



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

**Department of Chemical Engineering and  
petroleum Industrials**

# ***Pollution***

**2<sup>nd</sup> Stage**

**Lecturer: Dr. Duaa Alwarid**

**2020-2021**

## **1- Introduction**

Definition and importance of Environmental Pollution, Types of petroleum Pollutants, Influence of industrial operations, Toxicity measurements.

## **2- Water Pollution**

Sources, Causes, Classification and characterization of water pollutants, Effects of water Pollution; Control processes: Physical, Chemical, Biological; Treatments methods .

## **3- Treatment of Waste Water from Petroleum Industries**

Removal of suspended and dissolved hydrocarbons , Removal of solids, Activated Sludge process, Trickling filters, sludge disposal, solid-waste managements.

## **4- Air Pollution**

Sources, Causes, effects, control of air pollutants, automobile pollution, meteorological and natural purification processes, characteristics of stack plume and chimney design, control of gases (CO, SO<sub>x</sub>, NO<sub>x</sub>).

What is the meaning of Toxicity?

Toxicity is described as the **direct harmful effect of a substance on organisms**. It can refer to the effect on a whole organism or on a substructure of the organism, such as a cell.

The toxic effect depends on the concentration of toxic substances, on the sensitivity of the organisms as well as on the incubation period. Toxicity can already occur at low concentrations. In water toxicity is often calculated as EC<sub>50</sub>. The Effective Concentration indicates the concentration at which 50% of the test organisms are harmed.

<i>S. No.</i>	<i>Air pollutant</i>	<i>Source</i>
1	Particulate Dust,	Abrasion, quarrying (stone mining), soil erosion fuel combustion in automobiles, building and other civil construction, Industrial effluents, mining, power station, etc.
2	Oxides of sulphur (SO <sub>x</sub> )	Power houses, smelters, coal and other fossil fuels combustion, sulphuric acid plant, automobiles etc.
3	Oxides of nitrogen	Combustion, automobiles, acid manufacturing
4	Hydrogen sulphide	Petroleum industry, wastewater treatment, tanneries, oil refineries etc.
5	Carbon monoxide	Metabolic activity, fuel combustion, automobile exhaust
6	Ozone	Photochemical reactions
7	Lead	Automobile exhaust
8	Organic solvents	Solvent use, paints, pesticides, cooking, cosmetics etc.
9	Mercury	Pesticides, paints, laboratories
10	Fluorides (HF)	Glass and ceramics, cement factories, aluminum industry, fertilizer industry etc.

### *Definition and Types Of Pollutants*

**The Environment Definition:** The term Environment has been defined : “Environment Protection Act to include water, air, land and inter-relationship between water, air, land and human beings, other living creatures, plants, microorganisms and property”.

**Pollution** is an unfavorable alteration in the physical, chemical or biological characteristics of air, water and land that may or will adversely affect human life, industrial life, industrial progress, living conditions and cultural assets. Thus it is a sort of negative stress exerted on the positive health of the ecosystem. The substances that cause the undesirable changes in the air, water and land are referred to as the pollutants. Thus, pollutant is a substance (e.g., dust, smoke), chemicals (e.g., SO<sub>2</sub> or Methyl mercury) or factor (like heat, noise etc.) that on release into the environment has an actual or potential adverse effect on human interests. A pollutant is defined as any solid, liquid or gaseous substance present in such concentration as may be or tend to be injurious (harmful) to the environment Various types of pollutants ranging from gaseous pollutants to radioactive wastes exist in

nature. However for convenience, the entire pollutant spectrum may be divided into two broad categories namely biodegradable and non-biodegradable pollutants

### **Pollutant Sources:**

- 1- Stationary sources, factories, industries, forest fires
- 2- Movable, cars , automobiles

### **Classification of Pollutants**

Classification **based on environment:**

1. air pollution
2. Water pollution
3. Soil pollution.

Classification **based on nature of pollutants**


1. Chemical pollution
2. Noise pollution
3. Pollution by radio activity

### **Main pollutants**


Pollutants are by-products of man's action. The important pollutants are summarized below:

- Deposited matter • harmful Gases • Metals
- Industrial pollutants • Agriculture pollutants
- Photochemical pollutants • Radiation pollutants

**SOURCES OF AIR TOXICS.**




*Routine Emissions From Stationary Sources*

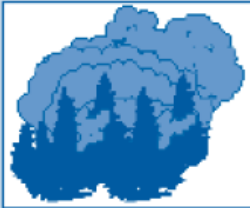


*Accidental Releases*

Each year, millions of tons of toxic pollutants are released into the air from both natural and manmade sources.



*Mobile Sources*



*Forest Fires*

