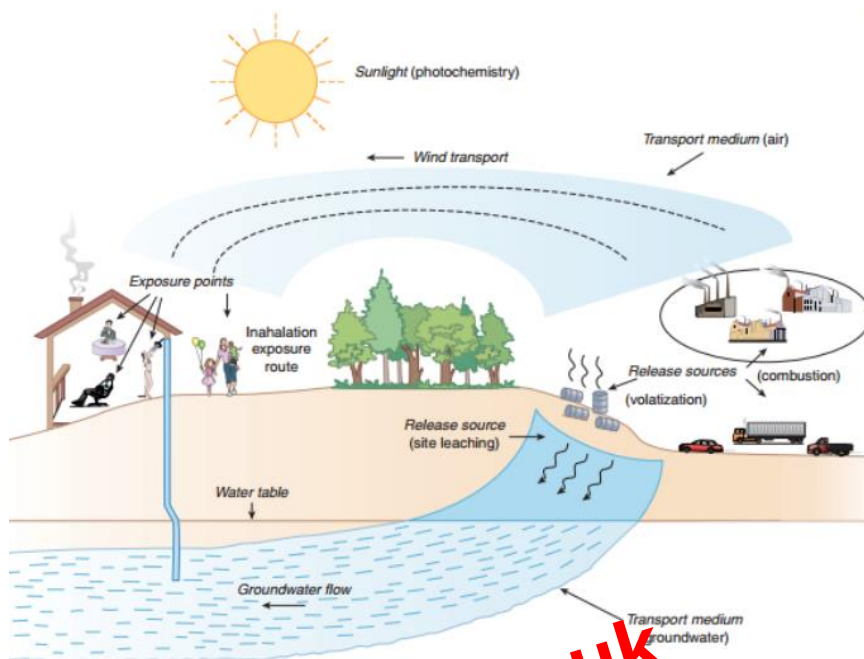


Environmental Toxicology

Environmental toxicology is the study of the effects of pollutants on organisms, populations, ecosystems, and biosphere.

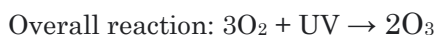
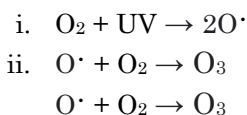
I. Hazardous air pollutants (HAP)

- HAP: air pollutants that is known to cause cancer and other serious health impacts.
- Originated from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g. factories, refineries, power plants), as well as indoor sources (e.g. some building materials and cleaning solvents)
- Examples: benzene, methylene chloride, dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds
- How are we exposed to HAP? By breathing contaminated air, eating contaminated food products, drinking contaminated water, ingesting contaminated soil, touching contaminated soil, dust, or water.



II. Toxicity of Ozone (O₃)

- Known as photochemical air pollution
- Ozone or trioxygen, is an inorganic molecule with the chemical formula O₃. it is a pale blue gas with a distinctively pungent smell.
- O₃ initiate propagation of lipid radicals and auto oxidation of cell membranes
- Stratospheric ozone production



- Nitrogen dioxide and UV
 - $\text{NO}_2 + \text{UV} \rightarrow \text{O}^\bullet + \text{NO}^\bullet$
 - $\text{O}^\bullet + \text{O}_2 \rightarrow \text{O}_3$
 - $\text{O}_3 + \text{NO}^\bullet \rightarrow \text{NO}_2$

Barrier for short-wavelength UV. Degraded by emission of Cl₂ gas and chlorofluorocarbons (CFC)

- O₃ penetrates deeply into the lungs → accumulate in the terminal bronchioles until alveoli
- Centriacinar interstitial fibrosis
 - Fibrosis in the area of terminal bronchioles to the alveolar ducts
 - Studies of 18-month chronic exposure to O₃ at 0.25 ppm produced evidence of centriacinar interstitial fibrosis

