



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

**Department of Chemical Engineering and
petroleum Industrials**

Pollution

2nd Stage

Lecturer: Dr. Duaa Alwarid

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Water pollution

Water Pollution can be defined as change of water quality

in physical, chemical, or biological characteristics through natural or human activities or by the addition of harmful or objectionable material and making it unsuitable for its designated use. The used water becomes contaminated and is called waste water.

Sources of Water pollution

Point Source: They are the source of pollution from single Identified location.

Non-Point Source: Those sources whose location cannot be easily identified are called **diffused** sources.



Some Human activities that contribute to water pollution

- Sewage, industrial, and domestic discharges
- Poor agricultural land management
- Construction, Mining
- Release of gases and aerosols to the atmosphere
- Mismanagement of reservoirs and
- Accidental spills

Classification and characterization of water pollutants

The major contaminants of concern, in potable water supplies are:

a) Suspended solids;

b) Biodegradable organics (proteins, carbohydrates and

fats);

c) Pathogens;(Bacteria, Viruses, Protozoa, Helminths, Malaria and Dengue).

d) Nutrients (Nitrogen, phosphorus and carbon);

e) Priority pollutants (highly toxic chemicals; Arsenic

, asbestos, Barium, Beryllium , Selenium , Silver)

f) Refractory organics (pesticides, phenols(from petrochemical industry), surfactants Chlorinated compounds, Polynuclear Aromatic Hydrocarbons which

are common effluents from crude oil power station);

g) Heavy metals;(Ag,Pb,Cd,Cr,Ni, Sn,etc.);

h) Dissolved inorganics(Al, Chlorides, colour, Cu,Hardness, Sulfides, Fe, Mn, Sulfates,pH,Na,Zn, petroleum hydrocarbones)

General sources: chemical industry batteries, paints,

fossil fuel combustion, pharmaceuticals, mirror coatings

Quality of Water

Parameters of water which are required to be tested for determining the quality of water can be divided into;

- **Physical Parameters**(Turbidity, Color, Taste and odor, Temperature)
- **Chemical Parameters**(solids; Suspended, Dissolved, Volatile), Hardness, Chlorides, Dissolved gases, Metals.
- **Microbiological Parameters** (Pathogens: viruses, bacteria, protozoa, helminthes)

Wastewater treatment

The objective of wastewater treatment is to reduce the concentration of specific pollutants in water to the level where the treated water will meet the acceptable quality standards and will not adversely affect the environment.

The specific processes needed for wastewater treatment vary according to both how the water

was used and where the wastewater will be discharged.

Biochemical oxygen demand or **B.O.D** is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period.

Chemical oxygen demand (COD), in that both measure the amount of organic compounds in water. However, COD is less specific, since it measures everything that can be chemically oxidized.

Waste water Treatment Processes

Coagulation and flocculation

- Softening
- Reverse osmosis RO
- electro dialysis
- ion exchange
- adsorption

- Precipitation
- disinfection
- sedimentation
- filtration