26. Air and Water

- Air is a mixture of different gases. It contains oxygen, Nitrogen, Argon, Carbon dioxide and traces of some inert gases. It also contains water vapour.
- O_2, N_2 and CO_2 are directly or indirectly useful to all living organisms.
- Air above the earth exerts a force on earth's surface which is called atmospheric pressure. It plays an important role in working of common devices like syringe, water pump, etc.
- Water is the next abundant natural resource available to us. Although sea water is the largest natural source of water, it is unfit for domestic use and drinking.
- Decantation, filtration, chlorination and boiling are some of the steps that convert non potable water into potable water.
- Properties of water make it suitable for use in everyday life for domestic purposes, in agriculture, in industries as coolant and for steam production) and in power generation.
- Water resources are managed by constructing dams, canals, reservoirs, walls etc.
- Rain water harvesting can recharge ground water.
- Human activities are responsible for air and water pollution.

Build Your understanding

- **Air**

Importance of various components of air

Component	Importance
Oxygen O_2	• Necessary for respiration of almost all living organisms. • Supports combustion. Finds use in cutting and welding torches in the form of hydrogen or acetylene torches. • Mixture of oxygen and nitrous oxide is used as anesthesia in surgical operations. • Rusting of metals occurs in presence of oxygen and water.
Nitrogen N_2	• Main constituent of amino acids, proteins and enzymes. • Subdues the activities of oxygen such as metabolism, combustion and corrosion.
Carbon dioxide CO_2	• During pototsynthesis green plants absorb CO_2 and H_2O and convert them into sugars. • Used for food preservation. • Solid CO_2 is called dry ice which is used as refrigerant. • used in soft drinks and in fire extinguishers. • It also acts as a green house gas.
Water vapour	• causes heating or cooling of atmosphere and day to day change in weather. • Water evaporates from water bodies due to heat of sun, forms clouds and then falls as rain.
Air pressure	• Air exerts pressure. • Atmospheric pressure decreases with altitude

- **Air Pollution**

Air pollution is caused by harmful chemicals, biological wastes and particulate matter introduced in the atmosphere through human activities. Air pollution has harmful effects on all living organisms.

Air pollutants	
Primary pollutants	**Secondary pollutants**
CO, CO_2 Volatile organic compounds CFCs Particulate matter	Photochemical smog Ground level ozone

- **Water** – the precious natural resource

Water is essential for survival of all living beings.

Non potable water can be treated to make it potable. The methods are:

(i) Decantation, (ii) Filtration,

(iii) Boiling, (iv) Chlorination.

Soft Water	Hard Water
1. Forms lather with soap	1. Does not produce lather with soap
2. Contains less amount of salt	2. contain salts of calcium and magnisium.

Properties of water Importance/Significance

1. Polar nature – makes it an excellant solvent
2. Capillarity – Water moves up from soil through roots and enters the branches and leaves of the plants
3. Strong surface tension – Upper layer of water acts like a tight sheet and small insects can crawl over and move on the water surface
4. Density of water is highest at 4°C. – This explains why aquatic animals living in water bodies of very cold regions do not die in severe winter.

Increasing population, growth in industries, expanding agriculture and demand for water in thermal and nuclear power plants have pushed up the demand for water.

Water conservation by way of rain water harvesting, making dams and reservoirs, recycling of used water and desalination of water has become the need of the hour.

✔ Maximise Your Marks

1. How does each one of the pollutants cause harm to humans?
2. Atmospheric pressure plays an important role in the working of a syringe, water pumps etc. How does it help in their working?
3. What role does atmospheric pressure play in the process of breathing?

★ Stretch Yourself

Terrestrial animals take O_2 directly from the air, O_2 dissolved in water is the source of oxygen for aquatic animals. However, Dolphin, Whales etc breathe in air. Can you explain how?

? Test Yourself

1. A person will die in an atmosphere of either carbon mono-oxide or carbon dioxide but due to different reasons. Explain.
2. Why are we advised to minimise the use of CFCs?
3. Water has highest density at 4°C. How is this unusual property helpful to aquatic animals in very cold regions? Explain.
4. 'Without CO_2 in the air, no food will be available for any organism and yet it is considered a menace when its level reaches beyond a certain level.' Discuss the statement.
5. In what ways can you recycle waste water at home? Mention any three ways.