Air Pollution

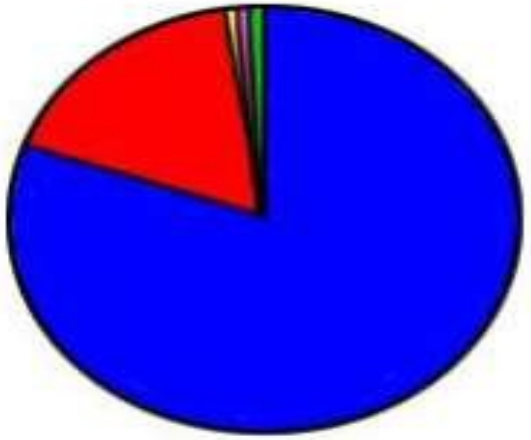
Air....

- Air supplies us with *oxygen* which is essential for our bodies to live.
- Air is a mixture of nitrogen, oxygen, water vapor, carbon dioxide and inert gases.
- Human activities can release substances into the air, some of which can cause problems to humans, plants, and animals.

Natural Composition of Gases

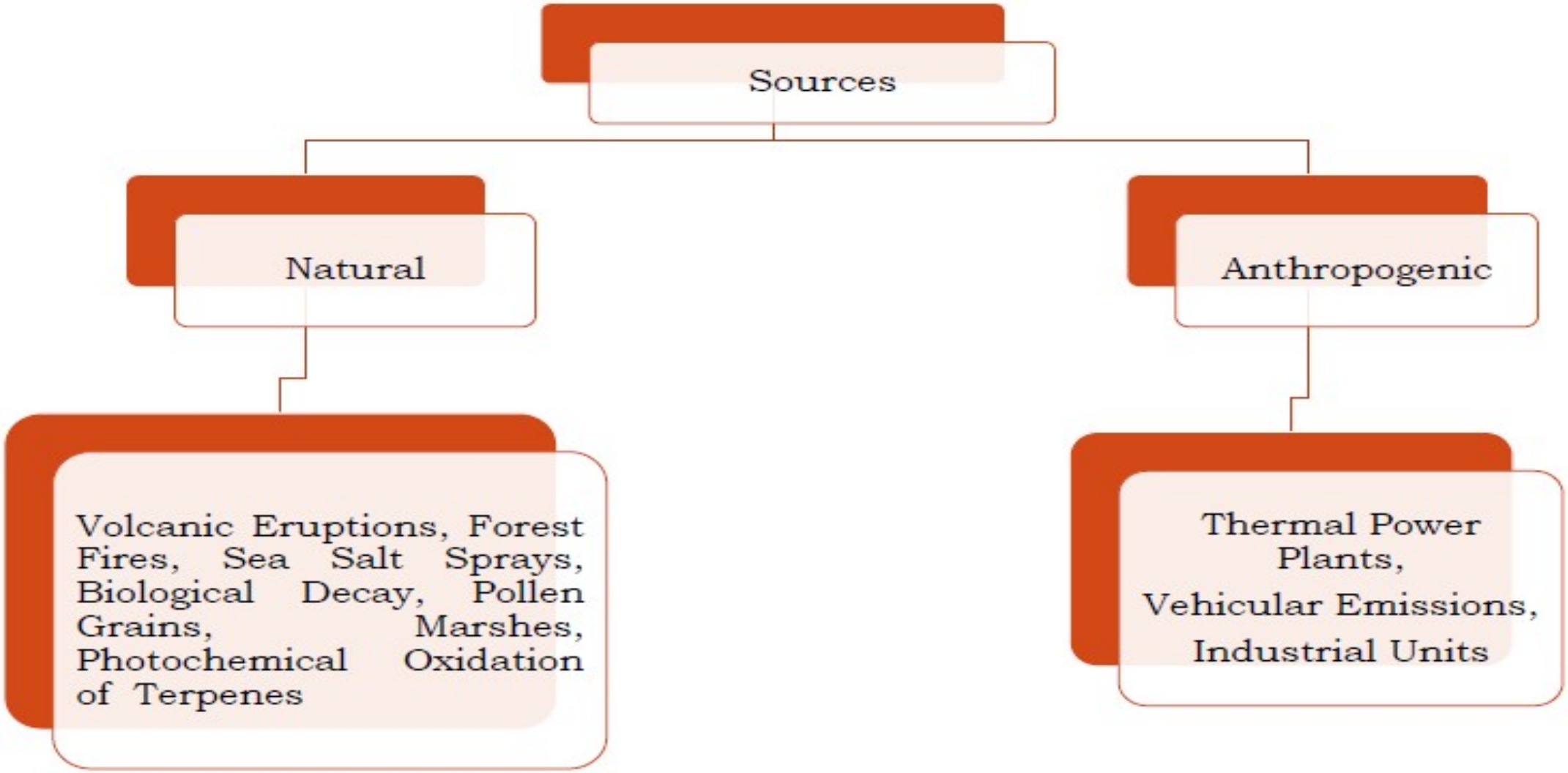
Dry Air Expressed in Volumes	
Nitrogen (N_2)	78.1%
Oxygen (O_2)	20.9%
Argon (A)	0.9%
Carbon dioxide (CO_2)	0.035%
Others	0.065%

