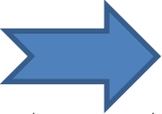
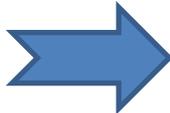


\* **NO<sub>x</sub>**  ( NO , NO<sub>2</sub> , N<sub>2</sub>O ..... etc. ) Nitrogen oxides are formed when the air temperature rises to more than 1100 ° C, especially nitrogen oxide (NO), and this happens with electric power stations and car engines .

These gases are very toxic and are found in the range 0.20 – 0.30 ppm in the natural atmosphere and also contribute to the formation of acid rain.

*The effect of NOx gases: -*

These gases are converted to HNO<sub>3</sub>, which causes various infections in the trachea. When the sun is shining, it turns NO into NO<sub>2</sub>, which is the most dangerous gas in human life and, it is considered a toxic gas for all types of animals and plants, causing leaf damage in plants and affecting plant growth.

\* **CO** 

It is a dangerous gas that emits from transport vehicles, formed from incomplete combustion of carbon materials (colorless gas, tasteless and odorless), remains in the air for a short time (a month or less) and this gas is removed from the air with several activities, including: -

- 1 Adsorption or oxidation processes.
- 2- It is used by animals and plants.
- 3- Chemical and optical processes that remove it.
- 4- It may be removed due to the activities of some microorganisms that live in the soil.

The amount of carbon monoxide increases in streets crowded with cars, and that carbon monoxide leads to the death of many people annually due to its tendency to combine with hemoglobin in the blood, leading to the formation of *a carboxy-Hb complex* that impedes the transport of oxygen .

The hemoglobin affinity for carbon monoxide is much greater than that of oxygen, as this gas reduces the separation of oxyhemoglobin into oxygen and

hemoglobin and this is called anoxia (blood carries a large amount of oxygen more than the body needs) .

Symptoms of CO poisoning depend on the concentration of the gas, including:

- difficulty breathing
- headache,
- muscle weakness,
- nausea,
- dizziness,
- and in dangerous cases they may die

## \* Hydrocarbons

They are organic chemical compounds containing carbon and hydrogen only, produced from natural sources from the decomposition of some natural substances, and they are of two types: -

I- Open (non-cyclic) chains that can be *saturated* as propane and methane (the main component of natural gas and are colorless and odorless and the smell of natural gas is due to added sulfur compounds), or *unsaturated* as ethylene.

II - Ring chains (Benzene).

*The effects:* -

- a- Ethylene has an inhibitory role in plant growth .
- b- Methane leads to suffocation in humans with high concentrations.

c- Some hydrocarbon compounds are irritating to photochemical smog .

**3- Lead pollution** : Lead is used in industry in several fields :

I - Metal pipe connections for water

II- Paint materials

III - Iron and steel factories

IV - Chemical cleaners

V - Some types of batteries

VI- The most harmful derivatives of lead are tetraethyl of lead and tetramethyl of lead , one of them is usually added to benzene to make the engine run at a better performance . Concentration of CO gas in the atmosphere, depending on the density of the vehicles.

VII- Food cans , Lead is used to close these cans, part of which is mixed with food inside cans and transferred to humans.

Symptoms  
of lead  
poisoning  
include

- diarrhea, fatigue and nervousness, and may cross the membranes that surround the brain, causing mental retardation

**4 - Other air pollutants :** There are other pollutants such as organic fumes, smoke, some types of pollen , fluorides, chlorides, ammonia, pesticides, radiation,.... etc.

**Smog (Smoke + Fog = Smog):** - This word is placed to describe the smoke - fog condition, and there are two types of smog: -

**1- Classical smog:** It is the type of smog in London

**2- Photochemical smog:** It is a smog in Los Angeles (it is formed by chemical reactions that include sunlight) and the following table represents the characteristics of classic smoke and chemical smoke:

Table below lists some of the characteristics of the two types of smog :-

Characteristics	Classical smog	Photochemical smog
First occurrence noted	London	Los Angeles
Principle pollutants	Sulfur oxides (SO <sub>x</sub> ) Particulate matter	Nitrogen oxides (NO <sub>x</sub> ) , Carbon monoxide, Hydrocarbons, Ozone, Free radicals
Principle sources	Industrial fuel combustion	Motor vehicle Fuel combustion
The effects on humans	Lung & throats irritation	Eye irritation
The effects on compounds	Reducing	Oxidizing
Time of occurrence of worst episodes	Winter months (especially in early morning )	summer months (Around mid day )