

# Humidity and Precipitation

| Lesson No. | Title                      | Activity  |
|------------|----------------------------|---|
| 12         | Humidity and Precipitation | Discuss with elders in family and prepare list of types of precipitation and in which month these are generally received. |

## Meaning

Water vapour is highly variable. It is an important component of atmosphere. It is responsible for global heat balance, atmospheric phenomena and sustaining plant and animal life on our planet. Falling down of atmospheric moisture is called precipitation which occurs due to continuous condensation. The distribution of precipitation in the world shows marked regional and seasonal variation.

## Water Vapour in the Atmosphere

- Water vapour is a highly variable component of the atmosphere. Its proportion varies from zero to four percent by volume of the atmosphere.
- Water can exist in the air in all the three states of matter i.e. solid (ice-crystals), liquid (droplets of water) and gaseous (water vapour).

## Humidity

The heat energy radiated from the sun changes water into water vapour. This invisible water vapour present in gaseous form in the atmosphere at any time and place is termed as humidity.

### Absolute Humidity

Absolute humidity is the ratio of the mass of water vapour actually in the air to a unit mass of air, including the water vapour. It is expressed in gram per cubic metre of air.

### Relative Humidity

Relative humidity is the most important and reliable measure of atmospheric moisture. It is the ratio of the amount of water vapor actually in a volume occupied by air to the amount the space could contain at saturation.

$$\text{Relative humidity} = \frac{\text{Vapour pressure in the air}}{\text{Saturation vapour pressure}}$$

## Evaporation

- Evaporation is the process of which water changes from its liquid state to gaseous form. This process takes place at all places, at all times and at all temperatures except at dew point or when the air is saturated.
- The rate of evaporation is affected by several factors.

Important among them are as under:

- Accessibility of water bodies
- Temperature
- Air moisture
- Wind
- Cloud cover

## Condensation

- Condensation is the process by which atmospheric water vapour changes into water or ice crystals. It is just reverse of the process of evaporation.
- When the temperature of saturated air falls below dew point, the air cannot hold the amount of humidity which it was holding earlier at a higher temperature. This extra amount of humidity changes into water droplets or crystals of ice.

## Forms of condensation

**Dew:** When the atmospheric moisture is condensed and deposited in the form of water droplets on cooler surface of solid objects it is termed as dew

**Frost:** When the dew point is below freezing point, under above mentioned conditions, the condensation of extra moisture takes place in the form of very minute particles of ice crystals. It is called frost.

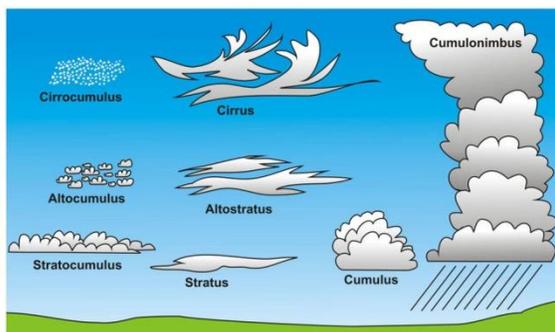
**Mist and Fog:** When condensation takes place in the air near the earth's surface in the form of tiny droplets of water hanging and floating in the air, it is called mist.

**Smog:** Smog is a fog that has been polluted and discoloured by smoke, dust, gases and other fumes. Smog frequently occurs in large cities and industrial centres.

**Cloud:** Clouds are visible aggregates of water droplets, ice particles, or a mixture of both along with varying amounts of dust particles.

## Types of Clouds

- **Low clouds:** The base level of low clouds varies from very near the ground to about 2000m.
- **Medium clouds:** These clouds are formed at altitudes between 2000 to 6000 metres. This group of clouds



include altocumulus and altostratus.

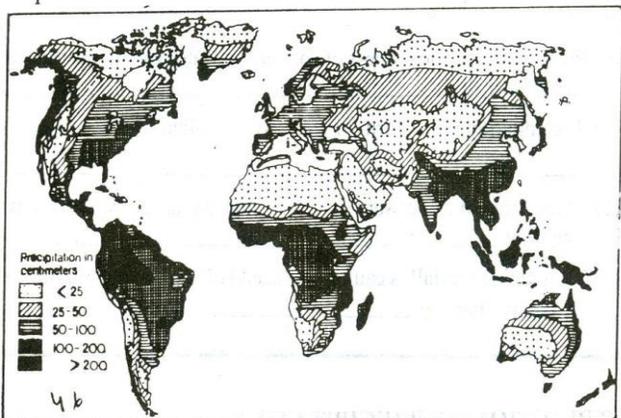
- **High clouds:** These clouds are formed above the altitude of 6000 metres and include cirrus, cirrostratus and cirrocumulus.

### Precipitation

Precipitation is defined as water in liquid or solid forms falling to the earth.

