

## **TOPIC -1. Solids, Liquids, and Gases**

Matter is basically a substance that takes up space. All matter is a solid, liquid, or gas, and they are called the states of matter.

Everywhere a person looks, there are examples of solids: desks, chairs, windows, rocks, tissues, and much more. Examples of liquids: water, milk, juice, chocolate syrup, soda, and others. Examples of gases are harder to see, because they are invisible: the oxygen in the air, propane gas used for a grill, helium inside a balloon, and more.

Everything, all matter, can be identified as a solid, liquid, or gas.

Besides what they look like, there are many differences between solids, liquids, and gases. These differences are called characteristics. The characteristics of each state of matter are different. These characteristics determine if a substance is a solid, liquid, or gas.

A solid has a definite shape. It can be hard or soft, smooth or rough. Solids can come in all sizes. A solid can be large like the Statue of Liberty, or small like a marble. It can be very tiny like a bread crumb, or as big as a mountain, and everything in between. If small enough, solids can be held in a person's hand, and they are difficult to compress or push, or change shape.

The molecules of a solid are compact and close together, and nearly impossible to move through.

A liquid takes the shape of the container it is held in, and will fill the bottom of a container. Liquids usually have a smooth surface, but does not have a specific size. A person may be able to hold a small amount of liquid in their hand, but a liquid cannot be held like a solid. Liquids are less difficult to compress or push. It is much easier to move through a liquid than a solid.

The molecules of a liquid are spread out more than a solid, but less than a gas.

Finally, a gas has no shape, but can fill a container or any size or shape. It will fill an entire container as the molecules move. A gas cannot be felt in the hands like a solid or liquid. It has no surface or no particular size. It cannot be held in a person's hands, and it is easy to push or compress. A gas is the easiest to move through versus a liquid or solid.

The molecules in a gas are more spread out and move all the time. They are full of energy.

Water is the best example of a substance that can be a solid, liquid, or gas. Water by itself is a liquid. When water freezes it becomes a solid. If a container of water is heated it turns into a gas called water vapor.

There are many other substances that can be more than one type of matter, too. Ice cream is a solid until it melts, then it's a liquid. A mothball is a solid, but it releases a gas that a person can smell across the room.

In summary, the different states of matter are called solids, liquids, and gases. The states of matter have different characteristics and examples of each can be found throughout the universe.

## Questions

Ques-1) choose the correct options.

A)-- Which of the following states of matter has no surface or particular size?

A: Solid

B: Liquid

C: Gas

D: Both b and c

B)-- Which of the following describes the molecules in a solid?

A: The molecules are spread out and have lots of energy.

B: The molecules are spread out some, but less than a gas.

C: The molecules can easily be moved through.

D: The molecules are compact and close together.

Ques-2)-- What is matter? What are their states?

Ans: Matter is basically a substance that occupies space.

It exists in three states:

1. Solid,

2. Liquid,

3. Gases

Ques-3)-- Why are gas molecules loosely packed?

Ans: Gas molecules have high kinetic energy in them. Therefore they are able to overcome the force of attraction between them and as a result they spread from each other.

Ques-4)-- 9) How increase in temperature effect the states of matter? Give example.

Ans: Change in temperature leads to the change in kinetic energy of molecules and effect the force of attraction between them. As temperature inceases, molecules spread from each other and solid change in liquid and liquid changes to gas.

Ex: Ice on heating become water and water on heating become vapour.

Ques-5)-- Write the characteristic of molecules of matter?

Ans. Characteristics of molecules of matter are as follows:

- 1.Exists in three states.
- 2.Made up of molecules and atoms.
- 3.Molecules of matter have kinetic energy in them.

## **TOPIC-2.Atmosphere and Air Temperature**

The Earth's atmosphere is the area between the Earth's surface and the edge of space. It acts as a thin blanket between the sun and the Earth. The heat from the sun has an effect on the temperature of the air. The heat from the sun is transmitted through the atmosphere and the Earth's surface becomes heated. The sun warms the Earth throughout the year but at different temperatures due to several variables.

The air temperature of an area, whether cold or hot depends upon the angle at which the Earth is tilted, and will affect the amount of heat an area of the Earth receives. Air temperature is the measure of how hot or cold the air is and can be measured by using a thermometer.

