



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

(An Autonomous institution)

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DEPARTMENT OF CHEMISTRY

**COURSE NAME : 23CHT103- ENVIRONMENTAL SCIENCE AND
SUSTAINABILITY**

I YEAR / I SEMESTER

UNIT : 2. ENVIRONMENTAL POLLUTION

TOPIC : 3. AIR POLLUTION



BRAINSTORMING WITH RECAP

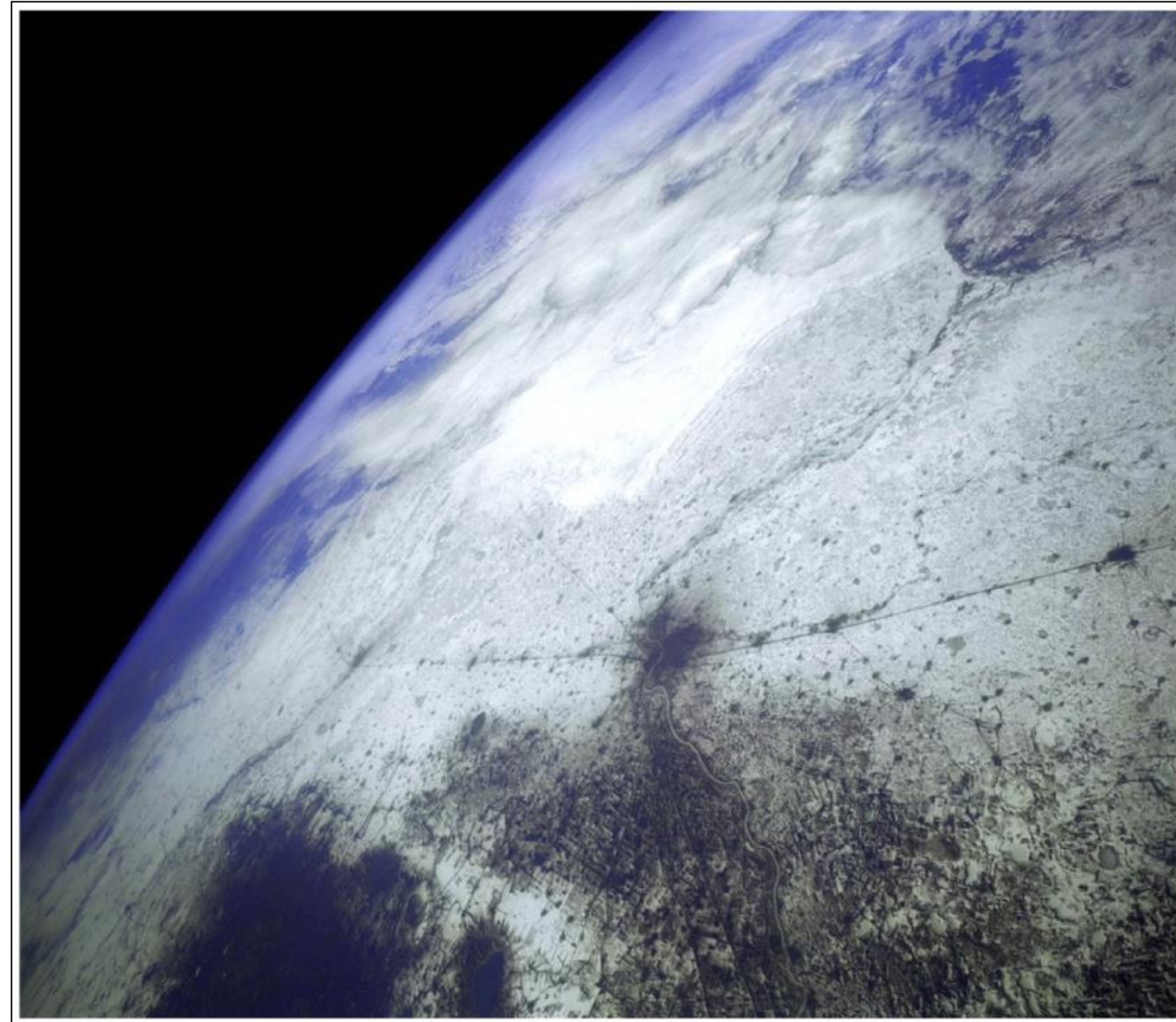




INTRO



- **Atmospheric Composition**
- Nitrogen 78.08%
- Oxygen 20.95%
- Argon 0.93%
- Carbon dioxide 0.04%
- **Ecosystem services**
- Blocks UV radiation
- Moderates the climate
- Redistributes water in
- the hydrologic cycle





