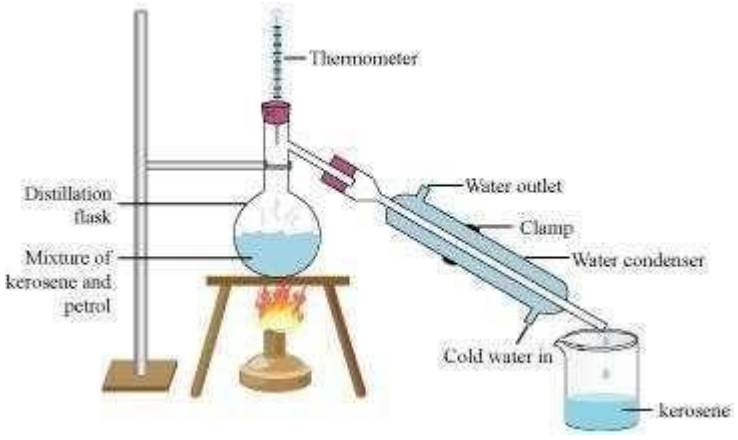
$$= \frac{\text{Mass of solute}}{\text{Mass of solvent}} \times 100\%$$
$$= \frac{36}{136} \times 100\%$$
$$= 26.47\%$$

Question 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?

Answer:

A mixture of two miscible liquids having a difference in their boiling points more than 25°C can be separated by the method of distillation. Thus, kerosene and petrol can be separated by distillation.



In this method, the mixture of kerosene and petrol is taken in a distillation flask with a thermometer fitted in it. We also need a beaker, a water condenser, and a Bunsen burner. The apparatus is arranged as shown in the above figure. Then, the mixture is heated slowly. The thermometer should be watched simultaneously. Kerosene will vaporize and condense in the water condenser. The condensed kerosene is collected from the condenser outlet, whereas petrol is left behind in the distillation flask.

Question 2:

Name the technique to separate

(i) butter from curd

(ii) salt from sea-water

(iii) camphor from salt Answer:

(i) Butter can be separated from curd by centrifugation.
(ii) Salt can be separated from sea-water by evaporation.

(iii) Camphor can be separated from salt by sublimation.

Question 3:

What type of mixtures is separated by the technique of crystallization?

Answer:
By the technique of crystallization, pure solids are separated from impurities. For example, salt obtained from sea is separated from impurities; crystals of alum (Phitkari) are separated from impure samples.

Question 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 water breaking down into hydrogen and oxygen gas
- Dissolving common salt in water
- Making a fruit salad with raw fruits
- Burning of paper and wood Answer:

- Cutting of trees → Physical change
- Melting of butter in a pan → Physical change
- Rusting of almirah → Chemical change
- Boiling of water to form steam → Physical change
- Passing of electric current through water, and water breaking down into hydrogen and oxygen gas → Chemical change
- Dissolving common salt in water → Physical change
- Making a fruit salad with raw fruits → Physical change
- Burning of paper and wood → Chemical change

Question 2:

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

Answer:

Pure substance: Water, salt, sugar

Mixture: Salt water, soil, wood, air, cold drink, rubber, sponge, fog, milk, butter, clothes, food

Question 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:

(a) Sodium chloride from its solution in water → Evaporation

(b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride → Sublimation

(c) Small pieces of metal in the engine oil of a car → Centrifugation or filtration or decantation

(d) Different pigments from an extract of flower petals → Chromatography

(e) Butter from curd → Centrifugation

(f) Oil from water → Using separating funnel

(g) Tea leaves from tea → Filtration

(h) Iron pins from sand → Magnetic separation

(i) Wheat grains from husk → Winnowing
(j) Fine mud particles suspended in water → Centrifugation

Question 2:

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

Answer:

First, water is taken as a solvent in a saucer pan. This water (solvent) is allowed to boil. During heating, milk and tea leaves are added to the solvent as solutes. They form a solution. Then, the solution is poured through a strainer. The insoluble part of

the solution remains on the strainer as residue. Sugar is added tothe filtrate, which dissolves in the filtrate. The resulting solution is the required tea.

Question 4:

Explain the following giving examples:

(a) Saturated solution

(b) Pure substance

(c) Colloid

(d) Suspension Answer:

(a) Saturated solution

A saturated solution is a solution in which the maximum amount of solute has been dissolved at a given temperature. The solution cannot dissolve beyond that amount of solute at that temperature. Any more solute added will settle down at the bottom of the container as a precipitate.

Suppose 500 g of a solvent can dissolve a maximum of 150 g of a particular solute at 40°C. Then, the solution obtained by dissolving 150 g of that solute in 500 g of that solvent at 300 K is said to be a saturated solution at 300 K.

(b) Pure substance

A pure substance is a substance consisting of a single type of particles i.e., all constituent particles of the substance have the same chemical properties.

For example, salt, sugar, water are pure substances.

(c) Colloid

A colloid is a heterogeneous mixture. The size of the solutes in this mixture is so small that they cannot be seen individually with naked eyes, and seems to be distributed uniformly throughout the mixture. The solute particles do not settle down when the mixture is left undisturbed. This means that colloids are quite stable. Colloids cannot be separated by the process of filtration. They can be separated by centrifugation.

Colloids show the Tyndall effect. For example, milk, butter, foam, fog, smoke, clouds.

(d) Suspension

Suspensions are heterogeneous mixtures. The solute particles in this mixture remain suspended throughout the bulk of the medium. The particles can be seen with naked eyes. Suspension shows the Tyndall effect. The solute particles settle down when the mixture is left undisturbed. This means that suspensions are unstable. Suspensions can be separated by the method of filtration. For example, mixtures of chalk powder and water, wheat flour and water.

Question 5:

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

Soda water, wood, air, soil, vinegar, filtered tea Answer:

Homogeneous mixtures: Soda water, air, vinegar

Heterogeneous mixtures: Wood, soil, filtered tea

Question 6:

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

Answer:

Every liquid has a characteristic boiling point. Pure water has a boiling point of 100°C (373 K) at 1 atmospheric pressure. If the given colourless liquid boils at even slightly above or below 100°C, then the given liquid is not pure water. It must boil at sharp 100°C. Thus, by observing the boiling point, we can confirm whether a given colourless liquid is pure water or not.

Question 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:

The following materials fall in the category of a "pure substance":

(a) Ice

(c) Iron

(d) Hydrochloric acid

(e) Calcium oxide

(f) Mercury

Question 8:

Identify the solutions among the following mixtures:
(a) Soil

(b) Sea water

(c) Air

(d) Coal

(e) Soda water Answer:

The following mixtures are solutions:

(b) Sea water (c)

Air (e)

Soda water

Question 9:

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

(a) Salt solution
(b) Milk

(c) Copper sulphate solution (d) Starch solution Answer:

Milk and starch solution will show the "Tyndall effect".

Question 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

(a) Sodium
(d) Silver
(f) Tin
(g) Silicon

Compounds

(e) Calcium carbonate
(k) Methane
(l) Carbon dioxide

Mixtures

(b) Soil
(c) Sugar solution
(h) Coal
(i) Air
(j) Soap
(m) Blood

Question 11:

Which of the following are chemical changes?

(a) Growth of a plant

(b) Rusting of iron

(c) Mixing of iron fillings and sand

(d) Cooking of food

(e) Digestion of food (f) Freezing of water (g) Burning of candle Answer:

The following changes are chemical changes:

(a) Growth of a plant

(b) Rusting of iron
(d) Cooking of food
(e) Digestion of food

(g) Burning of candle