Environmental pollution

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CHE 110: Environmental Studies

Unit - 4

Environmental pollution

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Environmental Pollution

- The word ‘pollution’ is derived from the Latin word ‘polluere’ which means ‘to soil or defile’ .
- Any alteration to air, water, soil or food that threatens the health, survival capability or activities of humans or other living organisms is called environmental pollution.
- Pollution is the introduction of contaminants into the natural environment that cause adverse change.
- Pollution can take the form of chemical substances or energy, such as noise, heat or light.
- Pollutants, the components of **pollution**, can be either foreign substances/energies or naturally occurring contaminants.

https://www.youtube.com/watch?v=OqHp03RRTDs

Types of Environmental pollution

- ❑ Air Pollution
- ❑ Water Pollution
- ❑ Noise Pollution
- ❑ Soil Pollution
- ❑ Marine pollution
- ❑ Thermal pollution
- ❑ Radiation Pollution
- ❑ Solid waste Pollution

Air Pollution

- Air pollution is the introduction into the atmosphere of **chemicals, particulates, or biological materials**
- That cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment.
- Air pollution is said to exist if the levels of gases, solids, or liquids present in the atmosphere are high enough to harm humans, other organisms, or materials.
- Pollutants:
  - Primary Pollutants
  - Secondary Pollutants

Pollutants

- **Primary pollutants**
  - **Harmful chemicals that are released directly from a source into the atmosphere.**
  - **Particulate matter such as soil particles, lead, and asbestos.**
  - **Suspended Particulate matter (SPM)**
    - **Consists of solids in the air in form of smoke, dust and vapour.**
  - **Oxides of carbon and nitrogen and sulphur dioxide**
  - **Nitrogen oxides,**
  - **Volatile organic compounds (VOCs):**
    - **Organic chemicals that have a low boiling point,**
    - **Evaporate easily and mix with the air, HCHO from painting, chemicals from perfumes**
  - **Hydrocarbons like methane and benzene**

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- **Secondary pollutants**
  - Those which are produced in the atmosphere when certain chemical reactions take place among primary pollutants.
  - Sulphur trioxide
  - Atmospheric sulfuric acid
  - Photochemical smog
  - Ozone
    - Upper atmosphere ozone plays an important and beneficial role by providing a shield from the sun's ultraviolet rays. Ozone at ground level is a harmful air pollutant.