SOURCES



Air Pollution-Definition

- Chemicals added to the atmosphere by natural or human activities in high enough concentrations to be harmful

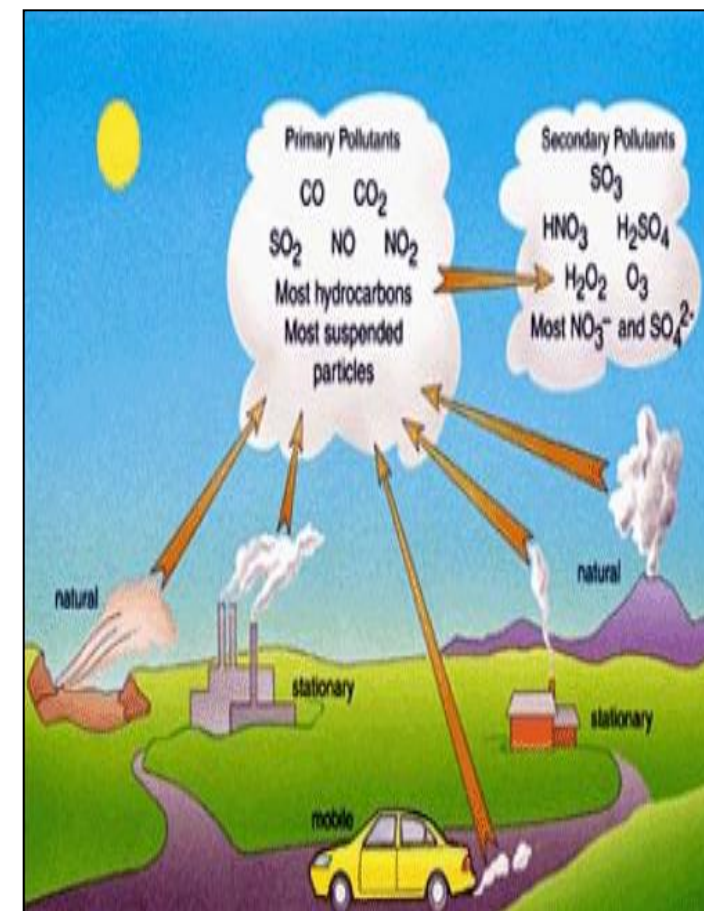
Types

1.Primary Air Pollutant

- Harmful substance that is emitted directly into the atmosphere(Originate from natural process)

2. Secondary Air Pollutant

- Harmful substance formed in the atmosphere when a primary air pollutant reacts with substances normally found in the atmosphere or with other air pollutants

