UNIQUE STUDY POINT

By Sumeet Sahu

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Unique Study Point, Amitesh Nagar, Indore, MP | Contact: 8103405051

Class: VI	**Subject:** Science	**Session:** 2025-26
Chapter: 08 - A Journey through States of Water	**Time:** 1½ Hours	**Max. Marks:** 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

1. Which state of water does NOT have a fixed volume?
(a) Ice
(b) Water
(c) Water vapour
(d) All have fixed volume

2. Evaporation takes place at:
(a) Boiling point only
(b) Any temperature
(c) Below 0°C only
(d) Above 100°C only

3. Which of the following substances will show the cooling effect due to evaporation?
(a) Alcohol
(b) Hand sanitizer
(c) Petrol
(d) All of these

4. Rainwater falling from clouds is an example of:
(a) Only evaporation
(b) Only condensation
(c) Both evaporation and condensation
(d) Neither evaporation nor condensation

5. When ice cubes are kept in a glass, after some time they turn into water. This process is called:

(a) Freezing
(b) Melting
(c) Evaporation
(d) Condensation

6. Which of the following factors does NOT affect evaporation?
(a) Surface area
(b) Temperature
(c) Wind speed
(d) Depth of container

7. Water in its gaseous state is present:
(a) Only in clouds
(b) Only near water bodies
(c) In the air around us everywhere
(d) Only above 100°C temperature

8. Which of the following correctly shows the interconversion of states of water?
(a) Ice → Water → Ice
(b) Water → Ice → Water Vapour
(c) Ice → Water → Water Vapour
(d) All of these

9. Coconut oil solidifies in winter. This is an example of:
(a) Evaporation
(b) Melting
(c) Freezing
(d) Condensation

10. The water cycle is driven by:
(a) Wind
(b) Solar energy (sun)
(c) Earth's rotation
(d) Ocean currents

SECTION B - Short Answer Questions (2 marks each)

11. Why does a desert cooler cool better on a hot, dry day compared to a hot, humid day?

12. What will happen if you pour hand sanitizer on your palm and blow air over it? Explain why.

13. Why should we not keep a glass of cold water uncovered on a hot day for a long time?

14. Name any two substances other than water that can exist in solid, liquid, and gaseous states. Give examples of each state.

SECTION C - Short Answer Questions (3 marks each)

15. Design an activity to show that evaporation is faster when the exposed surface area of water is larger. Describe the procedure and expected results.

16. Explain the role of humidity in the rate of evaporation. Why do we say "clothes won't dry today" on a rainy day?

17. What is meant by the states of matter? Explain with reference to water how a substance can change its state.

SECTION D - Long Answer Question (5 marks)

18. (a) What is a pot-in-pot cooler? Explain how it works and why it is useful in rural areas. (3 marks)
(b) Why is sand kept moist in a pot-in-pot cooler? (2 marks)

SECTION E - Case Study Based Questions (4 marks each)

19. Case Study 1: The Atmospheric Water Generator

An Atmospheric Water Generator (AWG) is a device that can produce drinking water from humid air. The machine works by cooling the air below its dew point. When air is cooled sufficiently, the water vapour present in it condenses into liquid water, just like water droplets form on a cold glass of water.

The collected water is then filtered and purified to make it safe for drinking. AWG machines are particularly useful in areas where traditional water sources are scarce or contaminated. However, these machines work best in humid environments and may not be effective in very dry climates.

Answer the following questions:
(a) What principle does an AWG machine work on? (1 mark)
(b) Why is it necessary to cool the air to extract water from it? (1 mark)
(c) Why would an AWG machine not work well in desert areas? (1 mark)
(d) How is the water collection process in an AWG similar to dew formation? (1 mark)

20. Case Study 2: Saving Water Through Understanding Evaporation

Ramesh is a farmer who grows vegetables. He noticed that a lot of water was being wasted due to evaporation when he watered his plants during the afternoon. His plants also seemed to wilt in the hot afternoon sun despite watering.

After learning about evaporation in school, his son Ravi suggested that they should water the plants early in the morning or late in the evening instead of afternoon. Ramesh also decided to cover the soil around plants with dried leaves and grass (mulching) to reduce direct exposure of soil to sunlight.

After implementing these changes, Ramesh found that his water consumption decreased significantly, and his plants remained healthier.

Answer the following questions:
(a) Why was watering in the afternoon causing more water wastage? (1 mark)
(b) How does watering in the morning or evening help in water conservation? (1 mark)
(c) Explain how mulching (covering soil with dried leaves) helps in reducing water loss. (2 marks)

DETAILED ANSWER KEY - PAPER 03

SECTION A - Answers to MCQs

1. (c) Water vapour
Water vapour (gaseous state) does not have a fixed volume. It expands to fill all available space.

