
Is Matter Around Us Pure

Multiple Choice Questions

1. Which of the following statements are true for pure substances?

- (i) Pure substances contain only one kind of particles
 - (ii) Pure substances may be compounds or mixtures
 - (iii) Pure substances have the same composition throughout
 - (iv) Pure substances can be exemplified by all elements other than nickel
- (a) (i) and (ii)
 - (b) (i) and (iii)
 - (c) (iii) and (iv)
 - (d) (ii) and (iii)

Ans. **(b)** (i) and (iii)

Explanation: Mixture is not a pure substance, hence option (iii) is ruled out. Nickel is an element and hence pure substance; so, option (iv) is incorrect.

2. Rusting of an article made up of iron is called

- (a) corrosion and it is a physical as well as chemical change
- (b) dissolution and it is a physical change
- (c) corrosion and it is a chemical change
- (d) dissolution and it is a chemical change

Ans. **(c)** corrosion and it is a chemical change

Explanation: Rusting of iron is a chemical change and it leads to corrosion.

3. A mixture of sulphur and carbon disulphide is

- (a) heterogeneous and shows Tyndall effect
- (b) homogeneous and shows Tyndall effect
- (c) heterogeneous and does not show Tyndall effect
- (d) homogeneous and does not show Tyndall effect

Ans. **(d)** homogeneous and does not show Tyndall effect

Explanation: Solution is a homogenous mixture and does not show Tyndall effect. Colloid and suspension are heterogeneous mixtures and show Tyndall effect. Mixture of Sulphur and carbon disulphide is a solution.

4. Tincture of iodine has antiseptic properties. This solution is made by dissolving

- (a) iodine in potassium iodide
- (b) iodine in vaseline
- (c) iodine in water
- (d) iodine in alcohol

Ans. **(d)** iodine in alcohol

5. Which of the following are homogeneous in nature?

- (i) ice (ii) wood (iii) soil (iv) air
 - (a) (i) and (iii)
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(b) (ii) and (iv)

(c) (i) and (iv)

(d) (iii) and (iv)

Ans. (c) (i) and (iv)

Explanation: Soil is a heterogeneous mixture and wood too has heterogeneous composition.

6. Which of the following are physical changes?

(i) Melting of iron metal

(ii) Rusting of iron

(iii) Bending of an iron rod

(iv) Drawing a wire of iron metal

(a) (i), (ii) and (iii)

(b) (i), (ii) and (iv)

(c) (i), (iii) and (iv)

(d) (ii), (iii) and (iv)

Ans. (c) (i), (iii) and (iv)

Explanation: A new substance is formed only in case of rusting of iron. In all other cases, no new substance is formed and hence they are physical changes.

7. Which of the following are chemical changes?

(i) Decaying of wood

(ii) Burning of wood

(iii) Sawing of wood

(iv) Hammering of a nail into a piece of wood

(a) (i) and (ii)

(b) (ii) and (iii)

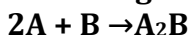
(c) (iii) and (iv)

(d) (i) and (iv)

Ans. (a) (i) and (ii)

Explanation: Burning and decay result in formation of new substances and they cannot be reversed. Hence, these are chemical changes.

8. Two substances, A and B were made to react to form a third substance, A₂B according to the following reaction



Which of the following statements concerning this reaction are incorrect?

(i) The product A₂B shows the properties of substances A and B

(ii) The product will always have a fixed composition

(iii) The product so formed cannot be classified as a compound

(iv) The product so formed is an element

(a) (i), (ii) and (iii),

(b) (ii), (iii) and (iv)

(c) (i), (iii) and (iv)

(d) (ii), (iii) and (iv)

Ans. (c) (i), (iii) and (iv)

9. Two chemical species X and Y combine together to form a product P which contains both X and Y



X and Y cannot be broken down into simpler substances by simple chemical reactions.

Which of the following concerning the species X, Y and P are correct?