Others : Neon (Ne)
Helium (He)
Krypton (Kr)
Hydrogen (H_2)
Xenon (Xe)
Ozone (O_3)
Radon (Rn)



- **Air pollution** : An atmospheric condition in which certain substances (including normal constituents in excess) are present in concentrations which can cause undesirable effects on man and his environment.
- They are in the form of gases (NOx, SOx, CO,VOC); Particulate matter(dust, smoke, fumes, etc) & Radioactive (rado-222, Iodine-131, etc)

Sources of Air Pollution



INDUSTRIAL EMISSION



BURNING FOSSIL FUELS

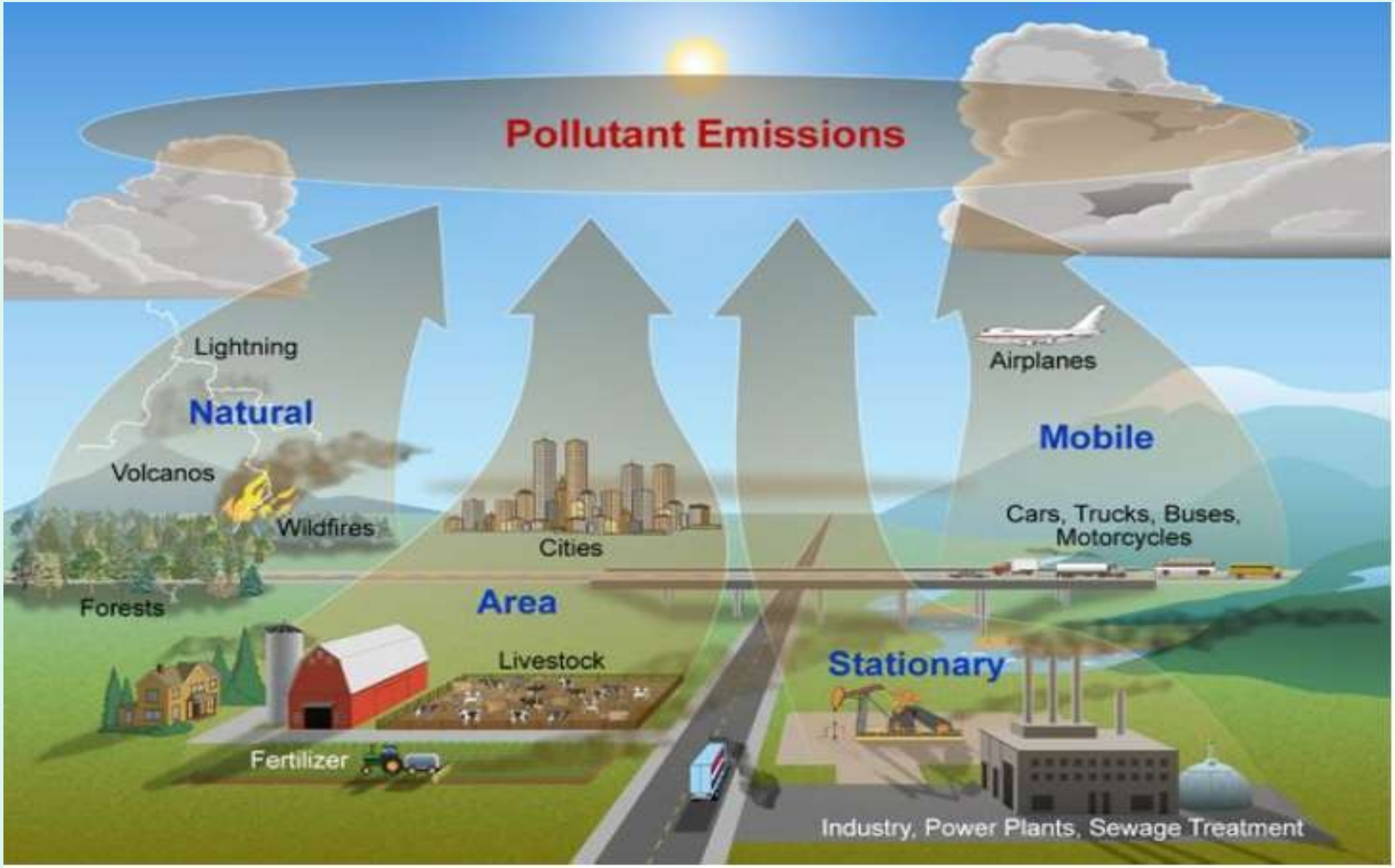