The hottest area of the Earth is near the equator. The equator is an imaginary line forming a great circle around the Earth's surface separating the Earth into the Northern and Southern hemispheres. The equator is the hottest area because the sun's path is directly above the Earth in that location.

Unlike the equator, the north and south poles are the coldest places on the Earth because the sun is at a low angle in that area. Even though the sun is closer to Earth's surface in that area, the sun's rays are much weaker. There is not a direct path like at the equator.

Another variable affecting the temperature of the air is called insolation. The angle of insolation is the angle at which sunlight strikes the Earth's surface. Isolation is short for incoming solar radiation, which is the amount of the Sun's energy that reaches Earth at a given place and time.

Sunlight warms the Earth in summer and winter. The amount of heat depends on the angle of insolation. The greater the angle, the warmer it gets. Since the angle is always less at the poles, it is colder in those areas. Because of the tilt of the Earth, if it is freezing in one part of the world, it is hot in another part.

The time of day also has an effect on the temperature of the air. In the morning the sun is close to the horizon, and at mid-day the sun is higher up in the sky. After mid-day the sun is again lower in the sky. These changes, due to the tilt of the Earth, is the reason it is warmer during the mid-day and cooler in the mornings and evenings.

The next variable affecting the temperature of the air in an area is the texture of the Earth's surface in that area. The texture of the Earth is how smooth or rough the surface is. Rough textures cause light to bounce around at many angles and more of the sun's heat is absorbed the surface. This cause the areas to become hotter.

Finally, dark colors get hotter than light colors in the same light. Dark soils and rocks can also get very hot. On the other hand, plants help keep an area cooler in the sunlight.

In summary, the Earth's atmosphere is like a very thin blanket in which the sun's rays pass through at different angles. The angles are called angles of insolation and is the amount of energy reaching Earth at a given place and time. The hottest area of the Earth is at the equator. There are many variables affecting how hot or cold the air is, which is also called the air temperature. Other variables include the texture of the Earth and the colors of objects that are absorbing the sun's rays.

1) Which of the following is the amount of the sun's energy that reaches the Earth at a given place and time?

- A: Atmosphere
- B: Insolation
- C: Thermometer
- D: Texture

2) Which of the following is the area between the Earth's surface and the edge of space?

- A: Insolation
- B: Radiation
- C: Hemisphere
- D: Atmosphere

3) Which of the following is a measure of how hot or cold the Earth is?

- A: Temperature

- B: Thermometer
- C: Atmosphere
- D: Radiation

4) A thermometer is used to measure which of the following?

- A: Rainfall
- B: Humidity
- C: Temperature
- D: Wind speed

5) Which of the following means incoming radiation?

- A: Insulation
- B: Insolation
- C: Atmosphere
- D: Equation

6) All of the following has an effect on the air temperature of the Earth EXCEPT:

- A: Tilt of the Earth
- B: Texture
- C: Colors
- D: All of the above

7) Define the term Atmosphere? How it affect earth\*s surface?

Ans) The Earth's atmosphere is the area between the Earth's surface and the edge of space. It acts as a thin blanket between the sun and the Earth.

The heat from the sun has an effect on the temperature of the air. The heat from the sun is transmitted through the atmosphere and the Earth's surface becomes heated.

8) What is an angle of insolation?

Ans) Another variable affecting the temperature of the air is called insolation. The angle of insolation is the angle at which sunlight strikes the Earth's surface. Isolation is short for incoming solar radiation, which is the amount of the Sun's energy that reaches Earth at a given place and time.

9) What kind of changes occurs due to the tilt of the earth?

Ans) The time of day also has an effect on the temperature of the air. In the morning the sun is close to the horizon, and at mid-day the sun is higher up in the sky. After mid-day the sun is again lower in the sky. These changes, due to the tilt of the Earth.

10) Define the role of the equator?

Ans) The equator is an imaginary line forming a great circle around the Earth's surface separating the Earth into the Northern and Southern hemispheres. The equator is the hottest area because the sun's path is directly above the Earth in that location.

