

## **UNIT 4**

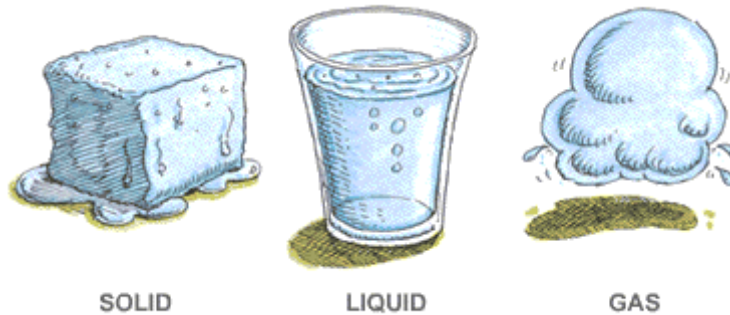
# **WATER AND APPLICATION OF WATER**



**SESSION 13**

**WATER**

⇒ **STARTER:** Look at the pictures and share your ideas with the group.



**Step 1.** Answer the following questions and try to predict what is going to be discussed in the session.

- What do you see in the pictures?
- What forms (states) of water are described in them?
- What is the difference between the forms?

**Step 2.** Read the Reading Passage.

Water is the source of life and civilization. Without it nothing can survive in the world. Humanity can develop only on the base of water and everything in the nature is balanced because of the water. That's why it is considered as the most essential and needful element of all.

**Water** (H<sub>2</sub>O) is the most abundant compound on Earth's surface, covering about 70 percent of the planet. Naturally, water exists in liquid, solid, and gaseous states. Usually we meet indynamic equilibrium between the liquid and gas states at standard temperature and pressure. At room temperature, it is

a tasteless and odorless liquid, nearly colorless with a hint of blue.

Perhaps, you have already observed that many substances dissolve in water and that's why it is commonly referred to as *the universal solvent*. Because of this, water in nature (or natural water as we call it) and in use is rarely pure. Analogically, some of its properties may vary slightly from those of the pure substance (However, there are also many compounds that are essentially, if not completely, insoluble in water).

Do you know water is the only unique substance found naturally in all three common states of matter? Yes, it is the three-stated element and *it is essential for all life on Earth*. Another interesting fact is that water usually makes up 55% to 78% of the human body. It says about necessity of it in the life and great demand of it for human being is growing day by day.

**Step 3.** Fill in the gap of the following statements and explain the meaning of the missing words.

In nature, ... exists in liquid solid, and gaseous states. It is in ... between the ... and gas states at standard temperature and pressure. At....., it..... and odorless liquid, nearly colorless with a .... .

Many substances dissolve in water and it is commonly referred to as *the universal*... .

**Step 4.** Do the following statements agree with the information in Reading Passage?

- YES (Y) *if the statement agrees with the information*
- NO (N) *if the statement contradicts the information*
- NOT GIVEN (NG) *if there is no information on this passage*

The first decomposition of water into hydrogen and oxygen, by	
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## HELP DESK

### WHAT DO THESE WORDS MEAN?

**water** – a colorless, transparent, odorless, liquid which forms the seas, lakes, rivers, and rain and is the basis of the fluids of living organisms

**compound** – a thing that is composed of two or more separate elements; a mixture

**liquid** – a substance that flows freely but is of constant volume, having a consistency like that of water or oil

**tasteless** – 1) lacking flavor 2) considered to be lacking in aesthetic judgment or to constitute inappropriate behavior

**solvent** – the liquid in which a solute is dissolved to form a solution ■ a liquid, typically one other than water, used for dissolving other substances ■ something that acts to weaken or dispel a particular attitude or situation

**state of matter** – a physical condition as regards internal or molecular form or structure

**heavy water** – water in which the hydrogen in the molecules is partly or wholly replaced by the isotope deuterium, used especially as a moderator in nuclear reactors

**temperature scale** – temperature condition





**Step 3.** Match the statements in the box A with the words in the box B.

A	B
composed of molecules that move freely among themselves but do not tend to separate like those of gases	nuclear
Having a grainy or granulated surface	deuterium
an isotope of hydrogen with one proton and one neutron in the nucleus having an atomic weight of 2.014.	gas
relatively great expansion and contraction with changes in pressure and temperature	granular
pertaining to or involving atomic weapons	solid
Firm or compact in substance	liquid

**Step 4.** List *adjective + noun* word combination from the text.

Word combinations	Paragraph

**Step 5.** Complete the sentences by your own understandings.

Solid water – \_\_\_\_\_

\_\_\_\_\_ .

Heavy water – \_\_\_\_\_

\_\_\_\_\_ .

Light water – \_\_\_\_\_

\_\_\_\_\_ .