AGRICULTURAL ACTIVITIES

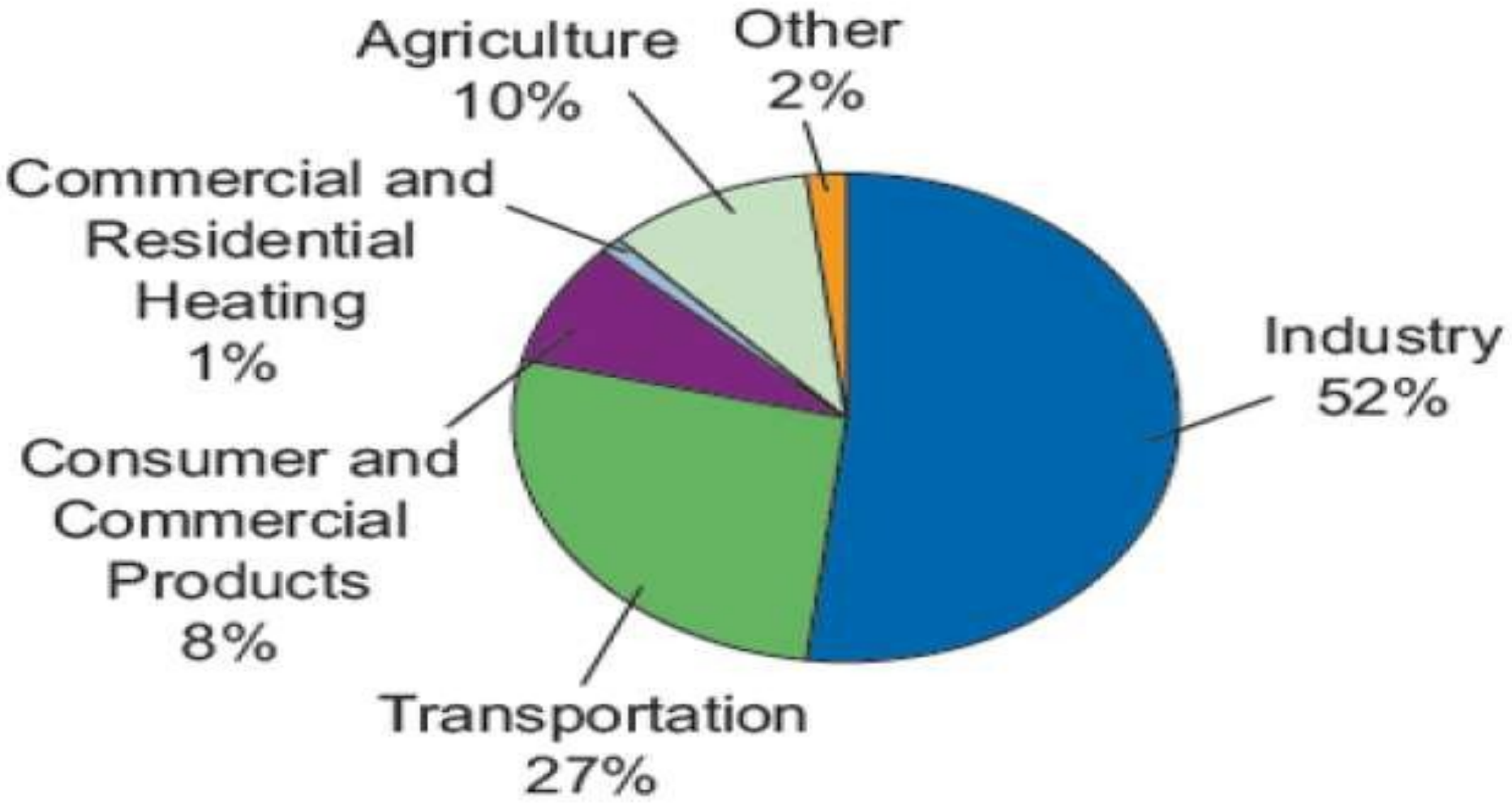


MINING OPERATIONS




Pollutant Emissions
Lightning
Natural
Volcanos
Wildfires
Forests
Cities
Area
Livestock
Fertilizer
Airplanes
Mobile
Cars, Trucks, Buses, Motorcycles
Stationary
Industry, Power Plants, Sewage Treatment

Sources of Emissions of Air Pollutants



Classification of Air Pollutents





Natural Pollutants: The pollution which comes out from natural sources such as forest fires volcanic eruption decomposition of organic matter & natural radioactivity.