### **TOPIC-3. Water Vapor and Humidity**

When an object is cool and warm air touches the cool object, the air cools and droplets of water forms on the outside of the object. This is the result of the hot and cold air coming into contact with each other. This water in the air is called water vapor. Water vapor is in the form of a gas.

Characteristics of water vapor include it being colorless, odorless, invisible, and has no taste. Humidity is the amount of water vapor in the air. When the in the air turns into a gas it is called evaporation.

Water vapor gets into the air day through the process of evaporation. Ocean water, and other bodies of water, is turned into water vapor using the energy from the sun. The molecules of the water is absorbed by the Sun's energy near the surface of the water which then evaporates into the air.

The changing of a gas into a liquid is called condensation. An example of condensation is the water which covers a mirror following a hot shower.

Another large source of water vapor in the air is when the plants absorb water through their roots and stems into their leaves. The leaves then give off water. The process of plants releasing water into the air is called transpiration.

All of the water in the air, whether it is from the world's ocean and other bodies of water, the water on a mirror following a hot shower, or the water a plant releases into the air; it is all called humidity because it is the amount of water vapor in the air.

When the air is filled with this water, the amount of water in the air can be measured. Another measurement used is called relative humidity. Relative humidity is a comparison between how much water is already in the air compared with how much water the air is able to hold at a certain temperature.

When the air can no longer hold the water vapor several things can happen. It may rain or snow depending on the temperature. The air could become foggy or misty, or dew may appear on the grass in the mornings. Another problem with too much water vapor in the air, especially in the summer, is it becomes very uncomfortable and people began to sweat very easily.

In summary, the water in the air is called water vapor. Water vapor in the air forms when cold air and warm air come in contact with each other. Examples include moisture on the outside of a cold glass, or a mirror after a hot shower, which is also called condensation. When this water is turned into a gas and is released into the air it is called evaporation. Plants also release water into the air during a process called transpiration. Finally, all of the water vapor in the air is called humidity. A comparison between how much water is already in the air compared with how much water the air is able to hold at a certain temperature is called relative humidity. When this happens there could be rain, snow, fog, or dew.

1) Which of the following forms is water vapor?

- A: Liquid
- B: Gas
- C: Solid
- D: All of the above

2) Which of the following best defines humidity?

- A: Amount of water in the air
- B: Amount of the sun's energy
- C: The force of water
- D: Water absorbed by plants

3) Which of the following takes place when the water is changed into a gas?

- A: Relative humidity
- B: Humidity

- C: Evaporation
- D: Condensation

4) Which of the following is an example of condensation?

- A: Water changing into a solid
- B: Water vapor changing into a liquid
- C: A gas changing into a solid
- D: A liquid changing into a gas

5) Relative \_\_\_\_\_ is a comparison between how much water is already in the air compared with how much water the air is able to hold at a certain temperature.

- A: Evaporation
- B: Transpiration
- C: Vapor
- D: Humidity

6) Which of the following is the process of plants releasing water into the air?

- A: Respiration
- B: Evaporation
- C: Transpiration
- D: Humidity

7) Define water vapour in which form does it exist?

Ans. When an object is cool and warm air touches the cool object, the air cools down and droplets of water forms on the outside of the object. This is the result of the hot and cold air coming in contact with each other. This water in the air is called water vapour. Water vapour exist in the form of gas.

8) For what purpose transpiration occur in plant? Through which parts of the plant absorbs water?

Ans. The process of transpiration occurs in plants to release water molecules in the form of vapour. The plants absorb water through their stems and root into their leaves.

9) How would you define humidity?

Ans. All of the water in the air whether it is world ocean and other water bodies of water, the water on the mirror following a hot shower, or a water plant releases into air, it is called humidity. It is the amount of water vapour in air.

10) Describe the situations if air is no longer able to hold the water vapour?

Ans. When the air is not able to hold the water vapour several things can happen. It may rain or snow depending upon the temperature. The air could be become foggy, misty or dew may appear on the grass. Another problem is in summer it becomes very uncomfortable and people began to sweat easily.

#### **TOPIC -4 .Air Masses and Fronts**

Air masses and fronts have an effect on the weather throughout the world, affecting everyone everywhere. An air mass is a large region of the atmosphere containing a volume of air defined by its temperature and moisture content. In an air mass the temperatures and amount of moisture is about the same throughout the region.

