Environmental pollution (soil, water, air)

Environmental pollution It can be defined as addition of any contaminant or pollutant (naturally or artificially) to the environment which is an undesirable change in chemical, physical, and biological characteristics of air, water and soil, that causes the health problem or harm to all the living things. These are categorized as Air pollution, Water pollution Soil, pollution Sound / noise pollution, Nuclear pollution.

Water pollution

Water is the most vital component in the origin of life. Without water, life is not possible. But it got contaminated by various toxic, inorganic industrial pollutants that results in several problems such as unsafe for consumption for humans and irrigation activities. Water pollution is the presence of impurities and foreign substance in water (surface water and ground water) as a result of human and natural activity that adversely effects on living organism.

Sources of water pollution:

A- Pollutants that causes health problems which include:
   1- Infection agents such as bacteria, virus and parasites.
   2- Organic material such as pesticides, plastics, oil, detergents and gasoline.
   3- Inorganic chemicals such as Acids, salts, metals
   4- Radioactive materials include Uranium, cesium, thorium and radon.

B- Pollutants causes effects on ecosystem or disruption:
   1- Sediment soil, silt
   2- Plant nutrients such as nitrate, phosphate and Ammonium.
   3- Oxygen demand waste like animal manure and plant residues.
   4- Thermal pollutants such as heat.

Pollutants entire to water body by two ways:

1-point source: Pollutants can come from a specific or single source such as a pipe that discharges pollutants into water or other materials from a factory into a water body. Such discharges can be harmful to the aquatic ecosystems and can affect the forest tree species surrounding the body of water.

2-non-point source: pollutants comes from many sources in to water body, It occurs when rainfall, snowfall, or irrigation runs over land or through the ground and picks up pollutants and deposits them in bodies of water.

Soil pollution

Soil is an important natural resource to sustain life on earth and is comprise of mineral, organic matter, and pores for movement of water and air. Soil pollution is the changes in properties of soil by addition of materials that adversely effects on its functioning and health of organisms living on it.

Sources of soil pollution:

1- Agricultural source: various chemical compounds used in agriculture to enhance the crop yield are fertilizers, pesticides, insecticides, fungicides, also fuel spilling is contaminant of soil. Surface runoff help in spreading of these chemicals. They penetrate deep inside the soil and infect the groundwater system.
2- Urbane source:

it includes: electric power station, ash. gas works, tars, heavy metals acid deposit. pollutants, sewage or waste.

3-Industrial sources:

-mining heavy metals -chemical and electrical industry.

-paper industries, tanneries, steel industries. -food processing industries, cement industries.

4- Atmospheric sources:

-wind pollutants. – acid rain

5-Incidental sources:

-Explosive poisonous - industrial accidents

Air pollution

Air is the important components for human life and organisms for respiration process. Man, breaths nearly 22000times a day and inhales 16kg of air per day.it is essential for survive organisms like water, light, heat and food. Air pollution can be defined as addition of any contaminant to the air which causes harm to the health of living organisms, any change in the atmosphere layer due to the presence substance in greater concentration in the air.

Sources of air pollution

1- Natural sources 2-artificial sources

Natural sources: In this source, the pollutants enter to the air naturally, it includes:

1-Dust storms they are cause due to the movement of hot wind a round earth and they concentrated place at particular time.

2-fire forest occurs in the area of tropical region or area of high temperature, very large quantities of smoke and particular matter liberating to air.

3-volcanic eruption the solid particle, gases and radiation added into air during volcanic eruption.

4-pollen grain the production of the pollen grain in the spring season are the air pollutants which causes allergy.

Artificially sources or Anthropogenic source

Man made activities are responsible for the pollution of air such as industrial pollution (chemical industry, cement industry), vehicle pollution and domestic pollution due to burning fuel in home for cooking purpose.

Human caused air pollution includes:

