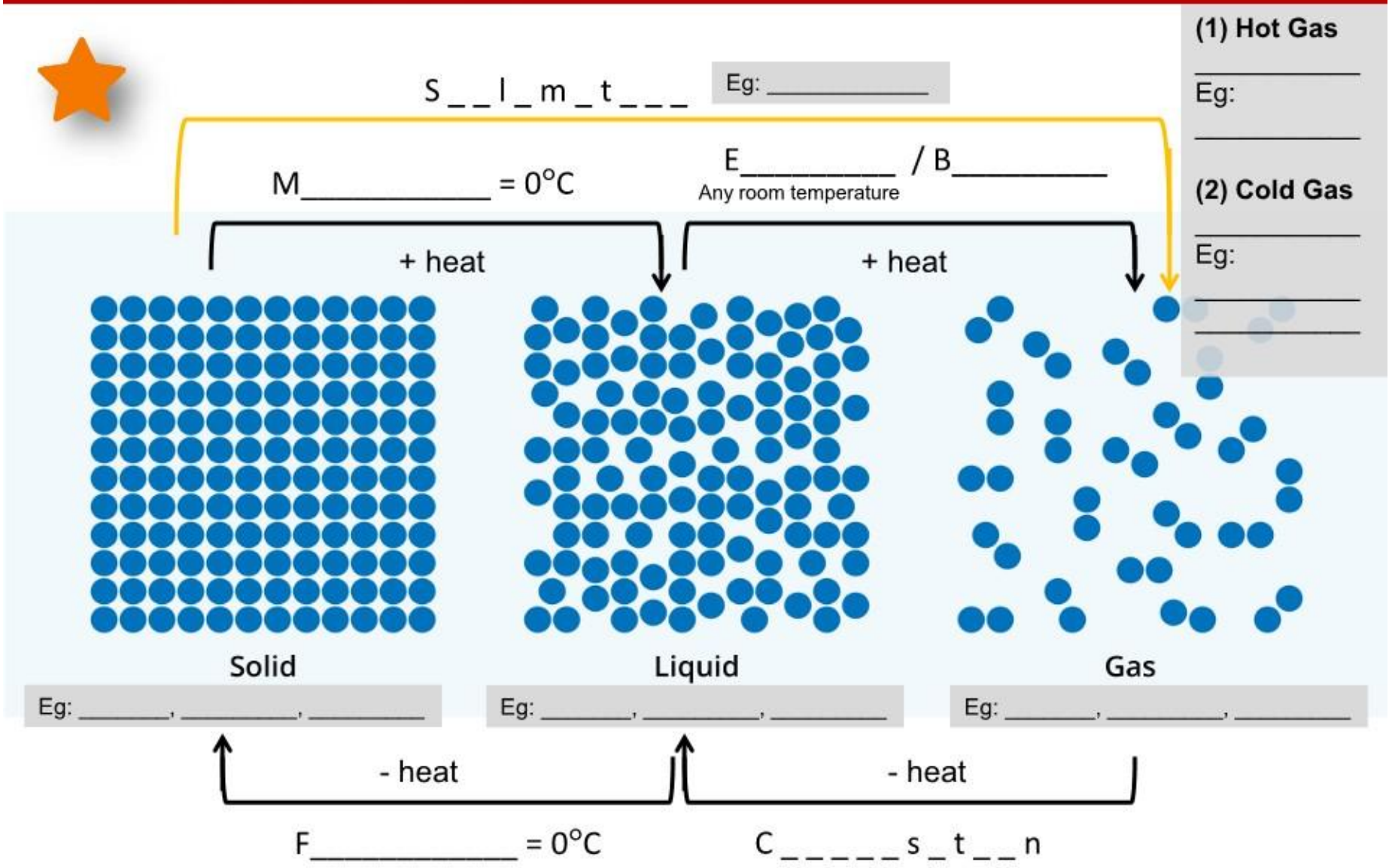
Chapter 1 – Water Cycle



Factors Affecting Evaporation

1. **Temperature** → _____ , _____

2. **Wind** → _____ , _____

3. **Surface Area** → _____ , _____

4. **Humidity** → _____ , _____

What Is Humidity?