There are different air masses throughout the world which mostly control the weather in that region. In the United States, global winds tend to move air masses from east to west. When different air masses come together and meet the boundary is called a front. The air masses do not mix together. A front is the narrow area or boundary where the air masses meet. Along this front is where the weather changes most rapidly.

There are two fronts to be most familiar with and which are heard of most often. A cold front and a warm front. A cold front occurs at a warm air mass where the weather changes as cold air moves in. A warm front occurs when warm air moves over a cold air mass. Fog may also be a result of a warm front moving into a cold air mass.

Another type of front also involves a cold front and a warm front. An occluded front occurs when a cold front overtakes a warm front. When this happens the warm air is separated at the Earth's surface. When an occluded front occurs it is most likely lead to precipitation such as rain, snow, sleet, or hail, depending on the air temperature and season of the year. After the cold front passes though, the temperatures will usually begin to get warmer again.

One final type of front is called a stationary front. A stationary front occurs when a cold air mass and a warm air mass meet. There is usually a drastic temperature change before the cold and warm air masses meet as well as a change in the direction of the wind. The stationary front may also stay over an area for days or weeks, or sometimes even longer. It is not moving and the weather it brings changes very little.

On a weather map the different fronts are shown by different symbols and colors. A cold front is represented by a blue line with triangles pointing toward the direction of movement. A warm front is represented as a red line with half circles pointing toward the direction of movement. A stationary front is represented as an alternating warm and cold front symbol. An occluded front is represented as a purple line with teeth and half circles.

In summary, an air mass is a large region of the atmosphere containing a volume of air defined by its temperature and moisture content. When the air masses come together, the boundary between them is called a front. The four types of fronts include cold fronts, warm fronts, occluded fronts and stationary fronts. Cold and warm fronts bring cold and warm air, an occluded front is when a cold front takes over a warm front. Finally, a stationary front occurs when cold and warm air masses come together stays in one place for a short or long period of time. On weather maps there are different colors and symbols used to identify each of the fronts. The colors used include blue, red, and purple, along with lines, triangles, and half circles. The weather throughout the world is the result of air masses, cold fronts, and warm fronts.

1) Which of the following is a large region of the atmosphere containing a volume of air defined by its temperature and moisture content?

- A: Air pressure
- B: Air front
- C: Air mass
- D: Stationary air

2) The boundary between two air masses with different temperatures is called (a):

- A: Front
- B: Mass
- C: Pressure
- D: All of the above

3) Which of the following fronts is likely to cause fog?

- A: Cold front
- B: Warm front
- C: Occluded front

D: Stationary front

4) Which of the following statements is true?

A: A warm front occurs when cold air mass moves over warm air mass.

B: A warm front occurs when a cold air mass and a warm air mass meet.

C: A warm front occurs when a cold front overtakes a warm front.

D: A warm front occurs when a warm air mass moves over a cold air mass.

5) Which of the following occurs when a cold air mass and a warm air mass meet and stay in one place for a long or short period of time?

A: Stationary front

B: Occluded front

C: Warm front

D: Cold front

6) The separate blue line and red line on a weather map indicate which of the following two fronts?

A: Occluded and warm

B: Stationary and cold

C: Warm and cold

D: Occluded and cold

7) Name two types of fronts to be most familiar with?

Ans. The two types of fronts are : COLD FRONT- It occurs at a warm air mass where the weather changes as cold air. WARM FRONT- It occurs when warm air moves over a cold air mass.

8) What happens an occluded front occurs?

Ans. When a cold front overtakes a warm front the warm air is separated at the Earth's surface it lead to precipitation such as rain, snow, sleet or hail, depending on the air temperature and season of the year.

9)How does the different fronts are shown on a weather map by different symbols and colors ?

Ans. A cold front is represented by a blue line with triangles pointing toward the direction of movement. A warm front is represented by as a red line with half circles pointing toward the direction of movement. A stationary front is represented as a alternating warm and

cold front symbol. ,An occluded front is represented as a purple line with teeth and half circles.

