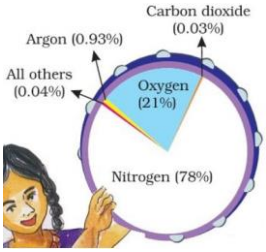
Chapter – 4: Air

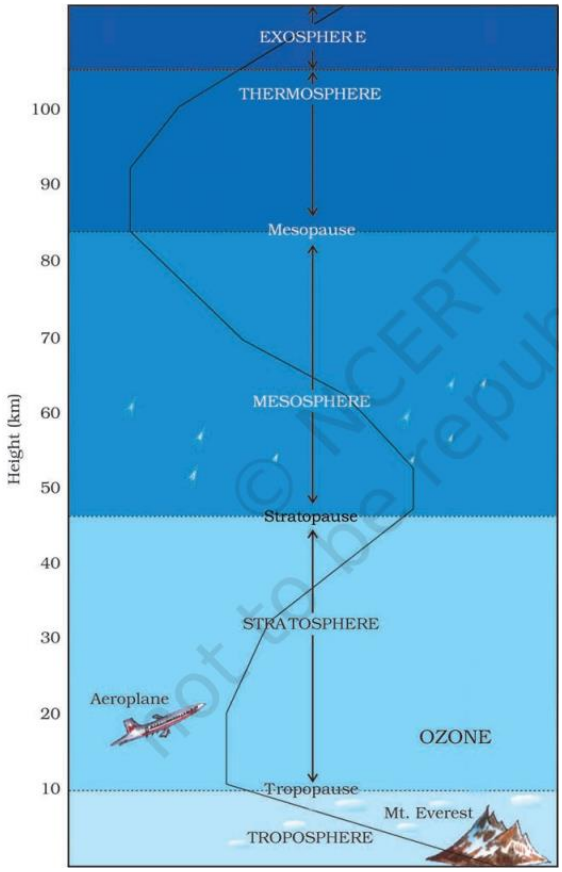
- Earth – surrounded by huge blanket of air – atmosphere
- All living things – depend on atmosphere
- Provides us air – breathing – protects from Sun's rays
- Without this – extremely high temperatures during days – extremely low temperatures during night

Composition of the Atmosphere



- Air – mixture of gases
- Nitrogen, oxygen – main gases – most of the air
- Other gases – carbon dioxide, helium, ozone, argon, hydrogen – lesser quantities
- Other things – dust particles, smoke, etc
- **Nitrogen** – available in most quantity
- Breathing – nitrogen – inhaled and exhaled
- Plants – use nitrogen for survival – cannot take nitrogen directly
- Bacteria – inside soli and roots – take nitrogen from air – convert it to usable form
- **Oxygen** – second most available gas
- Humans and animals – breathe oxygen – green plants – produce oxygen during photosynthesis
- Balance is maintained – BUT – balance is disturbed by cutting of trees
- **Carbon dioxide** – another imp. gas
- Green plants – use carbon dioxide – humans and animals – produce carbon dioxide
- Balance is maintained – BUT – balance is disturbed by burning of fuels – coal, oil, etc
- Increased carbon dioxide levels – affect earth's climate and weather

Structure of the Atmosphere



- Divided into 5 layers – starting from earth's surface
- Troposphere –
  - Most imp. layer
  - Average height – 13 km
  - Breathing air – exists here
  - Rainfall, fog, hailstorm – occurs here
- Stratosphere –
  - Above stratosphere – upto 50 km
  - No clouds or weather activities
  - Ideal for flying planes
  - Imp. feature – contains ozone layer
- Mesosphere –
  - 3rd layer – above stratosphere
  - Extends upto – 80 km
  - Meteorites burn up in this layer
- Thermosphere –
  - Temperature rises rapidly with height

    - Ionosphere – part of this layer
    - Extends between – 80-400 km
    - Helps in radio transmission – radio waves reflect back from this layer
- Exosphere –
    - Upper most layer
    - Very thin air
    - Light gases – helium and hydrogen – float into space from here

Weather and Climate

- Day to day condition – changes frequently – weather
- Hot or humid weather – very irritable
- Pleasant weather – very cheerful (enjoyable)
- Average weather conditions – longer time - climate

Temperature

- Everyday temperature – temperature of the atmosphere
- Degree of hotness or coldness of air – temperature
- Changes – between day and night – season to season
- Summers are hotter than winters
- Imp. factor – affects the temperature – insolation
- Insolation – incoming solar energy
- Insolation – decreases from equator to poles – maximum at equator and minimum at poles
- Temperature – decreases the same way
- Temp. – increases too much – difficult to grow crops
- Temp. in cities – much higher than villages
- Concrete and metals in cities – heat up easily during day – releases heat at night
- Concrete – also traps the heat – raises the temperature

Air pressure

- Air above us – presses us – great force – BUT – we don't feel it
- Air presses us in all direction – body exerts counter pressure
- Air pressure – pressure by weight of air on earth's surface
- Go up the layers of atmosphere – pressure decreases rapidly
- Maximum at sea level – decreases with height
- Horizontally – pressure changes due to temp.
- High temp. – air heats and rises up – creates a low-pressure area – associated with cloudy skies and wet weather
- Lower temperature – air is colder and heavy – air sinks – creates high-pressure area – associated with clear and sunny skies
- Air – moves from high pressure to low pressure areas

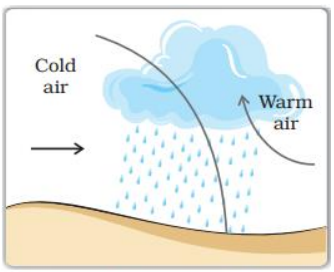
Wind

- Movement of air – high to low pressure area – wind
- Wind can be seen – leaves blowing – storm – uproots trees

- Sometimes – gentle wind – blows away dust and smoke – other times – strong wind – not easy to hold umbrella
- Divided into 3 types –
- Permanent winds –
    - Trade winds, westerlies, easterlies
    - Blows constantly throughout the year – particular direction
- Seasonal winds –
    - Change directions – different seasons
    - Example – monsoon in India
- Local winds –
    - Blows – particular period of the day
    - Example – land and sea breeze
    - Hot and dry – local winds - *loo*

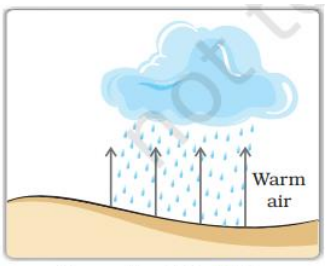
Moisture

- Water – evaporates – becomes water vapour
- Moisture in the air – humidity
- Air gets warmer – holding capacity increases – becomes more humid
- Water vapour rises – starts cooling – condenses – forms water droplets
- Clouds – group of water droplets – become heavier than water – come down as precipitation (rain)
- Jet planes – leave a white trail – moisture from the engine – condenses
- Most ground water – comes from rainwater
- Plants – preserve water – roots bind the soil – soil holds the water
- Trees on hill side – cut off – rainwater flows down – cause flooding
- 3 types of rainfall – convectional, orographic, cyclonic
- Rainfall – very imp. – brings fresh water to earth
- Less rainfall – drought – more rainfall – floods



Cyclonic Rainfall

Relief (Orographic) Rainfall



Convectional Rainfall