2. (b) Any temperature
Evaporation can occur at any temperature, even at room temperature. It doesn't require boiling.

3. (d) All of these
All these liquids evaporate and show cooling effect. That's why we feel cool when sanitizer or alcohol is applied on skin.

4. (c) Both evaporation and condensation
Rain is formed through evaporation of water from earth's surface and condensation of water vapour in clouds.

5. (b) Melting
Melting is the process of conversion of solid (ice) into liquid (water).

6. (d) Depth of container
Depth of container doesn't significantly affect evaporation rate. Surface area, temperature, and wind speed do.

7. (c) In the air around us everywhere
Water vapour is present in the air around us at all places, though the amount varies.

8. (d) All of these
Water can change from one state to another and back. All the given conversions are possible.

9. (c) Freezing
Freezing is the process of conversion of liquid into solid state due to cooling.

10. (b) Solar energy (sun)
The water cycle is powered by solar energy which causes evaporation.

SECTION B - Answers to Short Answer Questions

11.

A desert cooler works better on hot, dry days because:
- Desert coolers work on the principle of evaporative cooling
- On a dry day, humidity is low, meaning the air can hold more water vapour
- This allows rapid evaporation of water from the cooler pads
- On a humid day, air already contains lots of water vapour
- This slows down evaporation, reducing the cooling effect

12.

If hand sanitizer is poured on palm and air is blown over it:
- The sanitizer will evaporate very quickly

• We will feel a cooling sensation on our palm
• This happens because evaporation is a cooling process
• Blowing air increases the rate of evaporation
• As sanitizer evaporates, it takes heat from our palm, making it feel cool

13.

We should not keep a glass of cold water uncovered on a hot day because:
• Water vapour from the surrounding air will condense on the cold outer surface of the glass
• Dust and impurities from the air can fall into the uncovered water
• This can contaminate the water and make it unsafe to drink
• The condensed water on the outside can also make the glass slippery

14.

Two substances other than water that exist in three states:

1. Wax:
• Solid: Candle wax at room temperature
• Liquid: Melted wax when candle burns
• Gas: Wax vapour that burns in the flame

2. Ghee (Clarified butter):
• Solid: Solidified ghee in winter or refrigerator
• Liquid: Melted ghee at room temperature in summer
• Gas: Ghee vapour when heated to high temperature

SECTION C - Answers to Short Answer Questions

15.

Activity to show effect of surface area on evaporation:

Materials Required:
• Two identical measuring spoons
• Water
• One small bottle cap
• One flat plate
• Clock or timer

Procedure:
1. Take one spoon of water in the bottle cap
2. Take one spoon of water and spread it on the flat plate
3. Keep both containers side by side in the same place
4. Observe both containers at regular intervals
5. Note the time when water completely evaporates from each container

Expected Results:
• Water on the plate will evaporate much faster than water in the bottle cap
• This happens because the plate has a much larger surface area exposed to air
• Larger exposed surface area increases the rate of evaporation

Conclusion:

Evaporation is faster when the exposed surface area is larger.

16.

Role of humidity in evaporation:

Humidity refers to the amount of water vapour present in the air.

Effect on evaporation:
• When humidity is low (dry air), air can hold more water vapour
• This allows rapid evaporation from wet surfaces
• When humidity is high, air is already saturated or nearly saturated with water vapour
• Air has little capacity to hold more water vapour
• This significantly slows down evaporation

Why clothes don't dry on rainy days:
• Rainy days have very high humidity
• The air is full of water vapour
• Water from wet clothes cannot evaporate easily into already saturated air
• Therefore, clothes take much longer to dry or may not dry at all
• People say "clothes won't dry today" on rainy days because the evaporation rate is very slow

17.

States of Matter:
Matter can exist in three different forms or states - solid, liquid, and gas. These are called the three states of matter. Different states have different properties regarding shape, volume, and ability to flow.

Change of State in Water:
Water is an excellent example to show how a substance can change its state:

1. Solid to Liquid (Melting):
• Ice (solid) changes to water (liquid) when heated
• This occurs at 0°C (melting point)
• Example: Ice cubes melt at room temperature

2. Liquid to Gas (Evaporation):
• Water (liquid) changes to water vapour (gas) when heated
• Can occur at any temperature, but rapid at 100°C (boiling point)
• Example: Water drying from clothes, boiling water

3. Gas to Liquid (Condensation):
• Water vapour (gas) changes to water (liquid) when cooled
• Example: Dew drops, water droplets on cold glass

4. Liquid to Solid (Freezing):
• Water (liquid) changes to ice (solid) when cooled
• This occurs at 0°C (freezing point)
• Example: Water freezing in refrigerator

All these changes are reversible and show that the same substance (water) can exist in different states depending on temperature.

