

# **INDUSTRIAL WASTEWATER: SOURCES , TYPES AND ENVIRONMENTAL IMPACTS**

# INDUSTRIAL WASTEWATER

- It is used up water from industries
- Water with dissolved and suspended substances discharged from various industrial processes , such as water released during manufacturing, cleaning and other commercial activities, is termed as industrial wastewater
- There are many types of industrial wastewater based on different industries and contaminants; each sector produces its own particular combination of pollutants

# Types of industrial wastewater

- Generally industrial wastewater can be classified into two main types
  1. Organic
    - The factories manufacturing pharmaceuticals, cosmetics, organic dye-stuffs, glue and adhesives, soaps, synthetic detergents, pesticides and herbicides
    - Tanneries and leather factories
    - Textile factories
    - Cellulose and paper manufacturing plants
    - Factories of the oil refining industry
    - Brewery and fermentation factories
    - Metal processing

## 2. Inorganic

- coal and steel industry
- the nonmetallic minerals industry,
- commercial enterprises
- industries for the surface processing of metals (iron picking works and electroplating plants)



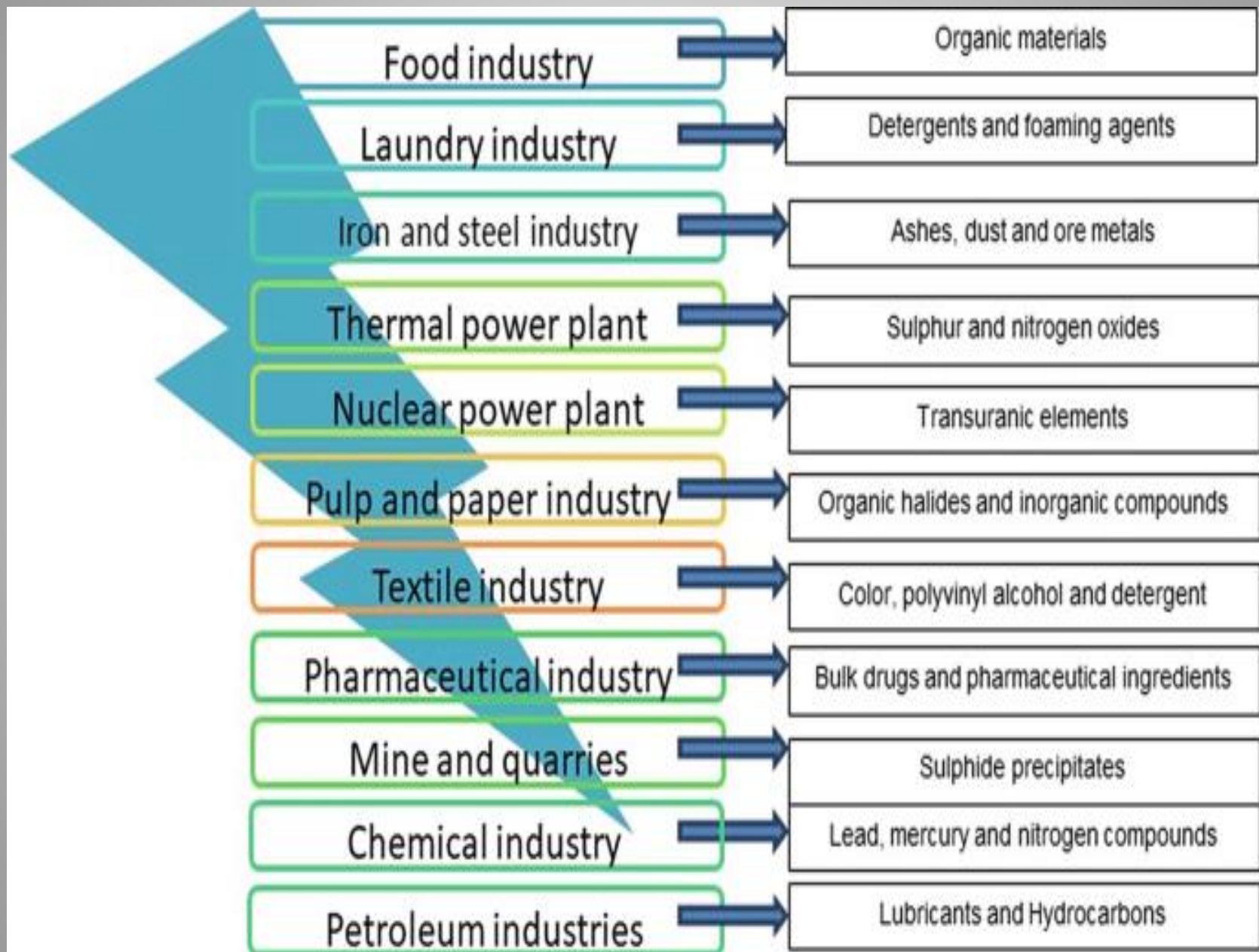
# Examples of Waste Effluents Generated by Selected Industries