### Forms of precipitation

- **Drizzle and Rainfall :** Drizzle is a fairly uniform precipitation composed exclusively of fine drops of water with diameter less than 0.5



mm. Only when droplets of this size are widely spaced are called rain.

- **Snowfall:** When condensation takes place below freezing point ( $-0^{\circ}\text{C}$ ), the water vapour changes into tiny ice crystals and start falling on the ground.
- **Sleet:** Sleet is frozen rain, formed when rain before falling on the earth, passes through a cold layer of air and freezes resulting in creation of solid particles of clear ice. It's usually a combination of small ice balls and rime.
- **Hail :** Hail is precipitation of small balls or pieces of ice (hail stones) with diameters ranging from 5 to 50mm, falling either separately or agglomerated into irregular lumps.

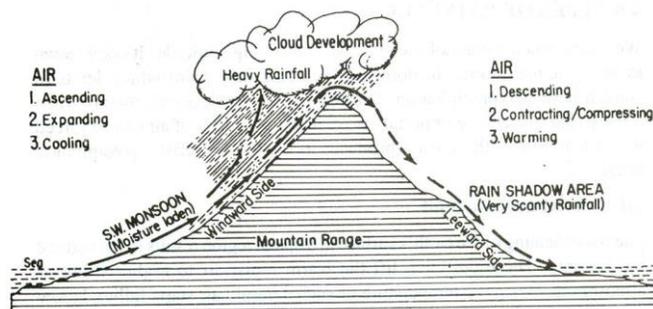
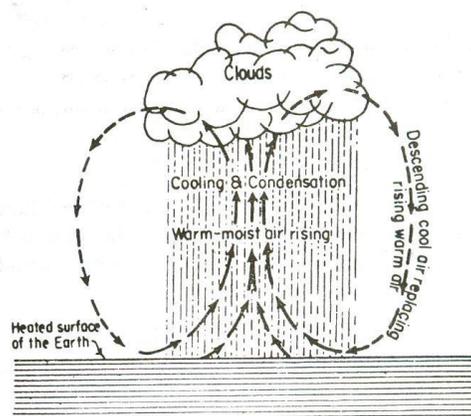
### Types of Rainfall

#### Convective Rainfall

Excessive heating of the earth's surface in tropical region results in the vertical air currents creating clouds and causing rains.

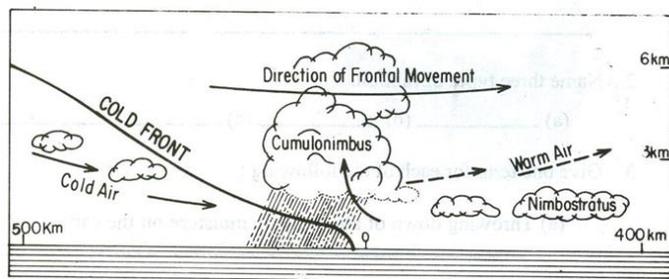
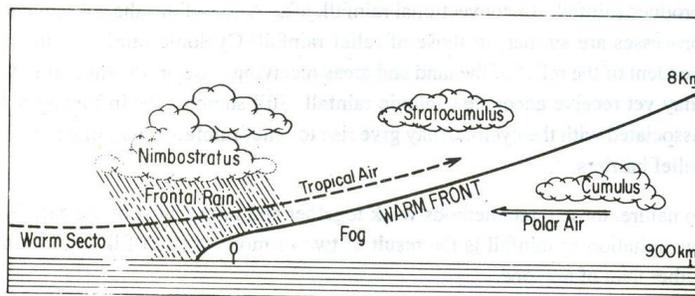
#### Orographic or Relief Rainfall

Orographic rainfall on formed where air rises and cools



because of a topographic barrier. When their temperature fall below dew point, clouds are formed.

#### Convergence or Cyclonic Rainfall



### Distribution of Precipitation

#### Regional Variations

**Regions of Heavy Precipitation:** The regions of over 200 centimeters of annual precipitation.

**Regions of Moderate Precipitation:** The regions of 100 to 200 centimeters of annual precipitation.

**Regions of Less Precipitation :** Precipitation between 50 to 100 centimeters.

**Regions of Scanty Precipitation:** The areas with

precipitation less than 50 centimeters.

### **Seasonal Variations**

The regional variations in the distribution of precipitation in different parts of the world are based on average annual precipitation which do not give us any correct picture of the nature of precipitation specially of those regions where seasonal fluctuations in the amount of precipitation are very common, for example arid, semi arid or sub-humid regions.

### **Factors Affecting Rainfall Distribution**

- Moisture supply to the atmosphere.
- Wind direction
- Ocean currents
- Presence of mountain across the direction of wind
- Pressure belts

### **Evaluate Yourself**

1. Differentiate between absolute and relative humidity.
2. Define precipitation. Explain forms of precipitation.
3. Differentiate between convectional and orographic rainfall.