

Matter in Our Surroundings and Its Purity

Science · Class 9 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Study every diagram and table carefully.

Section A — Scientific Reasoning

Q1–Q8 · 1 mark each

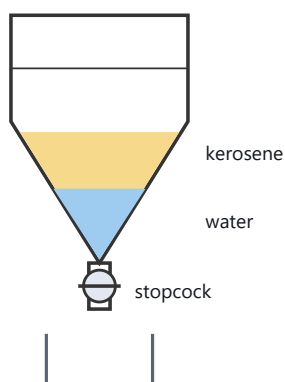
- Which state of matter has a definite volume but no definite shape?
 (A) Solid (B) Plasma
 (C) Gas (D) Liquid
- The change of a solid directly into vapour without passing through the liquid state is called _____.
 (A) Sublimation (B) Fusion
 (C) Condensation (D) Diffusion
- Evaporation causes cooling because the escaping particles _____.
 (A) Push the remaining particles closer together (B) Carry away the energy they absorb from the surroundings
 (C) Release heat into the liquid (D) Increase the pressure above the liquid
- Which of the following is a **compound**?
 (A) Air (B) Brass
 (C) Water (D) Milk
- The Tyndall effect — the scattering of a beam of light — is shown by a _____.
 (A) True solution (B) Pure element
 (C) Compound (D) Colloid
- Which method would you use to obtain pure water from sea water?
 (A) Distillation (B) Filtration
 (C) Sedimentation (D) Sieving
- The melting point of ice on the kelvin scale is _____.
 (A) 0 K (B) 273 K
 (C) 100 K (D) 373 K

8. While ice is melting, its temperature stays at 0 °C even though heat is being supplied. This heat is used to _____.
- (A) Raise the temperature of the water formed
(B) Increase the mass of the ice
(C) Overcome the forces of attraction between the particles
(D) Escape into the surrounding air

Section B — Applying What You Know

Q9–Q15 · 1 mark each

9. The apparatus shown is being used to separate a mixture of kerosene and water. The technique and the reason for using it are _____.



Apparatus used to separate two liquids

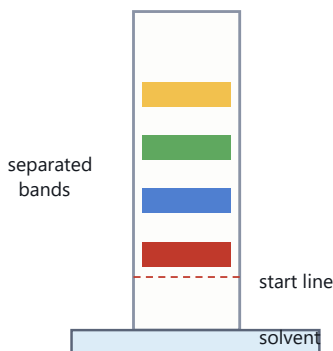
- (A) Filtration, because water passes through the filter
(B) Centrifugation, because water is heavier than kerosene
(C) Distillation, because the two liquids have the same boiling point
(D) Using a separating funnel, because the two liquids are immiscible and have different densities
10. A mixture contains common salt, sand and ammonium chloride. Which step should be carried out **first** to separate them?
- (A) Heat the mixture so that one component sublimates
(B) Add water and filter
(C) Distil the mixture
(D) Use a magnet
11. One row of the table below is **incorrectly** matched. Which row is it?

Row	Substance	Classification
(A)	Brass	Homogeneous mixture
(B)	Carbon dioxide	Compound
(C)	Soil	Heterogeneous mixture
(D)	Graphite	Compound

Table 1.1 — Substances and how they are classified

- (A) (A)
(B) (B)
(C) (C)
(D) (D)
12. 20 g of sugar is dissolved in 180 g of water. The mass percentage of sugar in the solution is _____.
- (A) 11.1%
(B) 10%
(C) 18%
(D) 20%

13. Wet clothes dry faster on a hot, windy day than on a cool, still day. The main reason is that heat and wind _____.
- (A) Lower the boiling point of water
(B) Increase the humidity of the air
(C) Increase the rate of evaporation
(D) Increase the surface area of the clothes
14. In the paper chromatogram shown, a spot of black ink was placed on the strip and the solvent allowed to rise. What does the result tell you?



A paper chromatogram of a spot of black ink

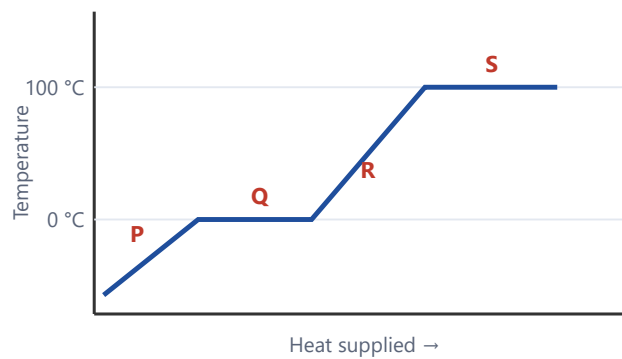
- (A) The ink is a pure substance
(B) The solvent has decomposed the ink into elements
(C) The ink has reacted with the solvent to form new colours
(D) The ink is a mixture of several coloured components
15. Droplets of water appear on the outer surface of a glass holding a cold drink. This happens because water vapour in the air _____.
- (A) Condenses on the cold surface
(B) Passes out through the glass
(C) Sublimes on the cold surface
(D) Evaporates from the drink

Achievers Section

Q16–Q18 · 3 marks each

16. **Assertion (A):** A desert cooler cools better on a hot, dry day than on a humid day.
Reason (R): The rate of evaporation increases when the humidity of the surrounding air is low.
- (A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

17. The graph shows how the temperature of a sample of ice changes as it is heated steadily until it becomes steam. Which labelled part of the graph represents **melting**?



