

Competitive Exams: Atmospheric Pressure

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- Air has weight and therefore it exerts air pressure or atmospheric pressure. Pressure is felt maximum at the surface and it decreases with height.
- It is about 2.7 kg per sq. cm i.e. 1013.2 millibar, water vapour decreases the pressure, the movement of the earth also affects pressure.
- At the equator earth rotates with a speed of 1600 km/ hour and completes a distance of 40,000 km in 24 hour.
- Speed decreases as it goes up and down;
- At 45 degree latitude speed is 1100 km/ hour and becomes 0 degree at the poles, therefore after 60 degree latitude air pressure is constant.

Types Of Atmospheric Pressure

1. Vertical distribution of pressure - the pressure is highest at surface and at every 300 m above the earth the pressure decreases by 34 millibar. At 5,500 m. pressure reduces to half and 1/4th at 11000m.
2. Horizontal distribution of pressure - In January, sun is tilted towards south and therefore in the southern hemisphere there is low-pressure belt. Therefore in Eurasia and North America high pressure is developed with low temperature. In July, at Atlantic and Pacific ocean low pressure is developed especially Icelandic and Aleutianic. On the other hand, when the sun is tilted towards north low pressure is shifted to Asia and Africa. However in the lower Asia, Africa, South Pacific Ocean and South Atlantic Ocean high pressure is developed.

7 pressure belts

- Equatorial Low Pressure Belt;
- North of Capricorn- High Pressure Belt;
- South Of Cancer- High Pressure Belt;

- 66 degree North Low Pressure Belt (Northern sub-Polar region);
- 6 degree South low Pressure Belt (Southern sub-Polar region);
- North Pole High Pressure Belt;
- South Pole High Pressure Belt

Relation between Pressure and Wind

1. The temperature increases when wind expands and density decreases and when the temperature falls, winds contract and density increases. Therefore, where temperature is increased, density is lowered and any reduction in temperature produces high pressure.
2. The earth rotates west to east and therefore, it produces centrifugal force and due to this force, there is change in the direction of the wind. There are three laws related to it
3. Ferrel's Law: In the northern hemisphere, wind deflects towards right and in the southern hemisphere it is vice-versa. This means that in the northern hemisphere, the wind deflects clockwise and in the southern anti-clockwise. This is called deflection of wind and because of high and low pressure the wind tends to be deflected instead of being straightened.
4. Buysballot's Law: In north hemisphere at the right side of your backside, there would be high pressure and at the left, low pressure. In the south, it is vice-versa. This would help in determination of appropriate direction.
5. Hadley's Law: In the northern hemisphere the wind from north to south deviates right and in the southern hemisphere, from south to north deviates to the left. The left from east to west does not deflect according to this law. Clouds: Clouds are defined as aggregates of innumerable tiny water droplets, ice-particles of mixture of both in the air, generally above the ground surface

Acid Rain

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- Acidity measured by pH. PH scale runs from 1 to 14 measures the balance of Hydrogen ions (H⁺) & Hydroxide ions (OH⁻) in a 14 point scale
- Positive and negative balance is pH7.
- If there are more hydrogen ions than hydroxide ion, the pH is less than the solution is termed acidic, the lower the pH, the higher the acid content. -Rainfall- somewhat acidic pH: 5.5 to 6.0.

Condensation

The process of change of water vapour into liquid form is called condensation. Therefore, condensation is opposite to vaporization. Surface Tension: water has the highest surface tension of any liquid except mercury. Surface tension is the attraction of molecules of each other.

Humidity

Humidity: water in gaseous form or water vapour in the atmosphere is referred to as humidity. It can also be defined as the number of molecules of water/unit volume. Vapour Pressure: Vapour pressure is simply the pressure, exerted by the water vapour content. Its value increases as the temperature increases.

- **Specific Humidity:** Specific humidity is the ratio of the weight of moist vapour (gms) to the weight of moist air. Represents the actual quantity of moisture in a definite air. It decreases from equator to poles. In Arctic it is 0.2 gm./kg., while in equatorial region, it is 18 gm./kg. It is used in Climatology
- **Absolute Humidity:** Absolute humidity of the air is the mass or weight of vapour per unit volume of air
- **Relative Humidity:** It is defined as the ratio of the amount of water vapour actually present in the air having definite volume and temperature (Absolute humidity) to the maximum amount the air can hold.

Forms of Condensation

Mist: Forms on wet surface, lakes or rivers where the humidity is high and condensation in evening was led to wisps of mist over the fields and water especially in sheltered spots.

Rime: It is a deposit of white opaque ice crystals formed by the freezing of super cooled water droplets on the surface . below 0 degree C. **Smog:** Smoke and Fog.

Normal lapse rate: 6.5 degree C/ thousand m. or 3.5 degree F/thousand feet.

Dew Point

- The temperature at which air becomes saturated is called Dew Point.
- The vapour is limited. If the volume of vapour increases but there may be a point at which the vapour cannot be incorporated, this is called saturation point.
- Dew points are the temperaing winter than summer.

Regional Distribution

According to the ancient Greek thinkers the globe is divided into three temperature zones on the basis of latitudes:

(1) Tropical Zone -Extends between the tropics of Cancer (23.5°N) and Capricorn (23.5°S).

1. The sun is more or less vertical on the equator throughout the year.
2. There is no winter around the equator because of high temperature prevailing throughout the year.

(2) Temperate Zone

1. Extends between 23.5° and 66.5° latitudes in both the hemispheres.
2. There is a marked seasonal contrast with the northward and southward migration of the overhead sun
3. The range of temperature is exceptionally high.

(3) Frigid Zone

1. Extends between 66.5° latitudes and the poles in both the hemispheres.
2. More oblique sun's rays throughout the year resulting into exceptionally very low temperature characterize it.
3. The length of day and night is more than 24 hrs. Isanomalous Temperature
4. The difference of observed temperature of a place and the mean temperature of the latitude passing through that places called thermal anomaly.
5. For example, if the average temperature of 30°N latitude is 20°C and the temperature of "S" place located on the latitude is 30°C , then the thermal anomaly is of 10° .
6. If the observed temperature of a particular place is more than the mean temperature of the latitude of that place, the thermal anomaly is called positive thermal anomaly, but if the observed temperature of a given place is less than that of the latitude of that place then it becomes negative thermal anomaly.
7. The equal thermal anomaly of several places is called isanomalous temperature and the lines drawn on the world map joining places of equal thermal anomaly are called isanomals.