

## **CHAPTER IV**

### **DIFFERENT TYPES OF POLLUTION**

#### **IV.1. Definition**

The term pollution comes from the Latin "**pollutio**" which means dirt or stain. This term could be a phenomenon or element that disrupts an established balance.

Therefore, pollution is the introduction into the air, water or soil of a foreign substance "not naturally present in the environment" or the variation of its rate of existence. This leads to environmental degradation or disruption of the ecosystem and can lead to the migration or extinction of certain species unable to adapt to change.

Industrial, urban or agricultural human activity produces polluting substances that are the origin of organic, chemical or radioactive pollution. These polluting substances are emitted into the atmosphere "air pollution", discharged into the water "water pollution" or spread on the soil "soil pollution". They may exist in the form of gas, dissolved substances or particles.

#### **IV.2. Types of pollution**

We can specify essentially 4 types of pollution:

##### **1- Organic pollution:**

Organic pollution results from the daily activities of human beings "excrement and corpses", industrial activities related to agri-food production or agricultural activities such as animal or plant production.



Fig.1 Organic pollution

## 2- Chemical pollution:

Chemical pollution is mainly found in water and air, it is produced by insecticides or pesticides used to eliminate insects and protect plants, chemical fertilizers.



Fig.2 Chemical pollution

## 3- Radioactive pollution:

Radioactive pollution is due to nuclear waste, directly or indirectly from human activity, which introduces radioactive substances into the environment.



Fig.3 Radioactive pollution

#### **4-Solid waste pollution:**

Solid waste pollution seriously denatures the waters and soils of the planet, pollutes our beaches, pollutes the streets of our cities and the meadows of our countryside, tons of waste dumped in nature bottles, tissues, plastic materials, polymers, there are everywhere and are proof of a serious failure on the part of many individuals to respect the elements.



Fig.4 Solid waste pollution

### **IV.3. Types of pollution**

Pollution exists in the three states of matter, so we can distinguish three types of pollution:

#### **IV.3.1. Air pollution**

Air is composed of 78% nitrogen, 21% oxygen and 1% other gases. The change in this composition, due to human emissions, implies a deterioration in air quality.

There are too many polluting gases:

**Carbon Monoxide CO:** Carbon monoxide is formed during incomplete combustion, approximately 55% from motor vehicles and 26% from heating and industrial combustion plants. It inhibits the transport of oxygen in the blood.

**Sulfur Dioxide SO<sub>2</sub>:** Sulfur dioxide SO<sub>2</sub> is a colorless gas with a pungent odor that irritates the eyes and respiratory tract, 91% of this gas is produced by the combustion of fossil fuels used for domestic heating and industrial boilers and the remaining percentage is produced by means of transport and the smelting of iron ores containing sulfur.

**Nitrogen dioxides NO<sub>2</sub>:** Nitrogen dioxide NO<sub>2</sub> is a toxic, suffocating gas with a pungent odor, it is formed from nitric oxide NO, 56% of this gas is produced by internal combustion engines and 30% by combustion plants.

**Volatile organic compounds VOC:** Volatile organic compounds VOC include several compounds, they come from the incomplete combustion of fuels and fuels of transport vehicles, industry, crafts and households and by evaporation of solvents. They can be biogenic "natural origin" or anthropogenic "human origin". The best known VOC compounds are butane, propane, ethanol, acetone, solvents in paints, solvents in inks, etc.

**Lead Pb:** Lead enters the environment mainly through car exhaust fumes. Large particles fall to the ground, small particles enter the air and remain in the atmosphere. Leaded gasoline is not the only contributor that increases the concentration of lead in the environment, other activities such as the combustion of fossil fuels, industrial processes and the burning of solid waste also increase this concentration.

**Ammonia NH<sub>3</sub>:** Ammonia NH<sub>3</sub> is a mainly agricultural pollutant, emitted during the storage and spreading of manure and slurry from animal breeding, but

also during the manufacture of ammonia fertilizers. It is a hazardous waste for the environment and health, it can cause burns and lung irritation.

**Trace Metal Elements “TME”:** TME or heavy metals correspond to a physical definition. They are naturally present in soils, some of which are essential to plants, the TMEs best known for their danger are cadmium, mercury, chromium, zinc and scrap metal containing TME. The latter are contained in the air we breathe, from which they are emitted through the chimneys of household waste incineration plants and steel mills. Some of them are very toxic.

**Tobacco:** Tobacco smoke is the primary source of pollution in the home, it is the main nuisance in the premises. More than 3,000 substances have been identified in tobacco smoke "nicotine, tar, carbon monoxide, ... and", these harmful substances are responsible for several diseases; cancer, addiction, asthma, respiratory diseases, ... and.

**Greenhouse gases:** The presence of gases in small quantities in the atmosphere "natural greenhouse effect", such as water vapor or carbon dioxide "CO<sub>2</sub>" increases the average temperature of our planet, which makes it habitable. In addition to water vapor and carbon dioxide, the main natural greenhouse gases are methane "CH<sub>4</sub>", nitrous oxide "N<sub>2</sub>O" and ozone "O<sub>3</sub>".

#### **IV.3.2. Water pollution**

The earth is also called the blue planet, because it is covered by about 71% of water on the surface "ocean, seas, rivers... etc.", water also exists in the aquifers of the soil "groundwater" and also exists in the air in the form of "vapor".

Water pollution is any "chemical, physical or biological" alteration of its quality and nature, which has a harmful effect and makes its use dangerous and "or" disrupts the aquatic ecosystem.

There are two types of sources of water pollution, localized sources and non-localized sources. If the pollutants are discharged in a specific place, it is a localized source of pollution "for example: sewers, factories, mines, oil tankers and agriculture", otherwise, if we cannot locate a specific place where the pollutants are discharged, it is a non-localized source of pollution "for example: acid deposits in the air, traffic, pollutants from groundwater or spread by rivers",

#### **IV.3.2.1. Different categories of pollution**

The different categories of pollution are:

- Disease pollutants: This category includes pollutants that cause diseases such as bacteria, viruses and parasitic worms that thrive in untreated wastewater.

Note: 80% of diseases in developing countries are due to water.

- Waste pollutants: These wastes need oxygen to decompose, this can lower the oxygen level of the water, which affects other species living in the water.
- Water-soluble inorganic pollutants: This category is that of water-soluble inorganic pollutants such as acids, salts and toxic metals, they make water unfit for consumption and cause the death of aquatic life.
- Nutrient pollutants "water-soluble nitrates and phosphates": These pollutants cause excessive growth of algae and aquatic plants, which also decreases the amount of oxygen in the water.
- Organic compound pollutants: This category includes organic compound pollutants such as oil, plastics and pesticides, they are harmful to humans as well as to all plants and animals living in the water.
- Suspended sediment pollutants: These pollutants reduce the absorption of light by water and they diffuse dangerous compounds such as pesticides into the water.

- Radioactive compound pollutants: These pollutants are the most dangerous, they can cause cancer, malformations in newborns and even genetic modifications.

#### **IV.3.3. Soil pollution**

Soil fulfills a multiplicity of complex functions, its pollution directly or indirectly influences water and air, because it represents an interface between land, air and water. This pollution is mainly due to; deposits of polluting substances, the use of pesticides and chemical fertilizers, the spreading of chemicals.