SECTION D - Answer to Long Answer Question

18.

(a) Pot-in-pot cooler - Structure and Working: (3 marks)

What is a pot-in-pot cooler?
A pot-in-pot cooler is a simple, electricity-free cooling device made by placing a smaller earthen pot inside a larger earthen pot with wet sand between them.

Structure:
• Two earthen pots of different sizes
• Smaller pot placed inside the larger pot
• Gap between the pots filled with sand
• A wet jute sack or lid to cover the top
• Water is poured regularly on the sand to keep it moist

How it works:
1. Water from the wet sand seeps through the porous walls of the earthen pots
2. This water evaporates from the outer surface of the pots
3. During evaporation, heat is absorbed from the pots and the contents
4. This causes a cooling effect inside the inner pot
5. The continuous evaporation keeps the inner pot cool

Why useful in rural areas:
• Does not require electricity, which may not be available or reliable in rural areas
• Very inexpensive to make and maintain
• Uses traditional, locally available materials
• Environmentally friendly with no carbon emissions
• Can keep vegetables and fruits fresh for several days
• Reduces food wastage
• Based on ancient cooling technology proven over centuries

(b) Why sand must be kept moist: (2 marks)

Sand must be kept moist in a pot-in-pot cooler because:
• The cooling effect depends on continuous evaporation of water
• If the sand dries out, there will be no water available to evaporate
• Without evaporation, the cooling effect will stop
• Moist sand acts as a reservoir of water
• It ensures continuous supply of water to the pot surfaces for evaporation
• The rate of cooling is directly related to the rate of evaporation
• Keeping sand moist maintains optimal cooling performance
• Regular watering of sand is necessary, especially in hot weather when evaporation is rapid

SECTION E - Answers to Case Study Based Questions

19. Case Study 1 - The Atmospheric Water Generator

(a) An AWG machine works on the principle of condensation of water vapour. It extracts water from humid air by cooling it below its dew point, causing the water vapour to condense into liquid water. (1 mark)

(b) It is necessary to cool the air because water vapour condenses (converts to liquid water) only when it comes in contact with a cold surface or when air is cooled sufficiently. At lower temperatures, air cannot hold as much water vapour, so the excess water vapour condenses into liquid form. This is the same principle we see when water droplets form on a cold glass. (1 mark)

(c) An AWG machine would not work well in desert areas because deserts have very low humidity. There is very little water vapour in the desert air to extract. The machine needs humid air to be effective. With minimal water vapour available, the machine would produce very little or no water, making it inefficient and impractical for use in dry climates. (1 mark)

(d) The water collection process in an AWG is similar to dew formation in the following ways:
• Both involve condensation of water vapour from air
• Both occur when water vapour comes in contact with a cold surface
• In dew formation, water vapour condenses on cold surfaces (like grass) in the morning
• In AWG, water vapour condenses on artificially cooled surfaces inside the machine
• Both processes convert invisible water vapour into visible liquid water (1 mark)

20. Case Study 2 - Saving Water Through Understanding Evaporation

(a) Watering in the afternoon was causing more water wastage because the temperature is highest during afternoon. High temperature increases the rate of evaporation significantly. Much of the water evaporated quickly before it could be absorbed by the soil and reach the plant roots. Thus, less water was available for the plants, and more was wasted through evaporation. (1 mark)

(b) Watering in the morning or evening helps in water conservation because:
• Temperature is lower during these times
• Lower temperature means slower rate of evaporation
• More water gets absorbed by the soil and reaches plant roots
• Less water is lost to the atmosphere through evaporation
• Plants get adequate time to absorb water before temperature rises
• Overall water requirement decreases as wastage is minimized (1 mark)

(c) Mulching helps in reducing water loss through the following ways:

1. Reduces direct exposure to sunlight:
• The layer of dried leaves and grass acts as a protective cover over the soil
• It prevents direct sunlight from falling on the moist soil
• This reduces the temperature of the soil surface
• Lower temperature means slower evaporation

2. Reduces exposed surface area:
• Mulch covers the soil surface, reducing the area exposed to air
• Less surface area means less evaporation can occur
• The mulch layer traps moisture beneath it

3. Additional benefits:
• Mulch slows down air movement at the soil surface, further reducing evaporation
• It keeps soil temperature more stable
• Ultimately, plants need less frequent watering, saving water and effort

This is why mulching is considered an excellent water conservation technique in agriculture and gardening. (2 marks)

Made with ❤ by Sumeet Sahu

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