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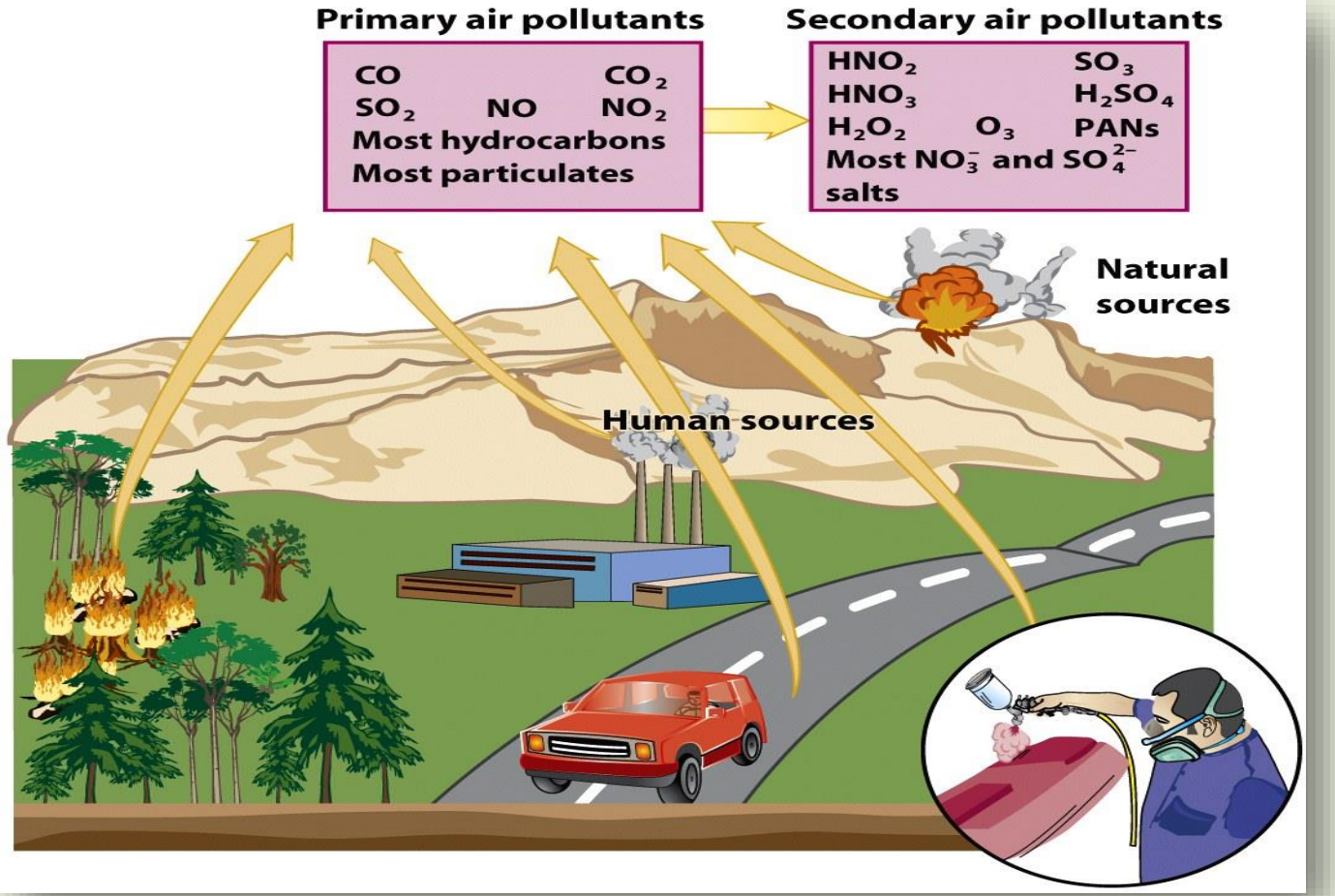
Primary air pollutants
CO
CO_2
SO_2
NO
NO_2
Most hydrocarbons
Most particulates
Secondary air pollutants
HNO_2
SO_3
HNO_3
H_2SO_4
H_2O_2
O_3
PANs
Most NO_3^- and SO_4^{2-} salts
Natural sources
Human sources

Major Air Pollutants

- Carbon Monoxide
- Carbon Dioxide
- CFCs
- Ozone
- Nitrogen oxide
- Sulphur dioxide
- Suspended Particulate Matter (SPM)

Sources, Health and Welfare Effects for Criteria Pollutants

Pollutant	Description	Sources	Health Effects	Welfare Effects
Carbon Monoxide (CO)	Colorless, odorless gas	Motor vehicle exhaust, indoor sources include kerosene or wood burning stoves.	Headaches, reduced mental alertness, heart attack, cardiovascular diseases, impaired fetal development, death.	Contribute to the formation of smog.
Sulfur Dioxide (SO_2)	Colorless gas that dissolves in water vapor to form acid, and interact with other gases and particles in the air.	Coal-fired power plants, petroleum refineries, manufacture of sulfuric acid and smelting of ores containing sulfur.	Eye irritation, wheezing, chest tightness, shortness of breath, lung damage.	Contribute to the formation of acid rain, visibility impairment, plant and water damage, aesthetic damage.
Nitrogen Dioxide (NO_2)	Reddish brown, highly reactive gas.	Motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels.	Susceptibility to respiratory infections, irritation of the lung and respiratory symptoms (e.g., cough, chest pain, difficulty breathing).	Contribute to the formation of smog, acid rain, water quality deterioration, global warming, and visibility impairment.
Ozone (O_3)	Gaseous pollutant when it is formed in the troposphere.	Vehicle exhaust and certain other fumes. Formed from other air pollutants in the presence of sunlight.	Eye and throat irritation, coughing, respiratory tract problems, asthma, lung damage.	Plant and ecosystem damage.
Lead (Pb)	Metallic element	Metal refineries, lead smelters, battery manufacturers, iron and steel producers.	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ.	Affects animals and plants, affects aquatic ecosystems.
Particulate Matter (PM)	Very small particles of soot, dust, or other matter, including tiny droplets of liquids.	Diesel engines, power plants, industries, windblown dust, wood stoves.	Eye irritation, asthma, bronchitis, lung damage, cancer, heavy metal poisoning, cardiovascular effects.	Visibility impairment, atmospheric deposition, aesthetic damage.