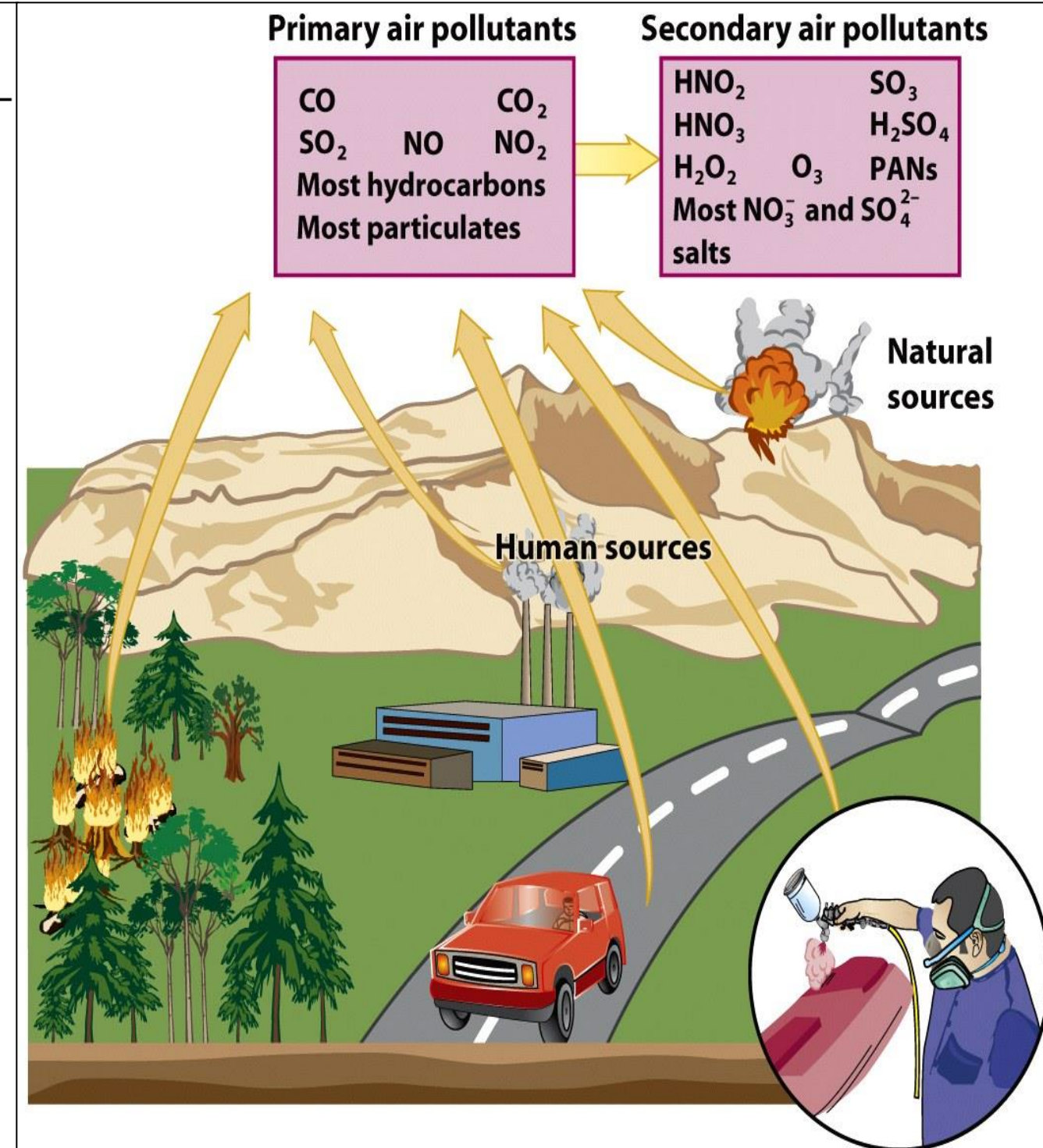




MAJOR AIR POLLUTANTS



Pollutant	Composition	Primary or Secondary	Characteristics
Particulate matter			
Dust	Variable	Primary	Solid particles
Lead	Pb	Primary	Solid particles
Sulfuric acid	H ₂ SO ₄	Secondary	Liquid droplets
Nitrogen oxides			
Nitrogen dioxide	NO ₂	Primary	Reddish-brown gas
Sulfur oxides			
Sulfur dioxide	SO ₂	Primary	Colorless gas with strong odor
Carbon oxides			
Carbon monoxide	CO	Primary	Colorless, odorless gas
Carbon dioxide*	CO ₂	Primary	Colorless, odorless gas
Hydrocarbons			
Methane	CH ₄	Primary	Colorless, odorless gas
Benzene	C ₆ H ₆	Primary	Liquid with sweet smell
Ozone	O ₃	Secondary	Pale blue gas with acrid odor
Air toxics			
Chlorine	Cl ₂	Primary	Yellow-green gas





