SNS COLLEGE OF TECHNOLOGY
Vazhiampalayam, Coimbatore-35
(An Autonomous Institution)
Accredited by NAAC with A++ grade 3rd cycle, Accredited by NBA
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Environmental Pollution

POLLUTION

Introduction of contaminants into a natural environment that causes harm or discomfort to the ecosystem.

It changes the quality of air, water and land which interferes with the health of humans and other life on earth.

POLLUTANT

A contaminant that adversely alters the physical, chemical, or biological properties of the environment.

Examples: solid waste, chemical wastes, radioactive materials, industrial, agricultural waste, etc.

TYPES OF POLLUTANT

BIODEGRADABLE POLLUTANT

Decomposes rapidly by natural processes.

NON-BIODEGRADABLE POLLUTANT

Do not decompose or decompose slowly in the environment

TYPES OF POLLUTANTS

Biodegradable Pollutants:

Decompose rapidly by natural processes.

Non- biodegradable Pollutants:

Do not decompose or decompose slowly in the environment.

CLASSIFICATION OF POLLUTION

Air Pollution

Water Pollution

Soil Pollution

Noise Pollution

Marine Pollution

Thermal Pollution

Nuclear Hazards

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AIR POLLUTION

AIR POLLUTION

Definition

Composition of Atmospheric air

Sources of Air Pollution

Classification of Air Pollutants

Sources of indoor air pollutants

Sources and effects of outdoor air pollutants

Prevention and control of air pollution

DEFINITION

Introduction of contaminants (like chemicals, particulate matter, etc.) in the atmosphere that cause harm to humans or other living organisms or cause damage to the natural or built environment.

AIR POLLUTANT

Any substance in the air that can cause harm to humans and the environment is known as an air pollutant.

CAUSES

Rapid industrialization

Fast urbanization

Rapid growth in population

Drastic increase in vehicles on the road

Other activities of human beings

COMPOSITION OF ATMOSPHERIC AIR

Constituents	Percentage
Nitrogen	78
Oxygen	21
Argon	<1
CO_2	0.037
Water Vapour	Remaining
Ozone, Helium, Ammonia	Trace amount

SOURCES OF AIR POLLUTION

NATURAL SOURCES:

Examples: Volcanic eruptions, forest fires, biological decay, dust storms etc.

MAN-MADE (Anthropogenic) SOURCES:

Examples: Thermal power plants, vehicular emissions, fossil fuel burning, etc.

Vehicle exhaust emissions

Classification of Pollutant

Primary Pollutant

Emitted directly in the atmosphere
Example: CO, NO, SO_2, etc.

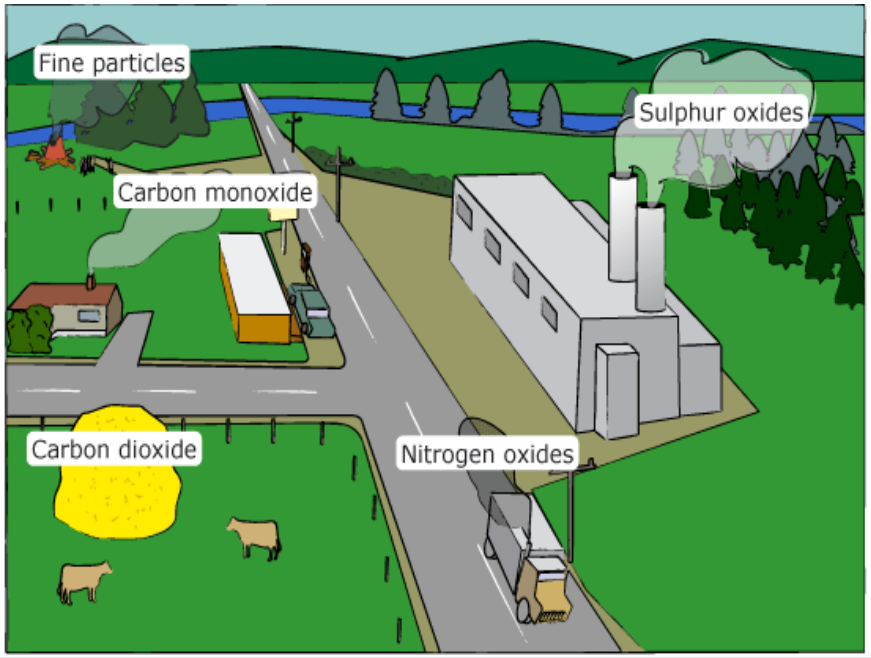
Secondary Pollutant

Not directly emitted as such, but formed in the atmosphere through chemical and photochemical reactions from the primary pollutants
Example: O_3, Smog, PAN,etc.

