

AP Environmental Science

Review of Common Ambient Air Pollutants



Name	Criteria	1° / 2°	Source & Impact
1. Carbon monoxide (CO)	Yes	1°	Sources: Incomplete combustion of fuel, combustion of waste. Impact: Out competes O ₂ for hemoglobin, potentially suffocating.
2. Lead (Pb)	Yes	1°	Sources: Exhaust fumes from leaded gasoline, metal smelting. Impact: A heavy metal that is toxic to nerve cells.
3. Nitrogen dioxide (NO ₂)	Yes	1° + 2°	Sources: Transportation (cars, trucks, trains, boats & planes), electrical utilities and some factories. N ₂ + O ₂ → NO ₂ Impact: A component of photochemical smog and acid deposition.
4. Particulate matter (suspended particulate matter / SPM)	Yes	1° + 2°	Sources: Soot and SO ₂ from coal combustion, dust from human activities, natural dust sources Impact: Inhalation causes respiratory diseases, ranging from asthma to respiratory distress and lung cancer
5. Sulfur dioxide (SO ₂)	Yes	1°	Sources: Combustion of coal and petroleum. Impact: Reacts in atmosphere to form SO ₃ and H ₂ SO ₄ , components of acid deposition. (see reactions sheet)
6. Tropospheric ozone (O ₃) (aka: ground level ozone)	Yes	2°	Sources: Reaction of NO from motor vehicles with sunlight, heat and O ₂ Impact: Damage to plants and respiratory system, traps heat, and contributes to thermal inversion
7. Carbon dioxide (CO ₂)	No	1°	Sources: Combustion of any organic material. Gasoline, petroleum, coal, natural gas, biomass. Also respiration. Impact: A greenhouse gas, CO ₂ absorbs thermal radiation and re-emits it at lower wavelengths.
8. Mercury (Hg)	No	1°	Sources: Combustion of coal. Impact: A heavy metal that is toxic to nerve cells. Capable of bioaccumulation and biomagnification.
9. Nitric Oxide (NO)	No	1°	Sources: Transportation (cars, trucks, trains, boats & planes). High heat of engine causes O ₂ + N ₂ → NO Impact: Poisonous. Reacts with O ₂ to form NO ₂ , leading to ground-level ozone production.
10. Nitric Acid (HNO ₃)	No	2°	Source: Transportation (cars, trucks, trains, boats and planes). NO ₂ + H ₂ O → NO + HNO ₃ Impact: Contributes to acid deposition. Harms respiratory system.
11. Peroxacyl nitrates (PANs)	No	2°	Source: Transportation (cars, trucks, trains, boats and planes). NO ₂ + hydrocarbons ("HC") → PANs Impact: A strong respiratory and eye irritant. Potentially mutagenic. Can damage vegetation.
12. Sulfur trioxide (SO ₃)	No	2°	Sources: Combustion of coal and petroleum. Coal has variable quantities of sulfur. Impact: Reacts with water in the atmosphere to form sulfuric acid (H ₂ SO ₄). Contributes to acid deposition.
13. Sulfuric acid (H ₂ SO ₄)	No	2°	Sources: Combustion of coal and petroleum. Coal has variable quantities of sulfur. Impact: Contributes to acid deposition. Harms respiratory system.
14. Volatile Organic Compounds (VOCs)	No	1° + 2°	Sources: Automobile exhaust, solvents, industrial processes, household chemicals. Impact: Contribute to climate change & ground level O ₃ . Some are carcinogenic, some harm respiratory system

*Note: The category labeled "1° + 2°" indicates whether the pollutant is a "primary air pollutant", a "secondary air pollutant" or both.

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