SOURCES & EFFECTS



Pollutant	Anthropogenic sources	Effects on human health
SO ₂	Combustion of fossil fuel	Respiratory disorder, visibility impairment
NO ₂	Biomass & fossil fuel burning	Respiratory disorder
CO	Exhaust of internal combustion engines	Respiratory disorder, Anomexis, Cardiovascular problems
NH ₃	Fertilizer industry	Respiratory disorder, skin & eye irritation
O ₃	Reaction of sunlight on air containing hydrocarbons and NO _x	Respiratory disorder, Cardiovascular problems
Pb	Automobile exhaust, Cosmetics, firewood burning, tobacco, batteries, Waste incineration, Metal processing, Paint,	Effects on CNS, cardiovascular system, kidneys, immune system, miscarriage & reduction of fertility
Ni	Combustion of fossil fuels, Nickel plating, Metallurgical processes	Allergy, dermatitis
As	Combustion of fuels, Smelting of metals, glass production,	Multi-system organ failure, poisoning, epigenetic changes,





SOURCES & EFFECTS



Pollutants	Anthropogenic sources	Effects on human health
C_6H_6	Combustion of fossil fuel	Reproductive effects, Neurotoxic, Hematotoxic, leukemogenic, carcinogenic,
PAH	Incomplete combustion of fuels	Respiratory disorder, mutagenic, carcinogenic effects
PM_{10}	Vehicular emission, Road traffic emissions, industrial combustion, agricultural burning	Respiratory disorder, Cardiovascular problems
$PM_{2.5}$	Vehicular emission, Industrial & residential combustion, Biomass burning, thermal power plants	Respiratory disorder, Cardiovascular problems, Oxidative stress, Systemic & immune alterations, Genotoxicity, Neurotoxicity, Reprotoxicity

