Air Pollution:

The air is composed of gases like nitrogen, oxygen, argon, carbon dioxide, neon, helium, krypton, methane, hydrogen, nitrous oxide, xenon etc. The actual composition of air is shown in **table 1**. This composition of air cannot produce any adverse impact on human beings, animals or the environment. But introduction of certain substances in air or presence of some of its constituents above permissible limit may produce adverse impact on human beings, animals as well as on the environment. Such an air which can cause undesirable effects on human beings, animals as well as on the environment is called polluted air. Thus***, air pollution may be defined as the undesirable introduction of some gases, smoke, dust, fume, mist, odour or particulate matters in the atmosphere which are injurious to human beings, plants and animals.***

Table 1: Composition of air

Component	Formula	Percentage by Volume
Nitrogen	N_2	78.084%
Oxygen	O_2	20.947%
Argon	Ar	0.934%
Carbon Dioxide	CO_2	0.033%
Neon	Ne	0.001818%
Helium	He	0.000524%
Krypton	Kr	0.000114%
Methane	CH_4	0.0002%
Hydrogen	H_2	0.00005%
Nitrous Oxide	N_2O	0.00003%
Xenon	Xe	0.0000087%
Ozone	O_3	0.000007%
Nitrogen dioxide	NO_2	0.000002%
Iodine	I_2	0.000001%
Carbon monoxide	CO	Trace
Ammonia	NH_3	Trace

Causes of Air Pollution:

The causes of air pollution may be natural or manmade.

Natural Sources:

The main sources of air pollution from the natural sources are –

Volcanic Eruptions: The main gases that are erupted during volcanic eruptions that contribute towards air pollution are carbon dioxide (CO_2), sulfur dioxide (SO_2), nitrogen oxides (NO_x) and some more gases that are released in lesser amounts.

Forest Fires:

The main gas that is released during forest fires is carbon dioxide (CO_2).

Sea Salt Sprays:

The main composition of sea salt sprays (also called Sea salt aerosols) is sodium chloride (NaCl).It is a natural nutrient for all living things, including plants. But in large quantities, it is toxic to plants. In the coastal areas the salt is sprayed into the air and when such air comes in contact with the plants, the salt accumulates on leaves and causes burning of the plants and plant death due to disruptions in photosynthesis and metabolic processes.

Pollen Grains:

Pollen grains are natural ingredients that help plants during their reproduction. The pollen grains are taken to a long distance by the wind and help it to germinate at that place. While breathing various pollutants (toxic gases) along with the pollen grains enter inside our body and start bombarding from inside. Although our immune system is supposed to fight with unknown objects or infections, is unable to differentiate between natural pollen grains and other toxic substances and some of our organs get allergic to the pollen grains and hence air become polluted by the pollen grains.

Moreover, some more natural sources that contribute towards air pollution are biological decay, photochemical oxidation of terpenes, marshes etc.

Manmade Sources:

Manmade sources of air pollution includes

1. **Industrialization**:

Manufacturing industries release a huge amount of carbon monoxide (CO), carbon dioxide (CO_2), hydrocarbons, oxides of sulphur (SOx), oxides of nitrogen

(NOx), various organic compounds, chemicals into the air thereby depleting the quality of air. The cement factories emit dust particles which is potential health hazard.

2. Agricultural Activities:

Due to the use of fertilizers, insecticides, pesticide etc , various gases like ammonia (NH_3), oxides of nitrogen (NOx), oxides of sulphur (SO_x), oxides of carbon (CO & CO_2), hydrogen sulphide (H_2S) and airborne particulate matter etc are introduced into the atmosphere thereby polluting air.

3. **Vehicles emission**:

The emissions from automobiles, locomotives, aircraft etc. contribute a major portion towards the air pollution. The emissions from such vehicles include carbon monoxide (CO), carbon dioxide (CO_2), unburnt hydrocarbons and various oxides of nitrogen (NOx).

4. Deforestation:

Trees release water vapour into the air which controls atmospheric temperatures. Due to deforestation the amount of water vapour will be reduced in the atmosphere thereby increasing the atmospheric temperature. Moreover, trees use carbon dioxide (CO_2) during the process of photosynthesis, thereby lowering the amount of carbon dioxide (CO_2) in air. Due to deforestation the amount of carbon dioxide (CO_2) will be increased in the atmosphere thereby increasing the level of carbon dioxide (CO_2) in air and as a result the quality of air will be deteriorated.

5. Brick kilns:

For burning of bricks in the brick kilns mainly biomass or coal is used. Due to such burning huge amount of oxides of carbon like carbon monoxide (CO), carbon dioxide (CO_2) etc, oxides of Sulphur (SO_x) , oxides of nitrogen (NO_x), smoke , dust etc are released which contribute towards air pollution.

Moreover, burning of garbage, mining operations etc also contribute towards air pollution.

Types of air pollutants :

Air pollutants can broadly classified into two types on the basis of their origin

1. Primary pollutants:

Some pollutants are either emitted directly from identifiable sources produced by natural events (eg: dust storms and volcanic eruptions) or from human activities (eg: emissions from vehicles, industries etc.). Such pollutants are called primary pollutants.

These are

Oxides Carbon	(CO and CO_2)
Oxides Nitrogen	(NO_x)
Oxides Sulphur	(SO_x)
Hydrocarbons	
Particulate matter	etc.

2. Secondary pollutants:

Some pollutants are produced in the atmosphere either by chemical reactions between primary pollutants or from natural components of air. Such pollutants are called secondary pollutant.

For example – sulphuric acid (H_2SO_4), nitric acid (HNO_3), carbonic acid (H_2CO_3), Ozone (O_3), Peroxyacetyl Nitrate (PAN) etc.