**HELP DESK**

**WHAT DO THESE WORDS MEAN?**

**liquid phase** – a distinct period or stage in a process of change or forming part of liquid's development

**solid phase** – firm and stable in shape phase; not liquid or fluid

**granular** – resembling or consisting of small grains or particles

**crystal** – a piece of a homogeneous solid substance having a natural geometrically regular form with symmetrically arranged plane faces

**ice cube** – a small block of ice made in a freezer, especially for adding to drinks

**amorphous** – without a clearly defined shape or form

**gaseous phase** – relating to or having the characteristics of a gas

**water vapor** – water in the gaseous state, esp. when due to evaporation at a temperature below the boiling point

**supercritical fluid** – above a critical a substance that has no fixed shape and yields easily to external pressure; a gas or (especially) a liquid critical temperature

**critical pressure** – the pressure of a gas or vapour in its critical state

**hydrothermal vent** – an opening in the sea floor out of which heated mineral-rich water flows

**volcanic plume** – a long cloud of smoke or vapour resembling a feather as it spreads from its point of origin as a result of volcano

**deuterium** – a stable isotope of hydrogen with a mass approximately twice that of the usual isotope (Symbol: D)

**heavy water** – the water in which the hydrogen in the molecules is partly or wholly replaced by the isotope deuterium, used especially as a moderator in nuclear reactors

**neutron** – a subatomic particle of about the same mass as a proton but without an electric charge, present in all atomic nuclei except those of ordinary hydrogen

**light water** – the water containing the normal proportion (or less) of deuterium oxide, i.e. about 0.02 per cent, especially to distinguish it from heavy water





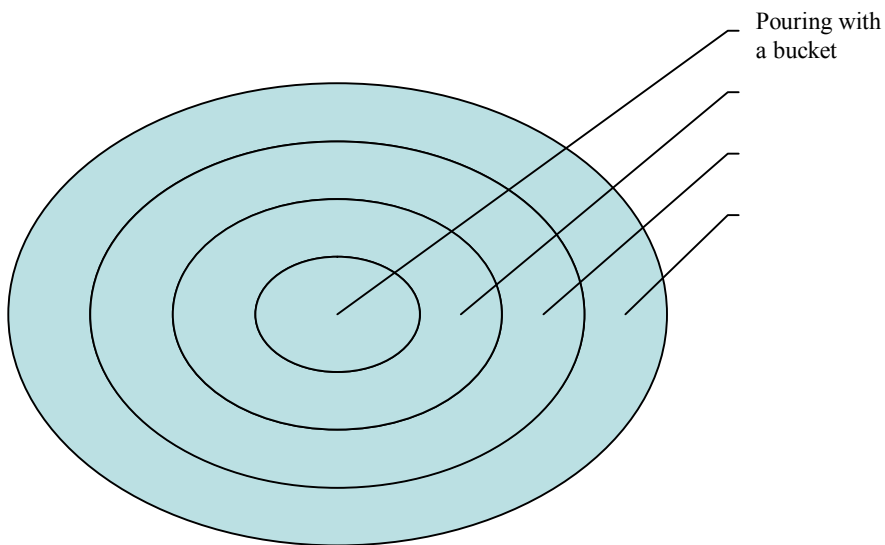
**Step 3.** Choose the title for the passage. Explain the reason of your choice.

**Step 4.** Put headings to the paragraphs.

Headings	Paragraphs
Water returning to the environment	
Ancient people and irrigation	
No very long surveying without irrigation	
Artificial application of water	
Irrigation throughout the world	

**Step 5.** Complete the mind-map according to the text and fill in the columns. Compare the features and give explanation of each choice.

### History of Irrigation



**HELP DESK**

**WHAT DO THESE WORDS MEAN?**

**irrigation** – supplying water to land or crops by different means

**fresh water** – clean water

**large-scale farming** – involving large numbers or a large area of farm culture

**river** – a large natural stream of water flowing in a channel to the sea, a lake, or another river

**lake** – a large area of water surrounded by land

**reservoir** – a large natural or artificial lake used as a source of water supply

**well** – a shaft sunk into the ground to obtain water, oil, or gas

**seed** – a small object of flowering plant, capable of developing into another such plant

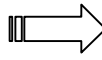
**first plant** – beginning crop

**irrigation technique** – watering technology

**water source** – water resource; a place, where a river or stream begins

**SESSION 16**

**IRRIGATION: ARTIFICIAL APPLICATION OF WATER**

 **STARTER:** Answer the following questions:

- What are the natural and artificial applications of water?
- How do you define the terms “usable”, “unusable”, and “reusable”, towards the water?
- What do you know about returning the water used by human to the environment?
- Describe the ways of losing water in use.