Heating curve for ice being converted to steam

- (A) P
(B) Q
(C) R
(D) S
18. A liquid mixture is tested and found to be transparent, to show the Tyndall effect and to leave no residue on filter paper. The mixture is _____.
(A) A true solution
(B) A colloid
(C) A suspension
(D) A pure compound

Answer Key

1	D	2	A	3	B	4	C	5	D
6	A	7	B	8	C	9	D	10	A
11	D	12	B	13	C	14	D	15	A
16	A	17	B	18	B				

Solutions

1. Answer: (D) Liquid

A **liquid** keeps its volume because its particles stay close together, but it flows and takes the shape of its container because those particles can slide past one another. A solid holds both shape and volume; a gas holds neither.

2. Answer: (A) Sublimation

Sublimation is the direct solid-to-vapour change, shown by camphor, naphthalene, ammonium chloride and dry ice. Fusion is melting, and condensation is the reverse change from gas to liquid.

3. Answer: (B) Carry away the energy they absorb from the surroundings

Only the fastest particles escape, and they take the latent heat needed for that escape from the liquid and its surroundings. So the surroundings lose energy and **cool down** — which is why sweat evaporating from skin feels cold.

4. Answer: (C) Water

Water is a compound: hydrogen and oxygen are chemically combined in a fixed 2 : 1 ratio, and the result has properties of neither gas. Air is a mixture of gases, brass a mixture (alloy) of copper and zinc, and milk a colloidal mixture.

5. Answer: (D) Colloid

A **colloid** has particles large enough to scatter light but too small to settle, so a light beam becomes visible as it passes through. In a true solution the particles are far too small to scatter light, so the beam stays invisible.

6. Answer: (A) Distillation

The salt is dissolved, so it passes straight through filter paper. **Distillation** works because the water boils off, leaving the salt behind, and the vapour is then condensed back to pure water.

7. Answer: (B) 273 K

To convert from Celsius to kelvin, add 273: $0\text{ }^{\circ}\text{C} + 273 = \mathbf{273\text{ K}}$. (373 K is the boiling point of water, $100\text{ }^{\circ}\text{C}$.)

8. Answer: (C) Overcome the forces of attraction between the particles

The heat supplied during melting is the latent heat of fusion: it goes into **breaking down the forces holding the particles in the rigid ice lattice** rather than into raising their speed. Since temperature measures average kinetic energy, it stays constant until all the ice has melted.

9. Answer: (D) Using a separating funnel, because the two liquids are immiscible and have different densities

Kerosene and water do not mix and kerosene is the less dense, so it floats and a clear boundary forms. Opening the stopcock of the **separating funnel** lets the lower water layer run out first, leaving the kerosene behind. Filtration cannot separate two liquids, and distillation is needed only when liquids are miscible.

10. Answer: (A) Heat the mixture so that one component sublimes

Ammonium chloride sublims on heating, so **warming the mixture removes it first** as a vapour that resolidifies on a cool surface. The remaining salt and sand are then separated by dissolving in water, filtering off the sand, and evaporating the filtrate.

11. Answer: (D) (D)

Graphite is made of carbon atoms only, so it is an *element* (one of carbon's forms), not a compound — row **(D)** is wrong. Brass really is a homogeneous mixture of copper and zinc, carbon dioxide a compound, and soil a heterogeneous mixture.

12. Answer: (B) 10%

The solution has mass $20 + 180 = 200\text{ g}$, of which 20 g is sugar. So the mass percentage is $\frac{20}{200} \times 100 = \mathbf{10\%}$. Dividing by the mass of water alone rather than of the whole solution gives the wrong 11.1%.

13. Answer: (C) Increase the rate of evaporation

Higher temperature gives more particles enough energy to escape, and wind carries away the water vapour so the air just above the cloth stays dry. Both effects **speed up evaporation**. Note that drying does not need boiling — evaporation happens at every temperature.

14. Answer: (D) The ink is a mixture of several coloured components

Chromatography separates components that are carried along by the solvent at different rates. Four distinct bands appear, so the black ink must be **a mixture of several dyes**. A pure substance would travel as a single spot, and no chemical change takes place here.

15. Answer: (A) Condenses on the cold surface

The cold glass chills the air touching it, and the water vapour in that air loses enough energy to **condense** into visible droplets. Glass is not permeable, so nothing seeps through it, and the same process explains dew forming on grass at night.

16. Answer: (A) Both A and R are true and R is the correct explanation of A

Dry air can accept much more water vapour, so evaporation from the cooler's wet pads is fast, and fast evaporation removes more heat from the air being blown through. Both statements are true, and the low humidity is exactly **why** the cooler works better, so R correctly explains A.

17. Answer: (B) Q

Melting happens at a fixed temperature, so it must be a flat part of the graph, and it must be the flat part at 0 °C. That is **Q**. P is ice warming up, R is liquid water warming from 0 °C to 100 °C, and S is the flat part at 100 °C where boiling occurs.

18. Answer: (B) A colloid

A true solution would not scatter light, and a suspension would be cloudy and would leave particles on the filter paper. Only **a colloid** has particles small enough to pass through filter paper and stay dispersed, yet large enough to scatter a beam of light — milk and fog behave in exactly this way.