Atmosphere | Important PYQ Topics

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INTRODUCTION

- Earth is enveloped by a deep blanket of gases extending several thousands of kilometres above its surface. This **gaseous cover of the earth is known as the atmosphere.**
- **Role:**
    - **Shields life on Earth** from incoming ultraviolet (UV) radiation, keeps the globe warm through insolation, and prevents temperature extremes between day and night.
    - Precise composition of the atmosphere in order to **breathe and live.**
    - **Greenhouse gases** in the atmosphere help to **control global temperatures** by trapping heat.
    - Protects us from the **micrometeorite collisions of space.**

STRUCTURE

- **Thermal Structure:** Atmospheric layers are characterised by **variations in temperature** resulting primarily from the absorption of solar radiation; visible light at the surface, near ultraviolet radiation in the middle atmosphere, and far ultraviolet radiation in the upper atmosphere.
- **Troposphere:**
    - Between the earth's surface and an altitude of **8 km at the poles and 18 km at the equator.**
    - **Contains 99 % of the water vapour** in the atmosphere.
    - **Meteorologically the most significant zone** (Almost all the weather phenomena like rainfall, fog and hailstorm etc. are confined to this layer).
    - Troposphere means **"region of mixing"** and is so named because of vigorous convective air currents within the layer.
- **Stratosphere:**
    - Lies beyond troposphere, up to an **altitude of 50 km** from the earth's surface.
    - Presence of ozone **(ozonosphere)**. Ozone absorbs the bulk of solar ultraviolet radiation in wavelengths from **290 nm – 320 nm (UV-B radiation).**
    - Almost free from clouds; **ideal for flying aeroplanes.**
- **Mesosphere:**
    - Extends up to a **height of 80 km.**
    - Temperature gradually falls to **-100°C at 80 km altitude.**
    - **Meteorites burn up** in this layer on entering from space.

- **Thermosphere:**
  - **Temperature rises very rapidly** with increasing height.
  - Ionosphere is a part of this layer. It extends between **80-400 km.** Helps in **radio transmission.**
  - The International Space Station and **satellites orbit in this layer.**
- **Exosphere:**
  - **Uppermost layer** of the atmosphere above a height of about **400 km.**
  - **Transitional zone** between Earth's atmosphere and interplanetary space.
  - Light gases like helium and hydrogen float into space from here.

COMPOSITION

- Mixture of many gases. Also contains huge numbers of solid and liquid particles, collectively called **'aerosols'.**
- Nitrogen and oxygen make up nearly **99% of the clean, dry air.**
- **Nitrogen:** control combustion by diluting oxygen.
- **Oxygen:** combustion is not possible without oxygen.
- **Carbon Dioxide:** efficient absorber of heat.
- **Ozone**: crucial role in blocking the harmful ultraviolet radiation.
- Water Vapour and Dust Particles are also found.

Permanent Gases of the Atmosphere

Constituent	*Formula*	*Percentage by Volume*
Nitrogen	N_2	78.08
Oxygen	O_2	20.95
Argon	Ar	0.93
Carbon dioxide	CO_2	0.036
Neon	Ne	0.002
Helium	He	0.0005
Krypto	Kr	0.001
Xenon	Xe	0.00009
Hydrogen	H_2	0.00005

PYQs

Q. The layer in the earth's atmosphere which reflects radio waves from the earth thus, helping radio communication is:

a) Stratosphere
b) Mesosphere
c) Troposphere
d) Ionosphere

Q. Discuss the evolution of the layered structure of the Earth along with the formation of the lithosphere, hydrosphere and atmosphere.