PRIMARY AIR POLLUTANTS –

Emitted directly in the atmosphere in harmful form.

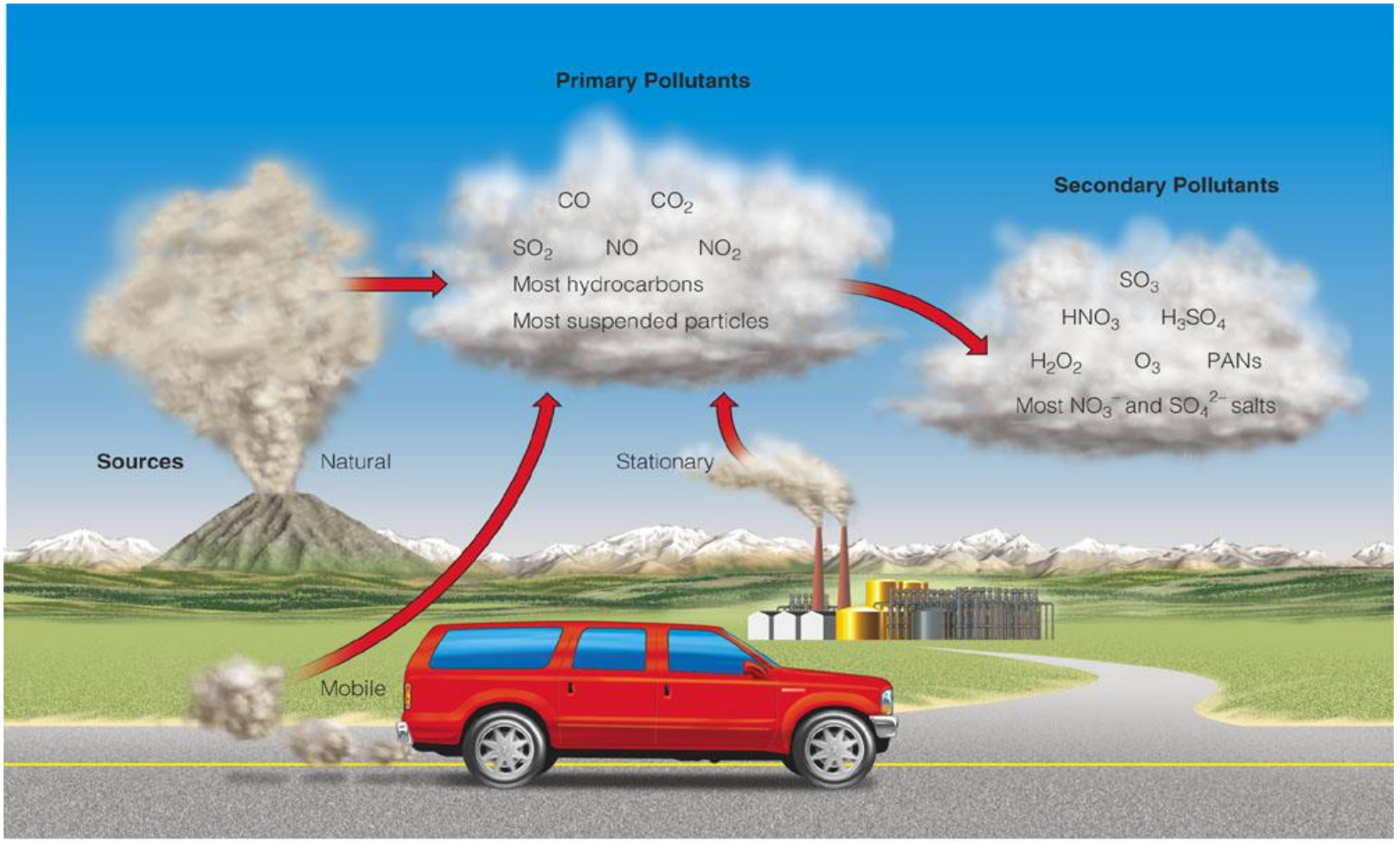
Examples: CO, NO, SO_2, etc.



