

Introduction and Evaporation

Concepts: *Optical illusions (rainbows)*, *Precipitation*, *Water vapour*, *Heated intensely*, *Evaporation (transformation process)*. **Humidity** Definition: *Amount of water vapour or moisture in the air*. **Variations:** *Zero in deserts*, *Up to 4% in rainforests/coastal areas*. **Physical Effect:** *High humidity = sweat doesn't evaporate/sticky*, *Low humidity = skin feels dry/lips chapped*. **Measurement:** **Absolute Humidity:** *Amount of water vapour in a unit volume of air*, *Expressed in kilograms per cubic metre*. **Relative Humidity (RH):** *Ratio of water vapour present vs. total capacity*, *Measure of dryness or moisture*, *Expressed as a percentage*. **Formula:** $\left(\frac{\text{Amount of WV}}{\text{Total capacity WV1}} \times 100 \right)$. * **Temperature Relation:** *Colder air holds less water*, *Maximum limit = Dew point*, *Condensation begins below dew point*.

condensation etc

Condensation Definition: *Change of water vapour to liquid (water) or solid (ice)*. **Process:** *Moisture-laden air contacts a cold surface*, *Atmosphere must be fully saturated*. **Surface Requirement:** *Blade of grass*, *Window*, *Dust particles in the atmosphere*. **Forms of Condensation:** **Dew:** *Temperature above 0°C*, *Water droplets on surfaces*. **Frost:** *Temperature below 0°C*. **Mist and Fog:** *Cooling of a larger layer of air near the ground*. **Clouds** Definition: *Floating masses of super-cooled water droplets and ice crystals*. **Types of Clouds:** **Cirrus:** *Thin, wispy*, *Streak across the sky*, *High altitude*, *Made of ice crystals*. **Stratus:** *Low-lying*, *Large grey sheets*, *Covering the entire sky*. **Cumulus:** *Massive, billowing*, *Extend to great altitudes*, *Towering thunderstorm clouds (Cumulonimbus)*. **Precipitation Definition:** *Water vapour becomes more than air capacity*, *Condensed droplets fall to Earth*. **Forms of Precipitation:** **Snow:** *Directly into ice*, *Temperatures so low water vapour doesn't turn to liquid*, *Snowflakes*, *Snow drifts*. **Hailstones:** *Ice pellets*, *Too large/heavy for winds to carry*, *Fall from cumulus clouds*, *Repeated updrafts of air*. **Rain:** *Most important form*, *Showers (short period)*, *Drizzles (small, fine droplets)*, *Sleet (rain mixed with snow)*. **Importance:** *Major source of fresh water*, *Essential for survival*, *Inundation/flooding (heavy rain)*, *Droughts (lack of rain)*. **Measurement:** *Rain gauge*, *Disdrometer*, *Rainwater harvesting (percolation pits)*.

Types of Rainfall

- 1. Convectional Rainfall * Process:** *Equatorial and tropical climates*, *Intense heating of Earth's surface*, *Air becomes less dense and rises*, *Cooling of rising air*, *Condensation occurs*, *Cumulonimbus clouds*, *Huge downpour*.
- 2. Orographic Rainfall (Relief Rainfall)** **Process:** *Caused by the relief or orography of the land*, *Moisture-laden winds encounter mountains/hills*, *Forced to rise along the slope*, *Cooling and condensation*, *Heavy rain on windward side*. **In India:** *Western Ghats*, *Himalayan foothills*, *Monsoon rains*. **Rain Shadow Regions:** *Leeward side of mountains*, *Air descends and becomes drier*, *Coimbatore gets less rain*.
- 3. Cyclonic or Frontal Rainfall Process:** *Tropical and temperate zones*, *Cold air mixes with warm/moist air*, *Associated with cyclones or depressions*. **Front:** *Point where warm air mass meets cold air mass*, *Warm air is lighter/forced to rise*, *Condensation and rain*.