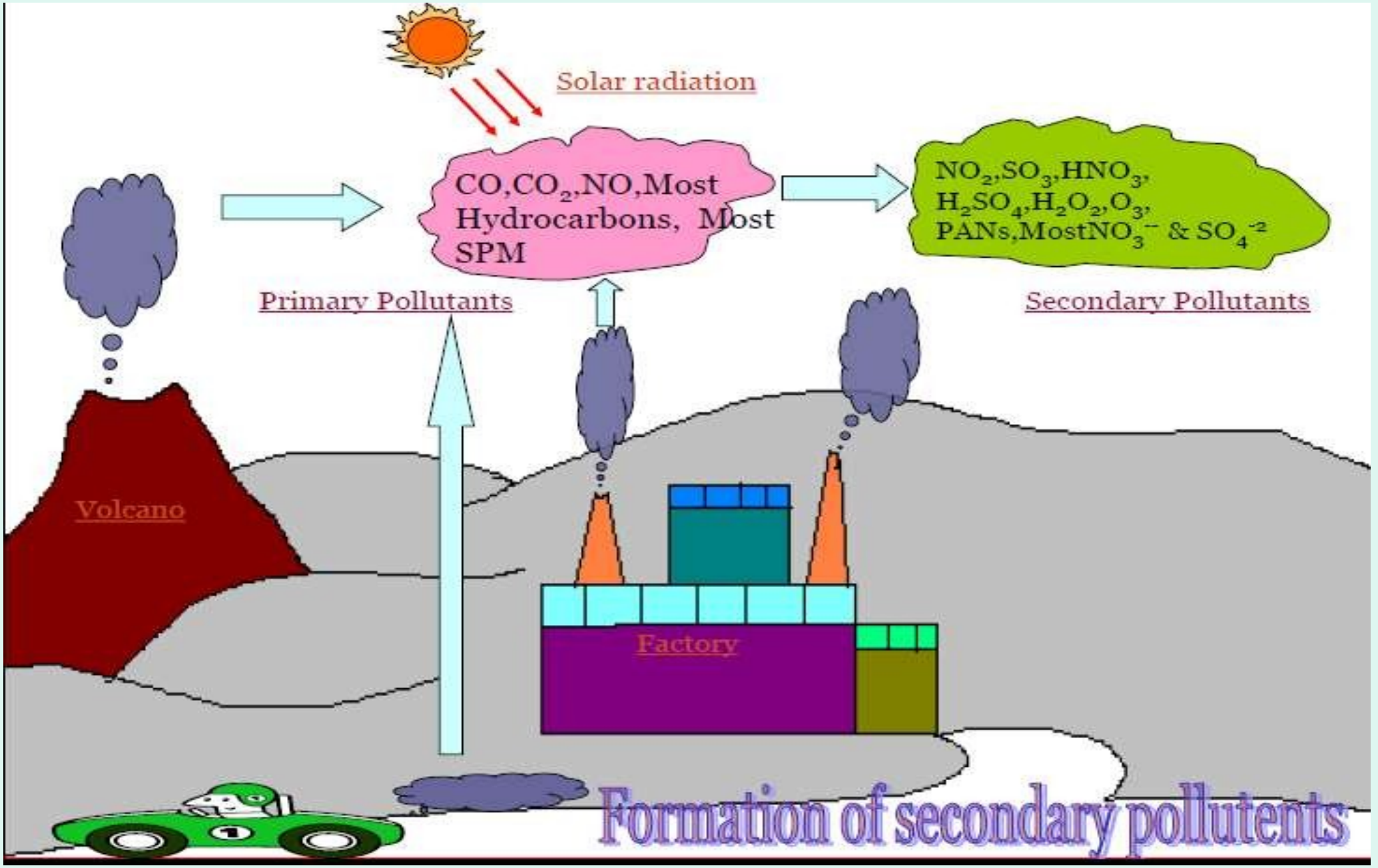
Primary Pollutants: Harmful chemical that directly enters the air as a result of human activity. These are deforestation burning of fossil fuel industrialization warfare etc.

Secondary pollutants :These result from chemical reactions between two or more air components.