10) The weather throughout the world is the result of air masses. .Comment on it.

Ans. Air masses is a large region of the atmosphere containing a volume of air and defined by its temperature and moisture content. In air mass the temperature and amount of moisture is about the same throughout the region.

## TOPIC- 5-ALL ABOUT NATURAL GAS

Natural gas as a source of energy is made up of four types of natural gas. It is called a fossil fuel, like coal and oil. Seventy to ninety percent of natural is composed of the natural gas methane. The remaining percent is made up of propane, butane, and ethane.

Natural gas is formed from bodies of dead animal buried the under pressure in the earth for thousands of years. These decomposed and are covered with rock and soil. The decomposed material goes deeper under the earth over time and meets hotter temperatures. The pressure higher temperatures cause a breakdown of carbon bonds. Methane is formed. It is called thermogenic Methane. Some can rise of the surface of the earth but be trapped in sedimentary basins made of rock. Holes must be drilled to reach these huge containers of natural gas.

These basins are found all over the world. Saudi Arabia, Alaska, and Venezuela are sites of natural gas drilling. Many states bordering the gulf of Mexico contain many of these basins also. North Dakota, South Dakota and Montana have sources of natural gas too. Companies drill near oils wells for natural gas, but sources near the surface are usually relatively small. The deposits of natural gas farther down in the earth are larger. The gas is paired with crude oil and made in to what can be used for energy to heat homes and other every day needs.

New technology is helping to extract natural gas from places previously thought to be inaccessible. Biogas is a type of gas formed when matter decomposes without oxygen present. This is called anaerobic decomposition. Sewage and animal matter found in landfills produce this type of gas. Biogas contain less methane but can be change for use as an energy source.

Conventional gas deposits can be found about several thousands feet below the surface of the earth. Those found much deeper in the earth are called unconventional. They are usually found up to fifteen thousand feet below the surface. The cost of drilling that deep is high, so new technology is developed.

Shale gas is also an unconventional gas. It cannot be drilled out in usual ways. Shale is sedimentary rock built up in layers. Gas is trapped between impermeable sheets of the shale. Impermeable means that nothing can penetrate through it.

Hydraulic fracturing and horizontal drilling are two ways being used to try to retrieve this shale gas. Fracturing involves splitting open the shale rock with a high pressure of steam and then keeping the opening apart by using pieces of glass, sand or silica. In attempting horizontal drilling to reach the gas trapped between the layer of shale.

Another process of retrieving gas from impermeable rocks is acidizing. Hydrochloric acid is injected into the rock which will dissolve it and allow the gas to flow out. Coal bed methane is natural gas found along a seam of coal in the ground. This is called an unconventional gas too.

Leaks of natural gas were thought to be sacred many years ago by ancient civilizations. One of these leaks or seeps was near mt. Parnassus in Delphi , Greece. A temple was established there with a priestess who said she could tell your future. It was called the 'Oracle of Delphi.'

[1]. In which of the following countries is Mt. Parnassus located?

- [A]. Italy
- [B].United States
- [C]. France
- [D]. Greece

CORRECT ANSWER: D

[2] Which of the following makes up most of what we use as natural gas for energy?

- [A]. Methane
- [B]. Carbon
- [C]. Propane
- [D]. Ethane

CORRECT ANSWER: A

[3]. Which of the following types of gas is found when matter decomposes without oxygen present?

- [A]. Biogas
- [B]. Shale gas
- [C]. Methane
- [D].Propane

CORRECT ANSWER : A

[4]. In which of the following does thermogenic methane get trapped below the earth's surface?

[A]. Craters

[B]. Sedimentary basins

[C]. Gas caves

[D]. Gas basins

CORRECT ANSWER: B

[5]. Which of the following is associated with Fracking?

[A]. Drilling deep into the earth straight down

[B]. Shooting hot oil down into a gas well

[C]. Shooting hot steam down into the layers of shale

[D]. Using explosives to get at the gas supply

CORRECT ANSWER: C

[6]. Which of the following is the meaning of the word **impermeable**?

[A]. Contains no gas

[B]. Is permanently attached to something

[C]. Cannot be penetrated

[D]. Able to be drilled through

CORRECT ANSWER: C