Type of waste	Type of plant
Oxygen-consuming	Breweries, Dairies, Distillers, Packaging houses, Pulp and Paper, Tanneries, Textiles
High Suspended Solids	Breweries, Coal washeries, Iron and Steel Industries, Distillers, Pulp and Paper mills, Palm oil mills
High dissolved solids	Chemical plants, Tanneries, Water softening
Oily and grease	Laundries, Metal finishing, Oil fields, Petroleum refineries, Tanneries, Palm oil mills
Coloured	Pulp and Paper mills, Tanneries, Textile dyehouses, Palm oil mills
High acid	Chemical plants, Coal mines, Iron and Steel, Sulfite pulp
High alkaline	Chemical plants, Laundries, Tanneries, Textile finishing mills
High Temperature	Bottle washing plants, Laundries, Power plant, Textile[24]

# Water Pollutants by the Industrial Sector

sector	pollutant
Iron and steel	BOD, COD, oil, metals, acids, phenols, and cyanide
Textiles and leather	BOD, solids, sulfates and chromium
Pulp and paper	BOD, COD, solids, Chlorinated organic compounds
Petrochemicals and refineries	BOD, COD, mineral oils, phenols, and chromium
Chemicals	COD, organic chemicals, heavy metals, SS, and cyanide
Non-ferrous metals	Fluorine and SS
Microelectronics	COD and organic chemicals
Mining	SS, metals, acids and salts





# Sources of industrial wastewater

- battery manufacturing
- chemical manufacturing
- electric power plants
- [food industry](#)
- iron and steel industry
- metal working
- mines and quarries
- nuclear industry
- [oil and gas extraction](#)
- [petroleum refining](#) and [petrochemicals](#)
- pharmaceutical manufacturing
- [pulp and paper industry](#)
- Smelters
- [textile mills](#)
- industrial [oil contamination](#)
- water treatment and [wood preserving](#)







# Environmental impacts of industrial effluents

- Contain toxic and hazardous materials
  - a) Impact on the water bodies (hydrosphere) : Industries that use large amounts of water for processing have the potential to pollute waterways through the discharge of their waste into streams and rivers.

Discharge of metals and some non-metals into water bodies have serious environmental effects.

Lead a prime environmental pollutant, is a multi-organ poison which in addition to well-known toxic effects depresses immune status, causes damage to the central nervous system, kidney and reproductive system

b) Impact on the soil (lithosphere) : When these effluent or sludge contains toxic materials and heavy metals, they immediately become part of the soil; when these toxic materials and heavy metals become ionised (i.e. in soluble form), they could be picked by the root of the plant and bioaccumulation in the tissues of the plant.

These toxic materials and heavy metals may also disrupt the natural activities of both the flora and fauna components of the soil.

c) Impact on the air i.e. atmosphere:

Effluent especially when it contains high BOD and other organic pollutant tends to give off foul smell. This worsens when the waste is not properly dosed with the required oxygen to effectively digest the complex organic matter to simpler form. Disgusting gases like hydrogen sulphide ( $H_2S$ ), cyanide (CN) among others is very notorious in this regards.

d) Impact on human and on the ecosystem and flow of energy (food web) : Effluents contain heavy metals like arsenic, mercury and lead which are harmful to human health either through direct ingestion or from fish and other animals or plants. Heavy metals particularly arsenic, mercury and lead are environmental pollutants threatening the health of human population and natural ecosystem.