- (i) P is a compound
- (ii) X and Y are compounds
- (iii) X and Y are elements
- (iv) P has a fixed composition

- (a) (i), (ii) and (iii),
- (b) (i), (ii) and (iv)
- (c) (ii), (iii) and (iv)
- (d) (i), (iii) and (iv)

Ans. (d) (i), (iii) and (iv)

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Short Answer Questions

10. Suggest separation technique(s) one would need to employ to separate the following mixtures.

(a) Mercury and water

Ans. Separation by using separating funnel

(b) Potassium chloride and ammonium chloride

Ans. Sublimation

(c) Common salt, water and sand

Ans. Filtration followed by evaporation

or

Centrifugation followed by evaporation/distillation

(d) Kerosene oil, water and salt

Ans. Separation by using separating funnel to separate kerosene oil followed by evaporation or distillation.

11. Which of the tubes in Fig. 2.1 (a) and (b) will be more effective as a condenser in the distillation apparatus?

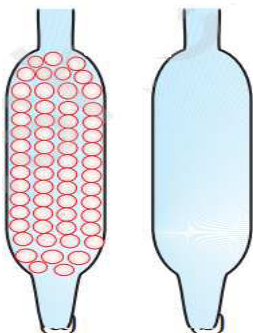


Fig. 2.1

- Ans. The tube (a) will be more effective as a condenser. Presence of marbles increases surface area. This allows more time for condensation and hence it would be more effective than the column without marbles.

12. Salt can be recovered from its solution by evaporation. Suggest some other technique for the same?

Ans. Crystallization

13. The 'sea-water' can be classified as a homogeneous as well as heterogeneous mixture. Comment.

Ans. Homogeneous— mixture of salts and water only

Heterogeneous— contains salts, water, mud, decayed plant etc.

14. While diluting a solution of salt in water, a student by mistake added acetone
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(boiling point 56°C). What technique can be employed to get back the acetone? Justify your choice.

Ans. Acetone can be separated from this mixture by distillation. The boiling points of acetone is much lower than that of water. So, it will evaporate and can be collected after condensation.

15. 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.

Ans. (a) Solid potassium chloride will separate out.

(b) Initially the water will evaporate and then sugar will get charred.

(c) Iron sulphide will be formed.

16. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do.

Ans. Particle size in a suspension is larger than those in a colloidal solution. Also molecular interaction in a suspension is not strong enough to keep the particles suspended and hence they settle down.

17. Smoke and fog both are aerosols. In what way are they different?

Ans. Both fog and smoke have gas as the dispersion medium. The only difference is that the dispersed phase in fog is liquid and in smoke it is a solid.

18. Classify the following as physical or chemical properties

(a) The composition of a sample of steel is: 98% iron, 1.5% carbon and 0.5% other elements.

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

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

(d) Most metal oxides form alkalis on interacting with water.

Ans. Physical properties – (a) and (c)

Chemical properties – (b) and (d)

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

Ans. 'C' has made the desired solution

$$\text{Mass by volume\%} = \frac{\text{Mass of solute}}{\text{volume of solution}} \times 100$$

$$= \frac{50\text{g}}{100\text{ml}} \times 100 = 50\% \text{ mass by volume}$$

20. Name the process associated with the following

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

Ans. Sublimation

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

Ans. Diffusion

(c) A potassium permanganate crystal is in a beaker and water is poured into the beaker with stirring.

Ans. Dissolution/diffusion

(d) A acetone bottle is left open and the bottle becomes empty.

Ans. Evaporation, diffusion

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

Ans. Centrifugation

(f) Settling of sand when a mixture of sand and water is left undisturbed for some time.

Ans. Sedimentation

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

Ans. Scattering of light (Tyndall effect)

21. 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 of water will not freeze at 0°C?

Comment.

Ans. Sample 'B' will not freeze at 0°C because it is not pure water. At 1 atm, the boiling point of pure water is 100°C and the freezing point of pure water is 0°C.

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

Ans. Pure gold is very soft as compared to gold alloyed with silver or copper. Thus for providing strength to gold, it is alloyed.