**Step 1.** Read the Reading Passage.

Water is an essential element for our being and surviving. When we use water in our home, or when an industry uses water, about 90 percent of the water used is eventually returned to the environment where it replenishes water sources (water goes back into a stream or down into the ground) and can be used for other purposes. But only about one-half of the water used for irrigation, is reusable. The rest is lost by evaporation into the air, evapotranspiration from plants, or is lost in transit, by a leaking pipe, for example.

We used to call irrigation as the artificial application of water to the land or soil, because natural sources of watering the plants (raining, snowing, flooding etc.) aren't irrigation means as themselves. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in

preventing soil consolidation. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dryland farming. Irrigation systems are also used for dust suppression, disposal of sewage, and in mining. Irrigation is often studied together with drainage, which is the natural or artificial removal of surface and sub-surface water.

**Step 2.** Do the following statements agree with the information in Reading Passage? In boxes 1-3 on your answer sheet write. Time – 5 min.

- YES (Y) *if the statement agrees with the information*  
 NO (N) *if the statement contradicts the information*  
 NOT GIVEN (NG) *if there is no information on this passage*

N	Irrigation is the natural application of water to the land or soil.
	Irrigation systems are also used for dust suppression, disposal of sewage, and in mining.
	Irrigation is seldom studied together with drainage, which is the natural or artificial removal of surface and sub-surface water.
	Water for irrigation is lost by leaking pipes.

**Step 3.** Find the words to the definitions.

Definitions	Words
a formal request for assistance, employment, admission to a school, etc.	<i>application</i>
preparing the land to grow crops.	
to continue living.	
the supplying of water to dry land.	

**Step 4.** Using NO MORE THAN THREE WORDS from the passage, answer the

following questions. Write your answers in the lines below.

1. What kind of application deals the irrigation with?

Irrigation deals with the artificial application of water.

2. Is irrigation the artificial application of water to the land or soil?

\_\_\_\_\_.

3. Is drainage considered as the natural or artificial removal of surface and sub-surface water?

\_\_\_\_\_.

**Step 5.** Write adverbs for the given adjectives and make up sentences using them.

Essential	<i>essentially</i>	<i>That blessed union has contributed so essentially to the prosperity of both countries.</i>
Artificial		
Natural		
Additional		
Eventual		

**Step 6.** Make some notes on the topic, including returning water to the environment (1), artificial application of water (2) and wide usage of irrigation in the world and in your area. Base your ideas on your own understanding and experience.

1. \_\_\_\_\_.
2. \_\_\_\_\_.
3. \_\_\_\_\_.



## HELP DESK

### WHAT DO THESE WORDS MEAN?

**reusable** – an attribute for the things or actions which can be used more than once

**leaking** – be accidentally lost or admitted through a hole or crack in a container or covering

**pipe** – a tube used to convey water, gas, oil, or other fluid substances

**transit** – the carrying of people or things from one place to another

**maintenance** – the process of preserving a condition or situation or the state of being preserved

**landscape** – all the visible features of an area of land; a picture of an area of countryside

**revegetation** – production a new growth of vegetation on (disturbed or barren ground)

**disturbed soil** – having had the anormal pattern of soil or functioning disrupted

**inadequate** – lacking the quality or quantity required; insufficient for a purpose

**rainfall** – the fall of rain ■ the quantity of rain falling within a given area in a given time

**soil consolidation** – the act of solidification of soil or state of being consolidated of soil

**dust suppression** – the action of depressing (lowering) of moving soil (dust)

**sewage** – waste water and excrement conveyed in sewers

**mining** – the process or industry of obtaining coal or other minerals from a mine

**sub-surface** – the stratum or strata (layer of earth) below the earth's surface

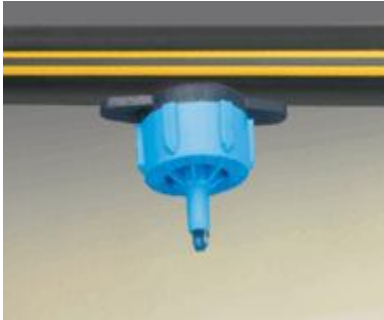
**evaporation** – turning from liquid into vapour

**evapotranspiration** – the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants

SESSION 17

TYPES OF IRRIGATION

⇒ **STARTER:** Look at the pictures below and tell your understanding.



**Step 1.** Skimming the text quickly try to order passages and make the whole topic.

Do you know what is drip irrigation and how does it function? **Drip irrigation**, also known as *trickle irrigation*, functions as its name signs. The water in this system falls drop by drop just at the position of roots (water is delivered at or near the root zone of plants, drop by drop). It is important to manage this process properly that the method can be the most water-efficient method of irrigation.