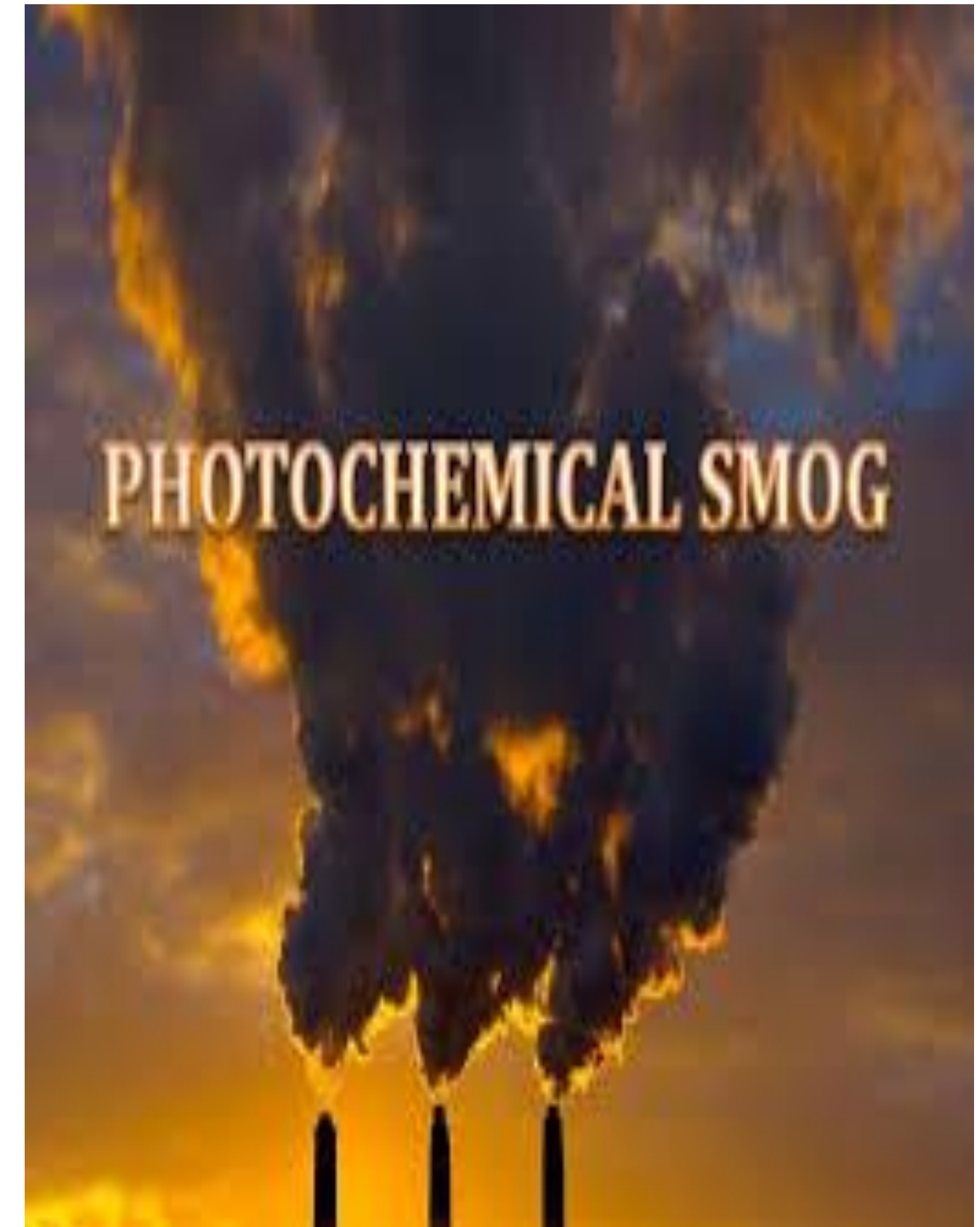
