



**Ministry of Higher Education and Scientific
Research Al-Mustaqbal University College**

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Pollution

2nd Stage

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Air Pollution

Air Pollution (is not new problem) Air pollution is the presence of contaminated substances in air in such concentrations that can produce harmful effects on man and his environment.

Classification of air pollutants Air pollutants emitted into the atmosphere by natural and anthropogenic sources. These pollutants can be classified according to their origin into primary and secondary pollutants

1) **Primary pollutants** They are those that are directly emitted into atmosphere from **natural sources** or are produced as a result of **human activity**. Some of common pollutants of this group are: Particulate Matter, Gaseous pollutants; such as, CO, CO₂, SO₂, H₂S, NO, NO₃, NH₃, Volatile organic Compounds, VOC.

2) **Secondary pollutants** They are those that are formed in the atmosphere **by chemical interaction among primary pollutants** and **normal atmospheric constituents**. Some of the common pollutants, which belong to this group, are: Ozone, Hydrogen peroxide, Peroxyacetyl nitrate PAN, Aldehydes such as formaldehyde, Organic

hydroperoxides. **Type of air pollutants:** Air pollutants are classified based on state of matter into 1. Particulate Matter (liquid drops or solid particles) 2. Gaseous pollutants

1) **Particulate Matter:** (PM) (also called airborne particulate) is the name for a wide range of atmospheric particles that are **small enough to be carried by the air**. They can be solid or liquid, or mixture of both. The classification of various particulates may be made as:

Dust: It contains particles of size ranging from 1 to 200 μm . These are formed by natural **disintegration of rock and soil** or by the **mechanical process of grinding and spraying**. They have large settling velocities and are **removed** from **air by gravity**.

Smoke: It produced Fine particles of size ranging from **0.01 to 1 μm diameter**, which is formed by **incomplete combustion of organics**.

Fumes: They are **finely divided solid particles of the size ranging from 0.1 to 1 μm** . they are produced during sublimation, **distillation** and **molten metal processing**.

Mist: **Liquid droplets generally smaller than 10 μm** , which are formed by **condensation in the atmosphere** or released from **industrial operations**.

Fog: It is the

mist in which the liquid is water. Smog: It is a mixture of **smoke and fog. Aerosol:** They are **small particles, either solid or liquid, suspended in a gas.** The aerosol particle size ranges from **0.01 to 100 μm .**

Sources of Air Pollutants

Pollutants are emitted to air as a result of natural processes as well as due to human activity: 1) Natural , swamps , sources such as oceans, volcanoes biologically decaying organic matter, desert and non-desert areas, forest and forest fires. 2) Created by human activities, which gives rise to air borne pollutants, are: (a) Industrial sources: There are numbers of industries which are sources of air pollution. Petroleum refinery are the major source of gaseous pollutants, Cement factories emit plenty of dust, stone crushers, food and fertilizers industries which emit gaseous pollutants, chemical manufacturing industries which emit acid vapors in air, fossil fuel combustors, metallurgical and metal processing industries, food biochemical and pharmaceutical industries (b)Thermal power stations: The chief pollutants are fly ash, SO_2 , and other gases

and hydrocarbons. (c) Automobiles: the source of emission of vehicles exhaust. This exhaust produced many air pollutants such as CO, NO_x and lead oxides.

Air pollution source categories: There are four types of air pollution sources:

- Point or stationary sources: such as electric power plants, oil refineries, industrial facilities, and factories
- Mobile sources: such as cars, buses, airplanes, trucks, and anything else that moves and pollutes the air
- Area sources: small and individual sources such as agricultural areas, cities, wood burning fireplaces,
- Natural sources such as wind-blown dust, wildfires, and volcanoes

Effects of air pollutants affected the ecosystem in various ways ecosystem directly or indirectly. The overall effects may be classified as:

1. Effects on atmospheric properties.
2. Effects on vegetation.
3. Effects on animals.
4. Effects on human beings.
5. Effects on land and water bodies.
6. Effect on material.

Atmosphere of earth The atmosphere comprises of a mixture of gases surrounding the planet earth. It acts as a gaseous blanket protecting the earth by absorption the

dangerous ultraviolet solar radiation (UV), warming the surface of the earth through the heat retention (greenhouse effect). The greenhouse effect' which keeps the earth warm enough to sustain the life on the earth. It extends up to about 500 km above the surface of the earth.