_____

_____

_____

Properities Of Water

	Solid	Liquid	Gas
1. Definite Shape	✓	X	X
2. Definite Volume	✓	✓	X
3. Can be compressed	X	X	✓

Use Of Water

1. **Homes**

   a) _____, (b) _____, (.c) _____,

2. **Industries**

   a) Steam = _____,

   b) Water = _____,

   c) Water = _____,

3. **Agriculture**

   a) _____, (b) _____, (.c) _____,

4. **Leisure**

   a) _____, (b) _____, (.c) _____,

Water Pollution

(1) Oil Spills

(2) Discharge of Industrial Waste

(3) Littering & Dumping

(4) Deforestation

Water Conservation (3R)

Reduce

a) _____,

b) _____,

c) _____,

2. **Reuse**

a) _____,

b) _____,

c) _____,

3. **Recycle**

a) _____,

b) _____,

c) _____,

EXPERIMENTS

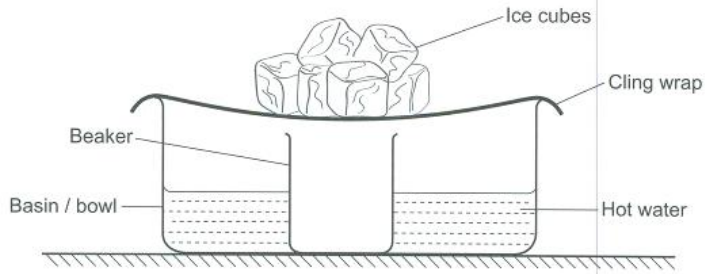
Experiment 1

Materials needed:

- Cling wrap
- 1 large basin / bowl
- 1 small beaker
- Bunsen burner
- Some water
- Some ice

Steps:

1. Boil the water using the Bunsen burner.
2. Pour the boiling water into the large basin / bowl.
3. Place the empty beaker in the middle of the large basin / bowl.
4. Cover up the large basin / bowl with a cling wrap.
5. Place some ice cubes in the middle of the cling wrap.
6. Wait for 5 – 10 minutes and record your observation.



- What is collected in the beaker?

Pure water.

- Explain your observation stated above.

The warm water vapour from the hot water condensed on the cooler surface of the cling wrap to form tiny water droplets. When the water droplets accumulate and became heavier, they fall back into the beaker.

- What does each of the following represent in nature's water cycle?

Hot water : **Sea / Ocean / Water bodies**
Beaker : **Land**
Ice cubes and cling wrap : **Cooler atmosphere**

EXPERIMENTS

Experiment 2

Materials needed:

- 2 thermometers
- Boiling ater
- Salt
- 2 beakers
- Ice cubes
- Bunsen burner

Steps:

1. Place the thermometer in a beaker of boiling water.
2. Observe the temperature on the thermometer until it reaches a constant temperature.
   - What is the constant temperature observed?

     100°C
   - The temperature mentioned above is known as the **boiling** point.

Steps:

1. Place the thermometer in a beaker of ice cubes.
2. Observe the temperature on the thermometer until it reaches a constant temperature.
   - What is the constant temperature observed?

     0°C
   - The temperature mentioned above is known as the **melting** point.

Steps:

1. Add salt to a beaker of boiling water.
2. Continue to boil the beaker of water.
3. Observe the temperature on the thermometer.
   - What is observed about the temperature of the water?

     The temperature increased.
   - Explain your observation.

     Salt increases the boiling point of water.

Steps:

1. Add salt to a beaker of boiling water.
2. Observe the temperature on the thermometer.
   - What is observed about the temperature of the melting ice cubes?

     The temperature decreased.
   - Explain your observation.

     Salt decreases the melting point of ice.

EXPERIMENTS

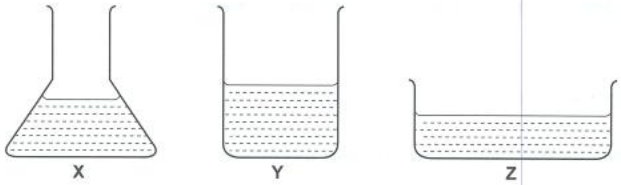
Experiment 3

Materials needed:

- 3 different containers
- Some water

Steps:

1. Fill each container with the same amount of water.
2. Place all 3 containers at the same location.
3. Measure the amount of water in each container after 2 days.



- What can be observed about the volume of water in the three containers after 2 days?

  Container Z has the least amount of water left, followed by Container Y, then Container X.

- Explain your observation.

  The water in Container Z has the greatest exposed surface area. Thus, the water in Container Z can gain the most heat to evaporate the fastest, followed by Container Y, then Container X.

- What can be concluded from this experiment?

  The greater the exposed surface area of the water, the higher the rate of evaporation.