Formation of secondary pollutants

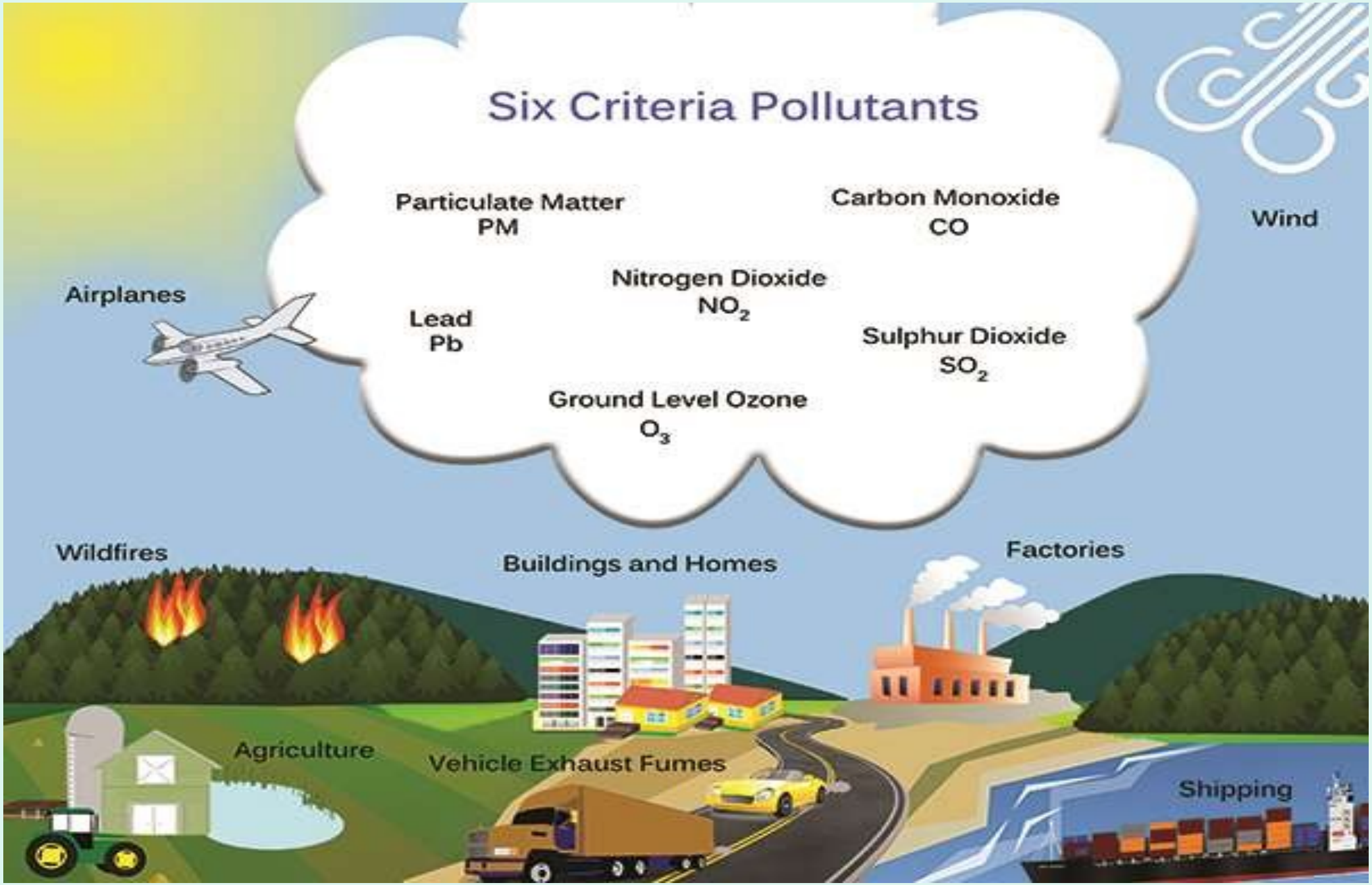
$$2SO_2 + O_2 \longrightarrow 2SO_3$$

$$2SO_3 + H_2O \longrightarrow H_2SO_4 \text{ (Secondary pollutant)}$$


Solar radiation
CO,CO2,NO,Most Hydrocarbons, Most SPM
NO2,SO3,HNO3, H2SO4,H2O2,O3, PANs,MostNO3− & SO4−2
Primary Pollutants
Secondary Pollutants
Volcano
Factory
Formation of secondary pollutents

Criteria Air Pollutants

- The Clean Air Act requires EPA to set National Ambient Air Quality Standards for six common air pollutants.
- The criteria air pollutants include particle pollution, ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. These pollutants can harm your health and the environment, and cause property damage.
- EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels.