1-primary sources 2-secondary sources

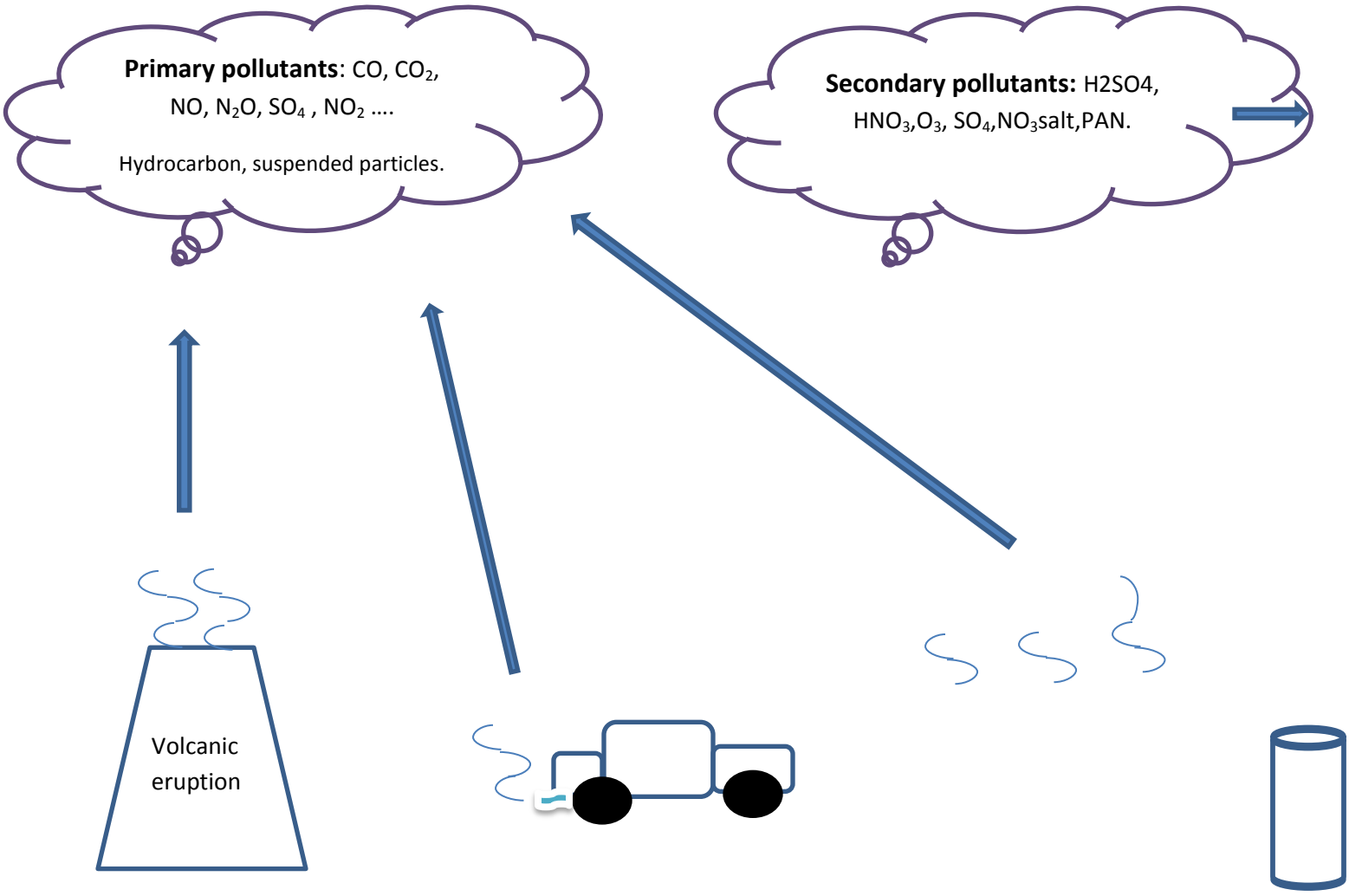
3-stationary sources 4-mobile or vehicle sources

Primary sources

They are pollutants which are directly emitted in to atmosphere from different polluted sources such as cars, volcano and industrial plant.

Secondary sources

They are pollutants which are formed by chemical reaction of two or more primary pollutants. Photochemical is responsible to formation of secondary pollutants (PAN, Ozone in troposphere).



This diagram show sources and types of air pollution.

What is the major outdoor air pollution?

According to the EPA there are 6 major types of air pollutants:

1- COX 2-NOX 3-SO2 4-traposphere ozone 5-Lead Pb 6-particular matter

Carbone monoxide (CO): It is a color less gas, odorless, high toxic or poisonous for organisms during breathing, because it displaces oxygen in the haemoglobin of the blood, its ability to bind in haemoglobin, responsible for the transport of oxygen. The major sources of CO are incomplete combustion of fuel, such as vehicle, burning of forest, open fire and tobacco.

Carbon dioxide (CO_2): It is colorless and odorless gas, about 92% of CO_2 in atmosphere as a result of natural carbon cycle (plants and animals' respiration, microbial release CO_2 gas by decomposition process, other source is volcano.

Increasing the level of CO_2 by human activities such as fossil fuel combustion, coal burning, solid waste, industrial plant, oil refinery, motor vehicle. Also, causes greenhouse gas.

Nitrogen oxide (NOX): In air, NO react with oxygen to form reddish-brown gas, this gas in atmosphere react with water vapor to form HNO_3 which cause acid rain and forming nitric salt (NO_3) in acid deposition shape or dust deposition. The main sources are nitrogen cycle, motor vehicle, coal burning, industrial plant, lighting and bacteria in soil and water.

NO or NO2 play important role in formation photochemical smog, troposphere and PAN. It causes greenhouse gas.

Sulfur dioxide (SO_2): It is colorless gas, irritating odor. In atmosphere, SO_2 gas come from natural source as a part of sulfur cycle. About 90% of SO_2 coming in industrial plant and oil refinery.