It is known that various types of irrigation techniques (methods) differ in how the water obtained from the source distributed within the field. In general, the goal is to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little. The modern methods are efficient enough to achieve this goal. The irrigation techniques are commonly divided into drip irrigation, surface irrigation and localised irrigation.

<input type="checkbox"/>	In <b>surface irrigation</b> systems, water moves over and across the land by simple gravity flow in order to wet it and to infiltrate into the soil. Surface irrigation can be subdivided into <i>furrow, borderstrip or basin irrigation</i> . It is often called <b>flood irrigation</b> when the irrigation results in flooding or near flooding of the cultivated land. Historically, this has been the most common method of irrigating agricultural land.
<input type="checkbox"/>	<b>Localized</b> irrigation is a system where water is distributed under low pressure through a piped network, in a pre-determined pattern, and applied as a small discharge to each plant or adjacent to it. Drip irrigation, spray or micro-sprinkler irrigation and bubbler irrigation belong to this category of irrigation methods.

**Step 2.** Choose the title for the passage. Explain your choice.

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**Step 3.** Match each topic in A with two items in B.

A	B
Drip irrigation	applied as a small discharge to each plant
	subdivided into <i>furrow, borderstrip or basin irrigation</i>
Surface irrigation	water is distributed under low pressure
	water falls drop by drop
Localized irrigation	trickle irrigation
	flood irrigation

**Step 4.** Fill in the gaps and complete the text with the words in the box.

Water	Types	Source
Plant	Efficient	Supply

*Various ... of irrigation techniques differ in how the water obtained from the ... distributed within the field. In general, the goal is to ... the entire field uniformly with ..., so that each ... has the amount of water it needs, neither too much nor too little. The modern methods are ... enough to achieve this goal.*

**Step 5.** Pay attention to the topic sentences and complete with controlling ideas.

4. The water in this system falls drop by drop just at the position of roots.

*It deals with the drip irrigation technique.*

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5. In general, the goal is to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little.

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6. It is often called **flood irrigation** when the irrigation results in flooding or near flooding of the cultivated land.

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7. Drip irrigation, spray or micro-sprinkler irrigation and bubbler irrigation belong to this category of irrigation methods.

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## HELP DESK

### WHAT DO THESE WORDS MEAN?

**drip irrigation** – watering grounds/plants/crops by the means of falling water drop by drop

**trickle irrigation** – the supply of a controlled restricted flow of water to a number of points in a cultivated area

**position of root** – placing of root

**root zone** – the part of a plant which attaches it to the ground or to a support, typically underground, conveying water and nourishment to the rest of the plant via numerous branches and fibers

**water-efficient method** – water-saving method

**surface irrigation system** – irrigating system below the earth's surface

**flood irrigation** – watering with an overflow of a large amount of water beyond its normal limits, especially over what is normally dry land

**localized irrigation** – local watering



**SELF-CONTROL on UNIT 4 (total 15 points)**

**Step 1. VOCABULARY CHECK (5 points).** These are the important words that you have studied in Unit 4. You should make sure that you know these words before you go on to Unit 5.

compound	localized irrigation
deuterium	neutrons
drip irrigation	position of root
evaporation	reservoir
evapotranspiration	river
first plant	root zone
fresh water	seed
floodwater harvesting	solid phase
granular	sprinkler or overhead irrigation
heavy water	surface irrigation system
hydrothermal vent	supercritical fluid
irrigation	temperature scale
irrigation technique	trickle irrigation
lake	volcanic plume
large-scale farming	water-efficient method
light water	water vapor
liquid phase	well

**Step 2. TRUE-FALSE ACTIVITY (5 points).** Which of the following bits of information is given (G) or not given (NG) in Unit 1?

1. Iceberg of the world considered one of the sources of water. \_\_\_\_\_
2. Before water component was divided into hydrogen and oxygen part. \_\_\_\_\_
3. Gaseous type of water is mostly can be crystal and takes hard. \_\_\_\_\_

4. Farming, fruits, vegetables and grains are not mostly dealt with irrigation. They are not essential. \_\_\_\_\_

5. Artificial application of water named as an irrigation means. \_\_\_\_\_

**Step 3. COMPREHENSION TASK (5 points).** Read and explain the meaning of the following proverbs and wise-sayings on gardening and planting. Underline metaphorical and specific usage of some expressions.

- 1. A hive of bees in May is worth a load of hay.*
- 2. A lawsuit is a fruit-tree planted in a lawyer's garden.*
- 3. A patent on seeds is a patent on freedom. If you have to pay for patented seeds, it's like being forced to buy your own freedom.*
- 4. A plant is like a self-willed man, out of whom we can obtain all which we desire, if we will only treat him his own way.*
- 5. Advances in medicine and agriculture have saved vastly more lives than have been lost in all the wars in history.*