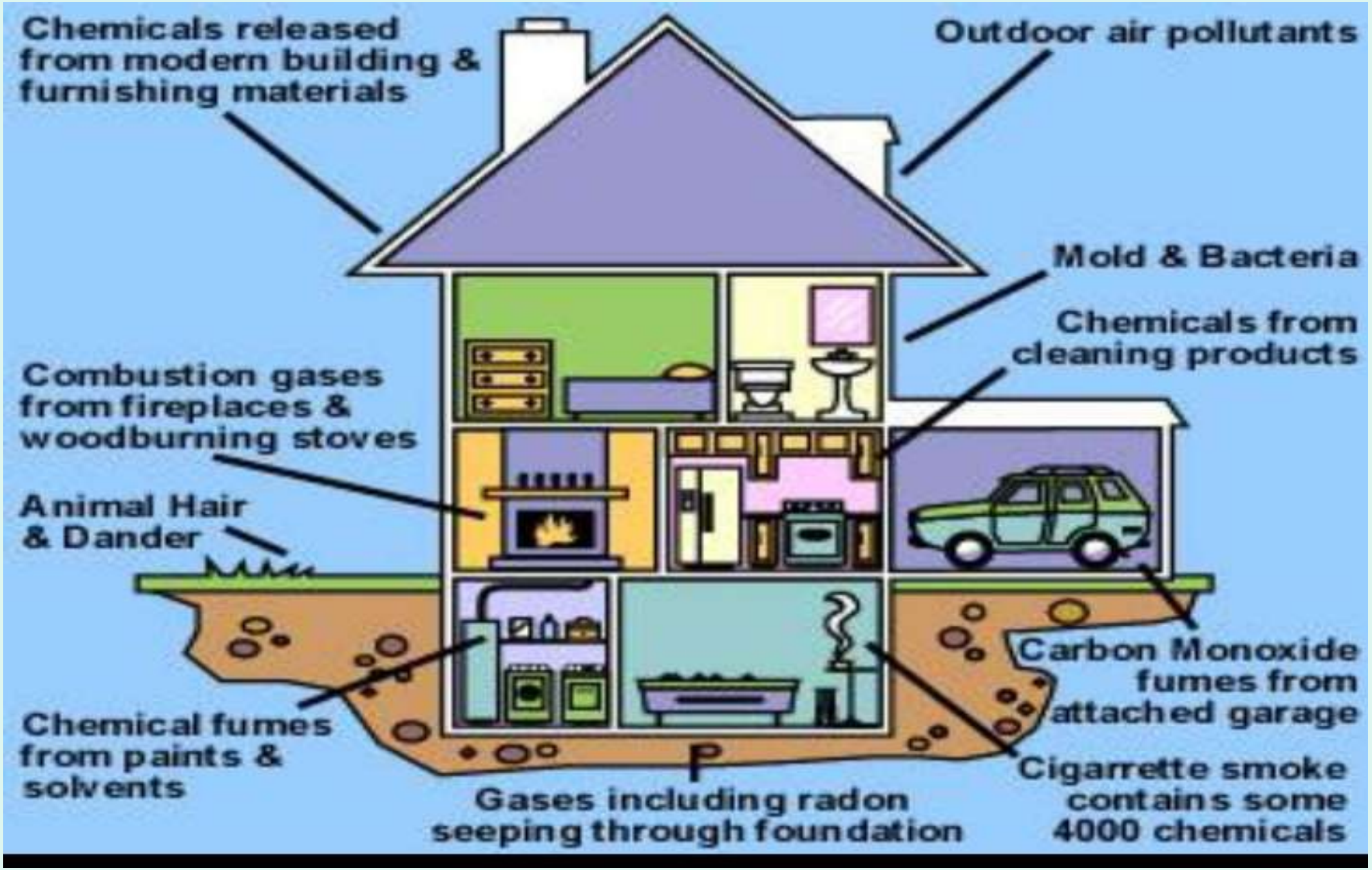

Six Criteria Pollutants
Particulate Matter
PM
Carbon Monoxide
CO
Wind
Airplanes
Nitrogen Dioxide
NO_2
Lead
Pb
Sulphur Dioxide
SO_2
Ground Level Ozone
O_3
Wildfires
Buildings and Homes
Factories
Agriculture
Vehicle Exhaust Fumes
Shipping

HEALTH EFFECTS OF AIR POLLUTION

POLLUTANTS	SOURCES	HEALTH IMPACTS
PM 2.5, PM 10 (particulate matter smaller than 2.5 micron and 10 micron)	Brick kilns, roads and construction work, wastes, fuel burning by motor vehicles	Breathing problem, asthma, lung cancer, chronic obstructive pulmonary and cardiovascular disease
Nitrogen oxide (NOx)	Incomplete burning of transport fuel	Impact on liver spleen and blood, irritation of eyes, nose and throat
Sulphur dioxide (SO2)	Sulphur-content fuel burning	Cardiovascular disease, headache and anxiety, irritation of eyes, nose and throat
Carbon monoxide (CO)	Incomplete burning of transport fuel	Lung cancer, chronic obstructive pulmonary disorder, cardiovascular disease

Indoor air pollution

- Many people spend large portion of time indoors - as much as 80-90% of their lives.
- We work, study, eat, drink and sleep in enclosed environments where air circulation may be restricted
- Children, women more exposed to risk
- Radon gas
- Burning of dung cakes for fuel, wood, kerosene
- Incomplete combustion produces CO
- Cigarette smoke.


