

# 6. Toxic Microclimate

# Toxic Microclimate

- Air is a mixture of different gases, of which nitrogen, oxygen, argon and carbon dioxide predominate. These gases make up 99.99% of the atmosphere.
- In addition, air contains various dopants such as ozone, carbon monoxide CO, sulfur oxides, ammonia and dust.
- Toxic substances present in the internal environment will be originated either from the exterior or in the interior itself.

# Carbon Monoxide

- **Carbon monoxide** is the product of incomplete combustion for oxygen access.
- The sources include solid fuel stoves, gas appliances without exhaust, fireplaces, non-fired kitchens with a gas stove, and others.
- Smoking of tobacco is also a significant source.
- Carbon monoxide binds to the red blood dye and thus reduces the amount of oxygen transmitted by the blood. **Lighter poisoning** is manifested by headaches, pounding blood in the head, chest pressure, dizziness.

# Nitrogen Oxides

- The sources of **nitrogen oxides** are emissions from automobile transport and from stationary sources burning fossil fuels at high temperatures.
- Eight nitrogen oxides can be found in the indoor environment. Only two cause health damage.
- **Nitrogen dioxide** (NO<sub>2</sub>) and **nitrous oxide** (NO) have a harmful effect on humans

# Smog

- **Smog** is the chemical pollution of the atmosphere caused by human activity.
- The atmosphere is enriched with ingredients that are not normally in it and which are harmful to health during a phenomenon.
- Smog (smoke and fog produced by nitrogen oxides) arises because of air pollution, which is degraded by exposure to ultraviolet radiation to other toxic substances, such as ozone.

# Ozone

- **Ozone (O<sub>3</sub> or triatomic oxygen)** is natural gas, which binds to the oxidized organic compounds. It is a reaction with other elements in the atmosphere. Ozone concentrations in the indoor environment tend to be half that of the external environment. There are two types:
  - **Atmospheric ozone**, which is in the atmospheric layer and protects us from harmful ultraviolet rays. Its loss causes the so-called ozone hole.
  - **Tropospheric ozone**, which is contained in the ground air zone and at high concentrations, is harmful to humans.

# Volatile Organic Compounds (VOCs)

- **Volatile Organic Compounds (VOCs)** are defined as organic substances in the solid, liquid or gaseous state that, at normal temperature and pressure, enter the atmosphere in the form of vapor with a pressure greater than 0.13 kPa.
- Their sources include, in particular, adhesives, solvents, paints, coatings, and the like.
- VOCs include for example toluene, xylene, styrene, ethylbenzene, chlorinated hydrocarbons, phthalates and terpenes.

# Polycyclic aromatic hydrocarbons (PAHs)

- **Polycyclic aromatic hydrocarbons (PAHs)** represent a group of more than 100 chemical compounds.
- Polycyclic aromatic hydrocarbons form carbon and hydrogen, two or more benzene nuclei. They
- Their characteristics include **toxic, carcinogenic and mutagenic properties.**
- They have a strong ability to bind to solid sorbents or particles (dust) even in living organisms (bioaccumulation capacity).