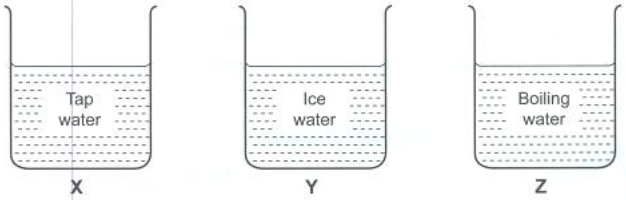
Experiment 4

Materials needed:

- 3 identical beakers
- 150 ml of tap water
- 150 ml of ice water
- 150 ml of boiling water

Steps:

1. Fill the 3 beakers; X, Y and Z, with tap water, ice water and boiling water respectively.
2. Place all 3 containers at the same location.
3. Measure the amount of water left in the containers after 1 day.



- What can be observed about the volume of water in the three containers after 1 day?

  Container Z has the least amount of water left, followed by Container X, then Container Y.

- Explain your observation.

  The temperature of the water in Container Z was the highest. Thus, the water had the most heat energy to evaporate the fastest, followed by Container X, then Container Y.

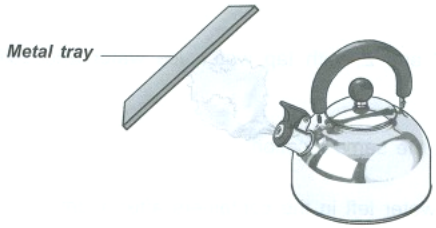
- What can be concluded from this experiment?

  The higher the temperature, the higher the rate of evaporation.

WORKED EXAMPLES

Experiment 1

Mary is boiling some water in a kettle. She places a metal tray near the spout of the kettle.



(a) What will she observe on the underside of the metal tray? (1m)

(b) Explain how the substance mentioned in (a) was formed (1m)

Thought Process:

Topic	:	Water cycle
Key Concept(s)	:	Condensation occurs when warm water vapour comes in contact with a cooler surface.
Key Words / Key Phrases	:	(a) water droplets (b) hot steam, cooler surface, condensed, form water droplets
Process Skills	:	Observing, Communicating, Inferring, Predicting

Answers:

(a) **Water droplets.** (1m)

(b) The **hot steam** from the boiling water comes in contact with the **cooler surface** of the metal tray and **condensed** to **form water droplets.** (1m)

Experiment 2

Mrs Ling hung out 3 similar towels early in the morning. She recorded the time taken for each towel to dry completely.

Towel	Description	Time when the towel dried completely
A	Not folded	By noon
B	Folded once, into halves	By early evening
C	Folded twice, into quarters	By the next morning

(a) What is the relationship between the number of folds and the time taken for the towels to dry? (1m)

(b) Explain why it took the shortest time for Towel A to dry. (1m)

Thought Process:

Topic	:	Water cycle
Key Concept(s)	:	The greater the exposed surface area, the faster the water evaporates.
Key Words / Key Phrases	:	(a) Greater number of folds, longer time taken to dry (b) Towel A was not folded, water in the towel had the greatest exposed surface area, gain the most amount of heat to evaporate the fastest
Process Skills	:	Observing, Communicating, Comparing, Inferring, Analysing

Answers:

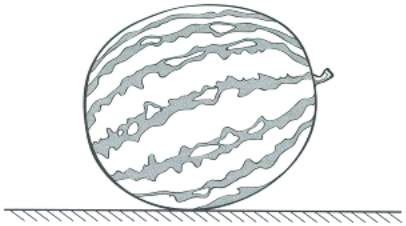
(a) The **greater the number of folds**, the **longer the time taken for the towel to dry**. (1m)

(b) **Towel A** was **not folded**, thus the **water in the towel had the greatest exposed surface area to gain the most amount of heat to evaporate the fastest**, causing the towel to dry the fastest. (1m)

WORKED EXAMPLES

Experiment 3

Mandy took a watermelon out of the refrigerator and placed it on a table.



(a) What would she see on the surface of the watermelon after a few minutes (1m)
(b) Explain what happened in Part (a). (1m)

Thought Process:

Topic	:	Water cycle
Key Concept(s)	:	Condensation occurs when warm water vapour comes in contact with a cooler surface.
Key Words / Key Phrases	:	(a) Water droplets (b) Warm water vapour, cooler surface, condensed, form water droplets
Process Skills	:	Observing, Communicating, Inferring, Predicting

Answers:

(a) **Water droplets**. (1m)

(b) The **warm water vapour** in the surrounding air came in contact with the **cooler surface** of the watermelon and **condensed** to **form water droplets**. (1m)

Notes