Chemicals released from modern building & furnishing materials
Outdoor air pollutants
Mold & Bacteria
Chemicals from cleaning products
Combustion gases from fireplaces & woodburning stoves
Animal Hair & Dander
Carbon Monoxide fumes from attached garage
Chemical fumes from paints & solvents
Cigarrette smoke contains some 4000 chemicals
Gases including radon seeping through foundation

Effects of Air Pollution

Air Pollution affects???

- Human health
- Animals
- Plants
- Materials
- Environment





Effect on Human health

- Main problems are related to Respiratory Track - Asthma, hay fever, and other allergic diseases.
- Irritation of the eye, nose and throat. In severe cases there may be headaches, nausea, and loss of coordination.
- Prolonged exposure can cause damage to the nervous system, digestive problems, and in some cases cause Lung cancer.
- It lowers our resistance to colds and pneumonia.
- CO has affinity towards Hb which cause disturbance in transportation of Oxygen, impairing our concentration, slow our reflexes, and make us confused and sleepy.
- SO_2 in the air leads to diseases of the lung and other lung disorders such as wheezing and shortness of breath.
- Chronic respiratory disease, lung cancer, heart disease, and even damage to the brain, nerves, liver, or kidneys.

Effect on Plants

- Pollutants enter through stomata
- Destroy chlorophyll and Affect photosynthesis
- Cuticle(Wax Layer on Leaves) is lost
- Necrosis – Damage to Leaf Structure
- Chlorosis - Loss/ reduction of Chlorophyll
- Abscission - Dropping of leaf
- Epinasty – Downward curling of Leaf
- DEATH









Effect on Animals and materials

- Corrosion of metal surfaces, fading
- SO_2 & water form H_2S – corrosion as well as disfigurement of statues made up of limestone or Marble
- Air pollutants mix with rain water and increase acidity (Acid Rain) of water body and kill fish.
- Ozone causes crackling of rubber

Effect on Environment

- Visibility
- Pollutants in the presence of sunlight produce photochemical Smog
- Emission of Green House Gases tend to Global Warming
- CFC's cause Ozone Depletion

Control of Air Pollution

- Proper air pollution control devices in industries
- Using low sulphur coal
- Regular engine tune up, replacement of old more polluting vehicles
- Using mass transport system, bicycles etc
- Shifting to less polluting fuels
- Planting more trees
- No to FIRE CRACKERS in occasions

LIVING IN TOXIC AIR

- Highest air pollution related deaths occur in Bangladesh
- Pollution related diseases reduce GDP in low to middle-income countries by up to **2%**

NUMBER OF UNHEALTHY DAYS IN BANGLADESH





MAJOR REASONS FOR AIR POLLUTION

1. BRICK KILNS
2. VEHICULAR EMISSION
3. CONSTRUCTION SITES

NUMBER OF VEHICLES IN DHAKA

2010
5,93,077

2018
13,70,500

WHAT TO BE DONE TO CUT AIR POLLUTION

- Phasing out use of burnt bricks
- Making the use of block bricks mandatory in phases
- Covering construction sites to reduce dust in the air
- Phasing out unfit vehicles
- Importing diesel with less sulfur contents



Up to 7% of health spending in heavily polluted, rapidly developing middle income countries goes to care for people made sick by pollution



BRICK KILNS IN COUNTRY

2013	2018
4,985	7,900

2,087 BRICK KILNS IN DHAKA IN 2018