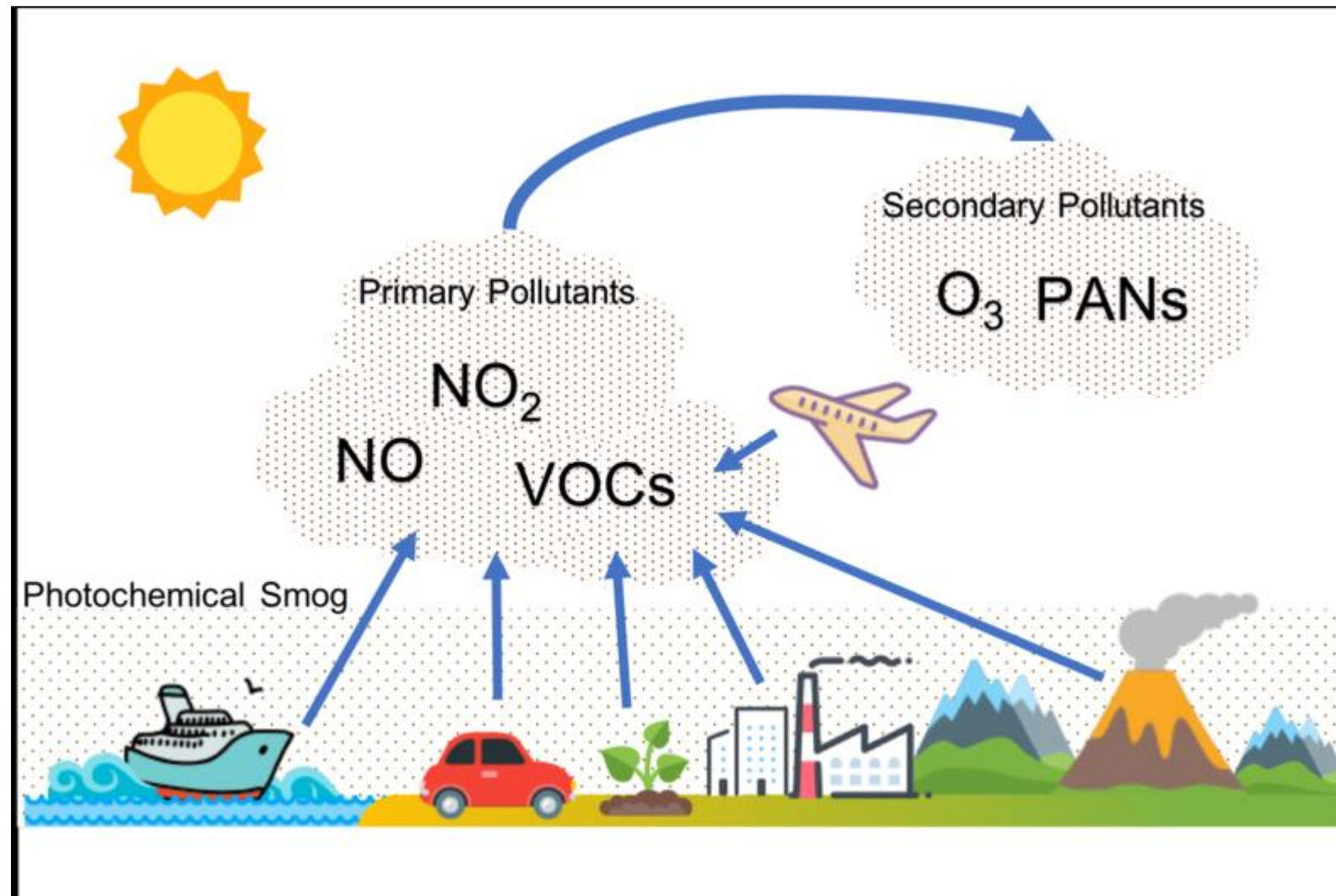