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

Ans. This element is a metal. Other characteristics expected to be possessed by the element are—lustre, malleability, heat and electrical conductivity.

24. 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.

Ans. Evaporation or distillation

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

Ans. Distillation

(c) Two immiscible liquids.

Ans. Separation by using separating funnel

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

Ans. Sublimation

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

Ans. Chromatography

25. Fill in the blanks

(a) A colloid is a _____ mixture and its components can be separated by the technique known as _____.

Ans. heterogeneous, centrifugation

(b) Ice, water and water vapour look different and display different _____ properties but they are _____ the same.

Ans. physical, chemically

(c) A mixture of chloroform and water taken in a separating funnel is mixed and left undisturbed for some time. The upper layer in the separating funnel will be of _____ and the lower layer will be that of _____.

Ans. water, chloroform (hint- density of water is less than that of chloroform)

(d) A mixture of two or more miscible liquids, for which the difference in the boiling points is less than 25 K can be separated by the process called _____.

Ans. fractional distillation

(e) When light is passed through water containing a few drops of milk, it shows a bluish tinge. This is due to the _____ of light by milk and the phenomenon is called _____. This indicates that milk is a _____ solution.

Ans. scattering, Tyndall effect, colloidal

26. Sucrose (sugar) crystals obtained from sugarcane and beetroot are mixed together. Will it be a pure substance or a mixture? Give reasons for the same.

Ans. It is a pure substance because chemical composition of sugar crystals is same irrespective of its source.

27. Give some examples of Tyndall effect observed in your surroundings?

Ans. Following are some examples of Tyndall effects.

(a) A beam of light coming through ventilation near ceiling.

(b) Beam of light coming through canopy of trees.

28. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. If not, explain.

Ans. Water and alcohol are miscible.

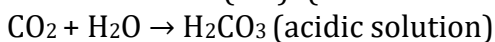
29. On heating calcium carbonate gets converted into calcium oxide and carbon dioxide.

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

Ans. 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 equation involved.

Ans. Acidic and basic solutions can be prepared by dissolving the products of the above process in water



- 30. Nonmetals 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.

Ans. Iodine

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

Ans. Bromine

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

Ans. Graphite

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

Ans. Carbon

(e) Name a non-metal other than carbon which shows allotropy.

Ans. Sulphur, phosphorus

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

Ans. Oxygen

- 31. Classify the substances given in Fig. 2.2 into elements and compounds**

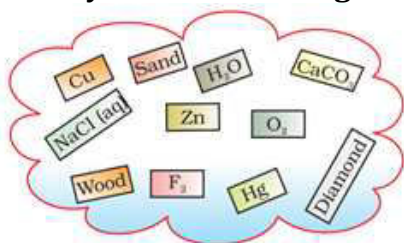


Fig. 2.2

Ans. Elements: Cu, Zn, O₂, F₂, Hg, Diamond

Compounds: H₂O, CaCO₃

- 32. Which of the following are not compounds?**

(a) Chlorine gas

(b) Potassium chloride

(c) Iron

(d) Iron sulphide

(e) Aluminium

(f) Iodine

(g) Carbon

(h) Carbon monoxide

(i) Sulphur powder

Ans. Chlorine gas, Iron, Aluminium, Iodine, Carbon, Sulphur powder.

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Long Answer Questions

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

Ans. The fractionating column packed with glass beads provides a surface for the vapours to collide and lose energy so that they can be quickly condensed and distilled. Also length of the column would increase the efficiency.