SO_2 in atmosphere react with water vapor to forming H_2SO_4 which cause acid rain and sulfuric salt (SO_4) in dry deposition.

Acid rain and dry deposition can damage crops, trees, soil materials, aquatic life in water, paint materials, building and reduce visibility.

Lead (Pb): It is a toxic at low concentration, accumulated in body organisms, which damage kidney, brain. The sources of Lead are battery manufacture, solid waste, oil refinery, steel factory, motor vehicle and lead fuel.

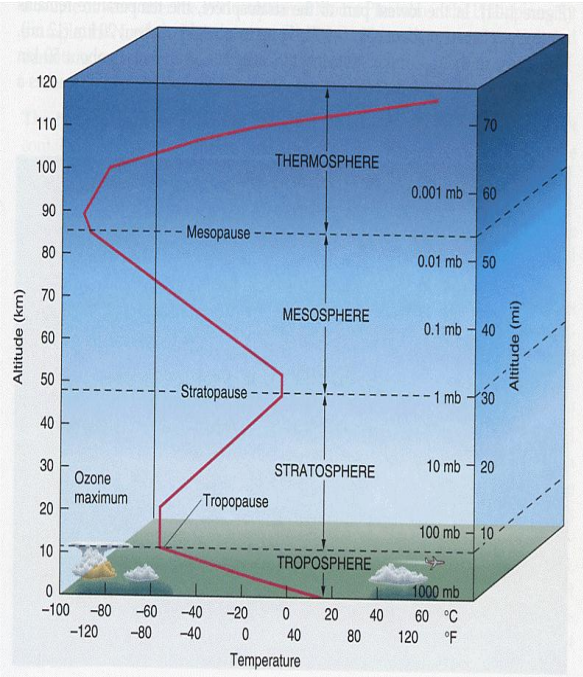
Particular matter: It is a mixture of solid and liquid droplet that floating in air (small and light enough to remain suspended particles in air for long time).

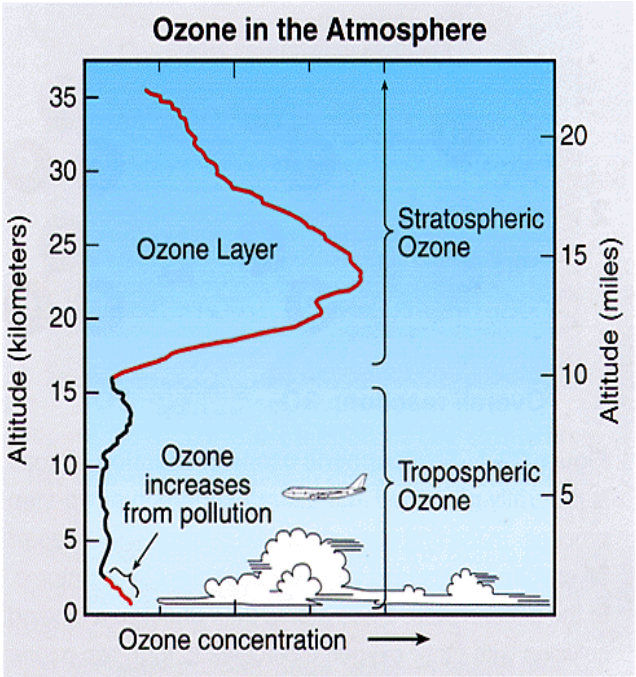
Sources of matter are naturally and mam made(anthropogenic) source, natural source (62%) are dust storm, smoke from forest fire, volcano, sea salt and pollen grain. The artificially or manmade sources (38) are motor vehicle, smoke or particular wastes from industrial factory, coal burning, road construction and tobacco smoke. The effect of particular matter are damage crops, lung damage, reduce visibility and damage building.

Atmosphere

Earth's atmosphere is composed of gases and water (nitrogen 78%, oxygen 21%, argon, water vapor, and a number of trace gases) that are retained by earth's gravity and help the earth retain heat and reflect UV radiation. The atmosphere is a complex system in which physical and chemical reactions are constantly taking place. Many atmospheric processes take place in a state of dynamic balance.

Layers of atmosphere: Troposphere 0-10km (90%), stratosphere 10-50km (9.5%), mesosphere 50-90km, thermosphere 90-500km, exosphere 500km (three layer less than 1%).


THERMOSPHERE
Mesopause
MESOSPHERE
Stratopause
STRATOSPHERE
Ozone maximum
Tropopause
TROPOSPHERE
0.001 mb
0.01 mb
0.1 mb
1 mb
10 mb
100 mb
1000 mb
Altitude (km)
Altitude (mi)
Temperature
°C
°F


Ozone in the Atmosphere
Ozone Layer
Stratospheric Ozone
Ozone increases from pollution
Tropospheric Ozone
Altitude (kilometers)
Altitude (miles)
Ozone concentration