PHOTOCHEMICAL SMOG



Brownish smoke appeared in large cities with significant amount of traffic in the presence of sunlight





INDIAN AMBIANT AIR QUALITY STANDARDS



Air Quality std

- Legal limits, placed on the conc. of air pollutants in a community where people & things are exposed

Ambient Air Quality std

- Permissible exposure of all living & non living things for 24 hrs, 7 days /week (24x7)/wee



Pollutants	Time-weighted average	Concentration of ambient air (in $\mu\text{g}/\text{m}^3$)		
		Industrial area	Residential rural	Sensitive area
SO ₂	Annual average	80	60	15
	24 h	120	80	30
NO ₂	Annual average	80	60	15
	24 h	120	80	30
SPM	Annual average	360	140	70
	24 h	500	200	100
RSPM	Annual average	120	60	50
	24 h	150	100	75



CONTROL MEASURES



1. Source control

- Use unleaded petrol
- Use low content S of S & ash in petroleum product
- Use public vehicle
- Schools, restaurants, children play area away from busy area
- Plant more trees
- Prefer recycling
- Use catalytic convertor





CONTROL MEASURES



2. Control measures from industries

- The permission rate should be restricted
- Well designed plant & equipment's made mandatory
- Continuous monitoring





Activity

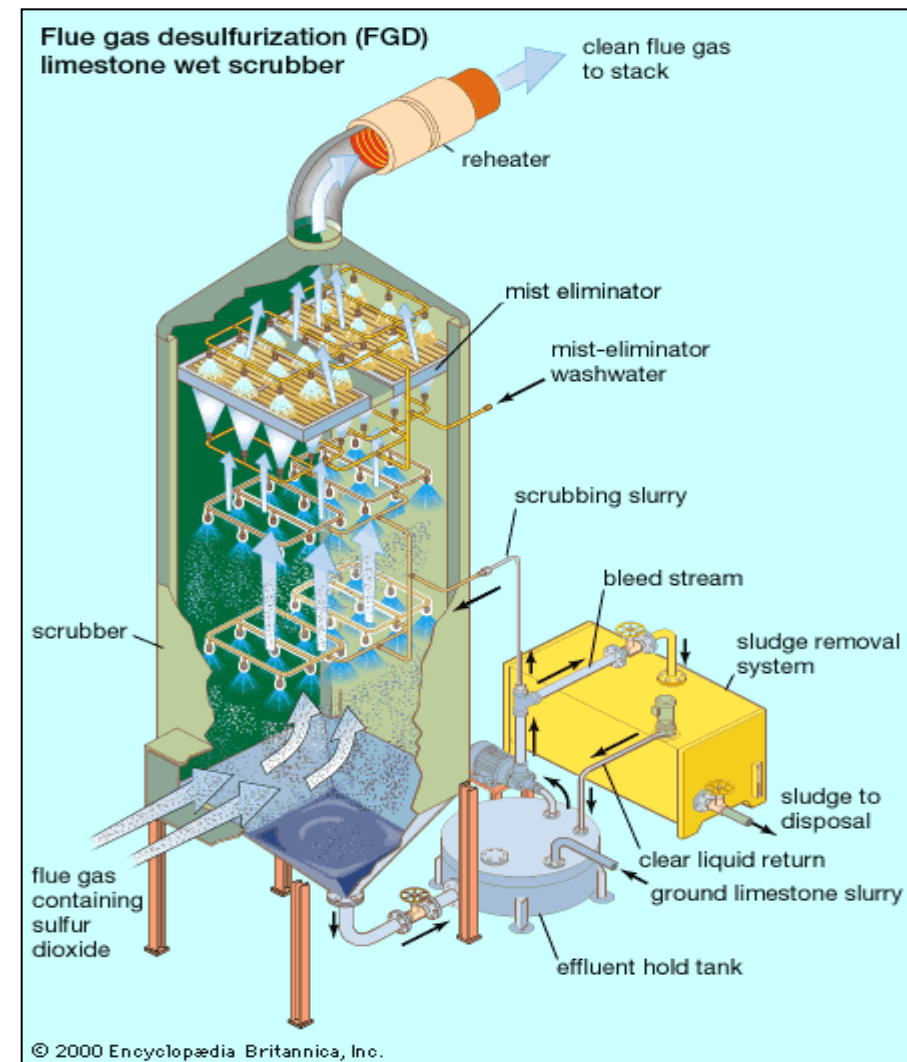


CONTROL MEASURES

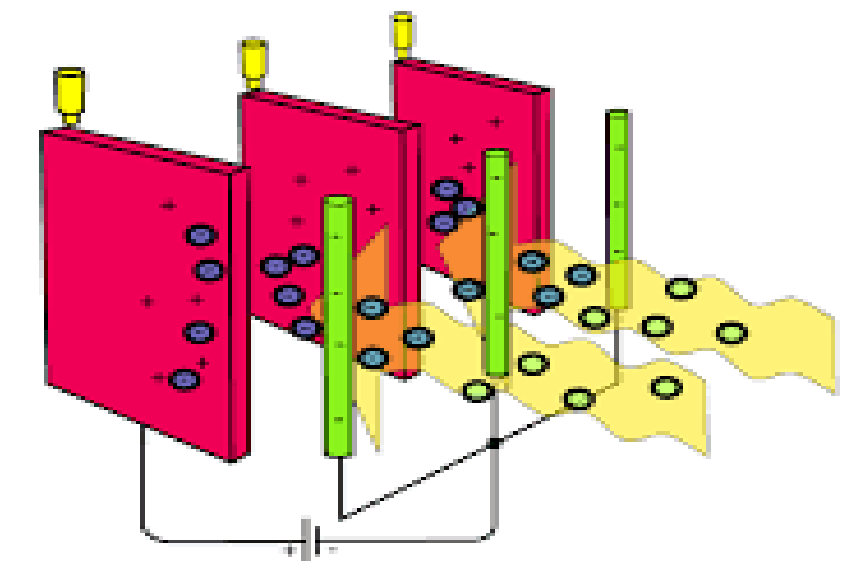


2. Control measures from industries

- The following equipment's used to reduce the air pollution



ELECTROSTATIC PRECIPITATOR DIAGRAM





ASSESSMENT



List out the various sources & effects of air pollutants



SUMMARY



REFERENCES



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2. G.Tayer Miller :Environmental Science”, Cenage Learning India Pvt Ltd, 2011.
3. Benny joseph, “Environmental science & engineering” Tata McGraw-Hill.Pub.Co.Ltd. New Delhi.2009.