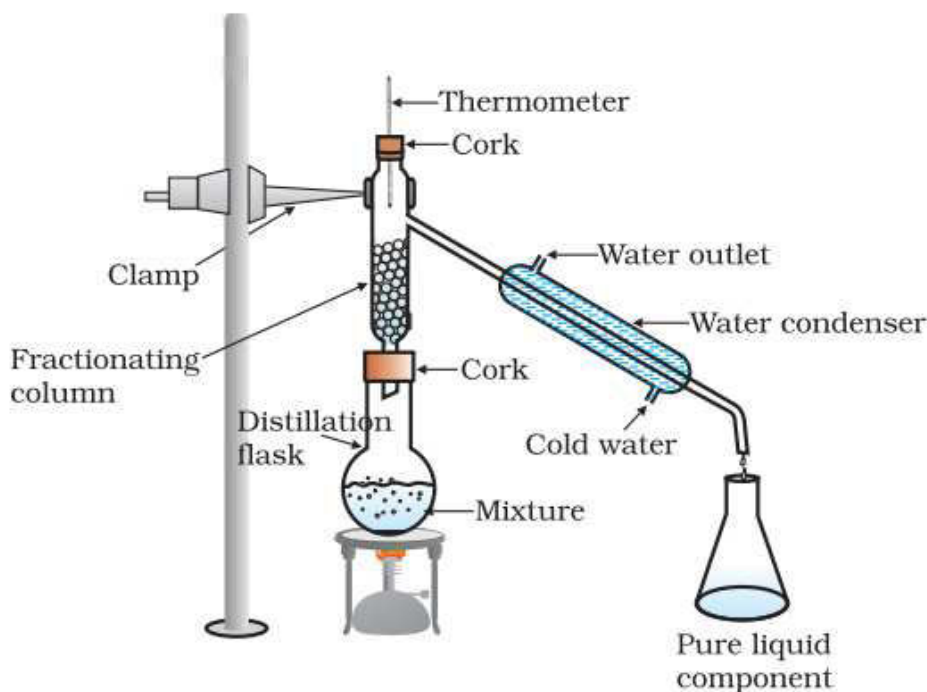


Figure: Fractional distillation

34. Answer the following:

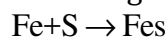
- (a) Under which category of mixtures will you classify alloys and why?
- (b) A solution is always a liquid. Comment.
- (c) Can a solution be heterogeneous?

Ans. (a) Homogenous mixture, because they have a uniform composition throughout
(b) No, solid solutions and gaseous solutions are also possible. Examples brass and air
(c) No, solution is a homogenous mixture of two or more substances

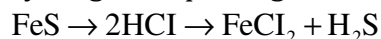
35. Iron filings and sulphur were mixed together and divided into two parts, 'A' and 'B'. Part 'A' was heated strongly while Part 'B' was not heated. Dilute hydrochloric acid
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was added to both the Parts and evolution of gas was seen in both the cases. How will you identify the gases evolved?

Ans. Following reaction takes place when part A is heated:

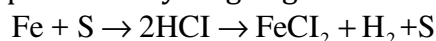


When dil. Hydrochloric acid is added to iron sulphide, following reaction takes place and hydrogen sulphide gas is evolved.



Hydrogen sulphide is a foul smelling gas and smells like rotten egg. When dil.

Hydrochloric acid is added to the mixture of iron and Sulphur, following reaction takes place and hydrogen gas is evolved.



In this case, Sulphur does not participate in the reaction.

When a burning matchstick is brought near the evolved gas the matchstick burns with a pop sound. This confirms the evolution of hydrogen gas.

- 36. A child wanted to separate the mixture of dyes constituting a sample of ink. He marked a line by the ink on the filter paper and placed the filter paper in a glass containing water as shown in Fig. 2.3. 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.

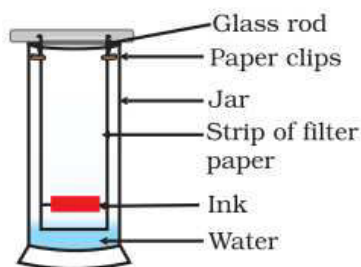


Fig. 2.3

- Ans.** (i) Three different bands will be observed.
(ii) Chromatography
(iii) To separate the pigments present in Chlorophyll.

- 37. 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 Fig.2.4. 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?**
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- (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?

