

## Introduction

- Air is a colourless mixture of gases. Moving air is called wind.
- Air has following properties:
  - Air exerts pressure- when air is filled in a bicycle tube, the air molecules collide with the walls of the tube and exert air pressure. This pressure exerted by air inflates the tube. If we keep on filling the air in the tube, a condition may arise when because of excessive pressure the tube may even burst. Similar happens in the case of a balloon.
  - Air expands on heating - Take a boiling tube. Fit a balloon tightly over the neck of the tube. Now, pour some hot water in a beaker. Place the boiling tube with the balloon in the beaker containing hot water. After 2–3 minutes, we observe that the balloon becomes inflated because the heated air expands and its volume increases. Now, take the tube out, cool it down to the room temperature. Place the tube with the balloon in ice cold water taken in a beaker for 2–3 minutes. The balloon gets deflated. This is because the air present in the balloon contracts on cooling.
  - Warm air rises, and cooler air sinks towards the earth surface.
  - As the warm air rises, the air pressure drops at that location, allowing cooler air to move in.

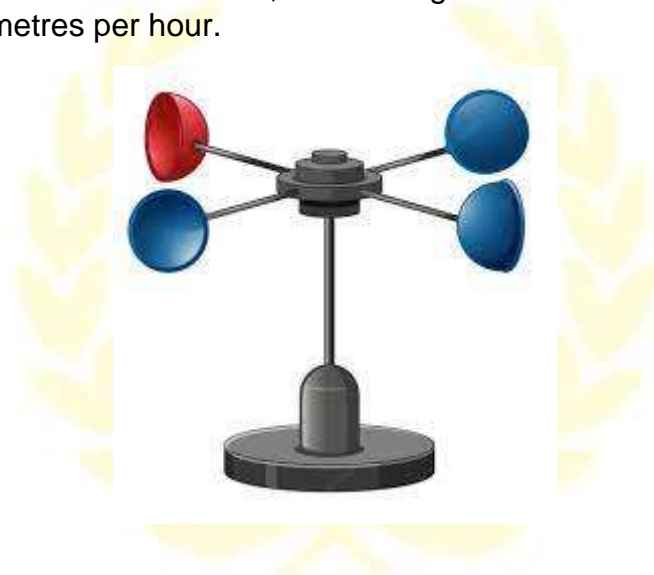
## Wind Generation

- Wind or wind currents is the movement of air which depends on the difference in air pressure between the two regions.
- Wind currents are produced by two factors:
  - **Uneven heating between the equator and the poles** - The regions near the equator receives maximum heat from the Sun. The air in these regions gets warm. The warm air rises, and the cooler air from the regions in the 0–30 degrees latitude belt on both the sides of the equator moves in.
  - Due to this the winds blow from the north and the south towards the equator. At the poles, the warm air at the latitude of about 60 degrees. rises up and the cold wind coming from the polar regions breaks in, to take its place. In this way, wind circulation takes place from the poles to the warmer latitudes.
- **Uneven heating of land and water** -In summer, the land near the equator warms up faster and the temperature of the land is mostly higher than that of water in the oceans. As a result, air over the land and rises. This makes the winds to flow from the oceans towards the land. These are called monsoon winds.
- In winter, the wind flows in the reverse direction; it flows from the land to the ocean. During this season the land cools down faster than water in

oceans. The temperature of ocean water is higher than that of land. The warm air over the ocean rises creating a low-pressure region and cooler air from the land rushes towards the ocean to replace it. This makes the wind to blow from land towards the ocean. The wind coming from colder land regions carries little water vapour and hence brings a small amount of rain in winter season.

## Anemometer

- The instrument used for measuring wind speed is called an anemometer.
- It consists of 3 or 4 cup like structures mounted on a rod that can rotate freely.
- The greater the speed of the wind, faster the cup rotates.
- At the base of the anemometer, a scale is given which reads the speed of the wind in kilometres per hour.



## Thunderstorms

- Thunderstorms frequently occur in hot, humid tropical regions like India. The rising temperatures creates very strong upward rising winds. These winds carry water droplets upwards, where they freeze, and return on earth again. This fast movement of the falling water droplets alongside the rising air leads to lightning and sound. This event is called a thunderstorm.

## Cyclone

- Before cloud formation, water takes up heat from the atmosphere and converts into vapour. When this water vapour changes back to liquid form as raindrops, this heat is released to the atmosphere. The heat released to the atmosphere warms the surrounded air. The air tends to rise and causes a decrease in pressure. More air moves rapidly towards the centre of the storm. This cycle is repeated. This chain of events

leads to the formation of a very low-pressure system with very high-speed winds revolving around it.

- This weather condition is called a cyclone. Factors that contribute to the development of cyclones are wind speed, wind direction, temperature and humidity.



### **Destruction caused by cyclone**

- The seawater fills the low-lying coastal areas, causing huge loss of life and property.
- It also reduces the fertility of the soil because the flood washes away the top fertile layer
- Continuous heavy rainfall can further make the flood situation even worse.
- High-speed winds of a cyclone can destruct houses, telephones and other communication systems, uproot the trees, etc., causing tremendous loss of life and property.

### **Tornado**

- Tornadoes are not very frequent in India. Tornado is defined as a dark colour funnel shaped cloud that stretches from the sky to the ground.
- These tornadoes are mostly weak. The speed of a violent tornado can be around 300 km/h.
- Tornadoes may form within cyclones.
- The whole coastline of India is vulnerable to cyclones, particularly the east coast.
- The west coast of India is less vulnerable to cyclonic storms both in terms of intensity and frequency of the cyclones.



### Effective Safety measures by Government

- A cyclone forecast and warning service is essential to prevent loss from such tornadoes.
- The warnings of a cyclone should be effectively communicated to the Government agencies, the ports, fishermen, ships and to the general public through radio, television etc.
- Cyclone shelters should be constructed in the cyclone prone areas.
- Proper Administrative arrangements should be made for moving people fast to safer places.

### Role of Advanced Technology

- Earlier, the coastal residents may have had less than a day to prepare or evacuate their homes from an oncoming cyclone. But now we are better protected because of advanced technology.
- Because of satellites and radars, a Cyclone alert or Cyclone watch is issued 48 hours in advance.
- Since We already know that Wind speed plays an important role in the formation of storms. Therefore, it is important to measure the wind speed.
- An expected storm and a Cyclone warning is issued 24 hrs in advance to the Government agencies, the ports, fishermen, ships and to the general public.. The message is broadcasted very frequently when a cyclone is nearer the coast.
- Many national and international organisations cooperate to monitor the cyclone-related disasters.