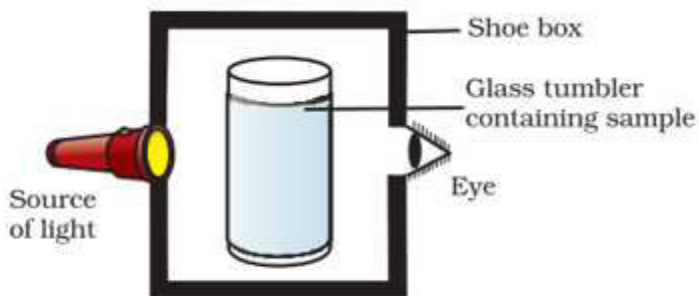


Fig. 2.4

- Ans.** (a) Milk is a colloid and would show Tyndall effect.
 (b) Salt solution is a true solution and would not scatter light.
 (c) Detergent solution, sulphur solution.
- 38. Classify each of the following, as a physical or a chemical change. Give reasons.**
 (a) Drying of a shirt in the sun.
 (b) Rising of hot air over a radiator.
 (c) Burning of kerosene in a lantern.
 (d) Change in the colour of black tea on adding lemon juice to it.
 (e) Churning of milk cream to get butter.

Ans. Physical changes —(a), (b), (e)
 Chemical changes— (c), (d)

- 39. During an experiment the students were asked to prepare a 10% (Mass/Mass) solution of sugar in water. Ramesh dissolved 10g of sugar in 100g of water while Sarika prepared it by dissolving 10g of sugar in water to make 100g of the solution.**
 (a) Are the two solutions of the same concentration
 (b) Compare the mass % of the two solutions.

Ans. (a) No

$$\text{Mass\%} = \frac{\text{Mass of solute}}{\text{mass of solute} + \text{Mass of solvent}} \times 100$$

(b) Solution made by Ramesh

$$\text{Mass\%} = \left(\frac{10}{10+100} \right) 100 = \frac{10}{110} \times 100 = 9.09\%$$

Solution made by Sarika

$$\text{Mass\%} = \frac{10}{100} \times 100 = 10\%$$

The solution prepared by Sarika has a higher mass % than that prepared by Ramesh.

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40. You are provided with a mixture containing sand, iron filings, ammonium chloride and sodium chloride. Describe the procedures you would use to separate these constituents from the mixture?

Ans. Components of given mixture can be separated by following methods:

(i) **By using a magnet:** Hovering a magnet over the mixture will result in iron filings getting stuck to the magnet. Thus, iron will be separated.

(ii) **Sublimation:** The remaining mixture is heated in a china dish. Ammonium chloride is a sublime and hence it will evaporate without undergoing the liquid phase. Crust of ammonium chloride can be collected by placing an inverted funnel on top of china dish.

(iii) **Sedimentation, decantation and filtration:** The remaining mixture is dissolved in water. The mixture is allowed to settle for some time. Sand, being insoluble in water, settles at the bottom. Liquid is decanted in another beaker. Then, the liquid is filtered to remove any trace of sand in it.

(iv) **Evaporation:** The liquid is now a solution of salt in water. This is heated in a beaker so that water evaporates. Once all the water evaporates, we get salt in the beaker.

41. Arun has prepared 0.01% (by mass) solution of sodium chloride in water. Which of the following correctly represents the composition of the solutions?

- (a) 1.00 g of NaCl + 100 g of water
(b) 0.11 g of NaCl + 100 g of water
(c) 0.01 g of NaCl + 99.99 g of water
(d) 0.10 g of NaCl + 99.90 g of water

Ans. (c) $\text{Mass\%} = \frac{\text{mass of solute}}{\text{mass of solute} + \text{mass of solvent}} \times 100$
$$= \frac{0.01}{0.01 + 99.99} \times 100$$
$$= \frac{0.01}{100} \times 100$$
$$= 0.01 \text{ g}$$

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

Ans. Let the mass of sodium sulphate required be = x g
The mass of solution would be = (x + 100) g
x g of solute in (x + 100) g of solution

$$20\% = \frac{x}{x + 100} \times 100$$
$$20x + 2000 = 100x$$
$$80x = 2000$$
$$x = \frac{2000}{80}$$
$$= 25 \text{ g}$$