SECONDARY AIR POLLUTANT - Primary air pollutant react among themselves or with atmospheric air and produce new and harmful compounds.

Example: Ozone, Photochemical smog, PAN (peroxy acetyl nitrate),etc.

$$NO/NO_2 \xrightarrow{\text{moisture}} HNO_3/NO_3$$



INDOOR AIR POLLUTANT

Primary pollutant

Important indoor air pollutant is radon gas.

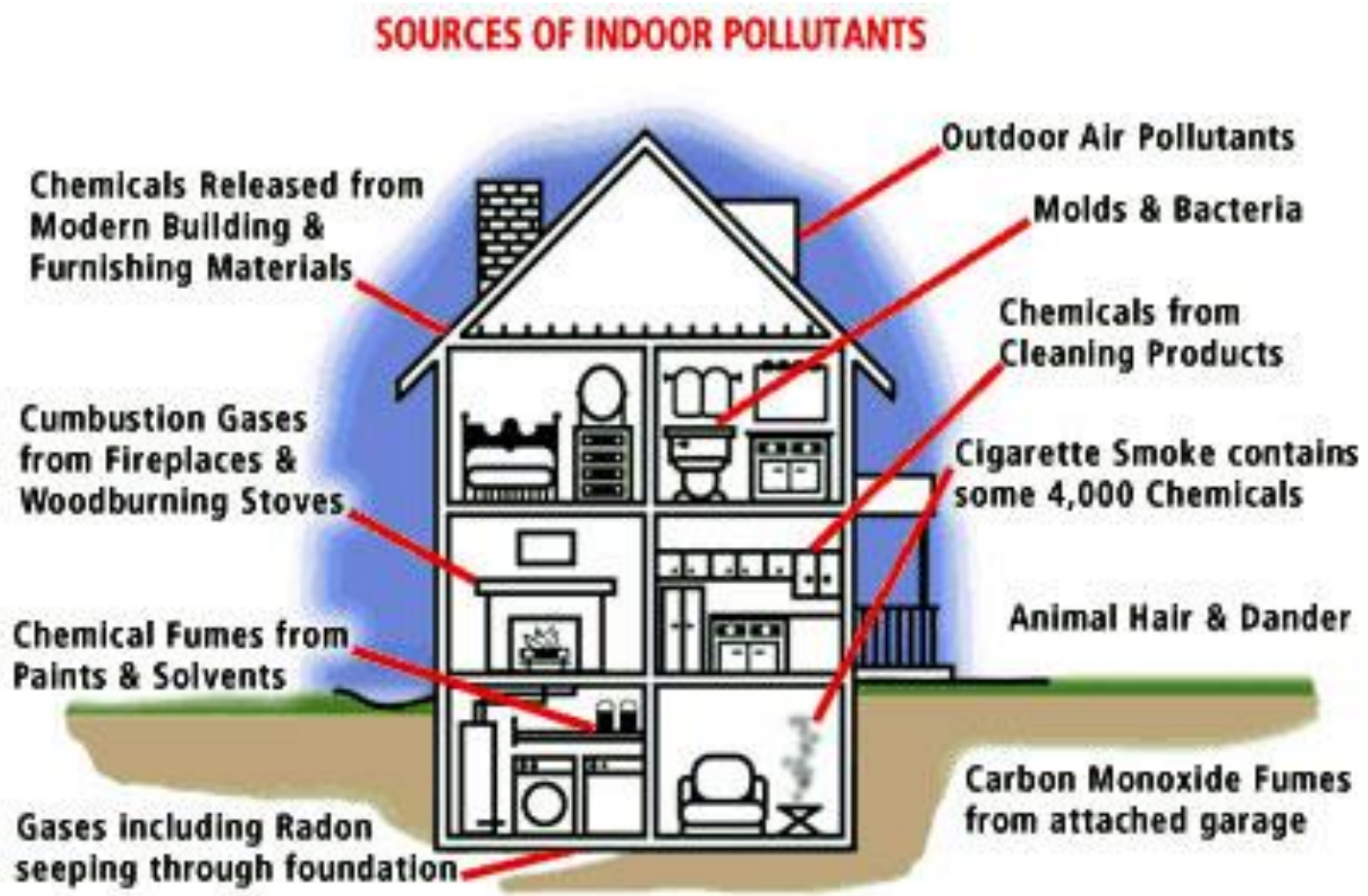
INDOOR AIR POLLUTION SOURCES

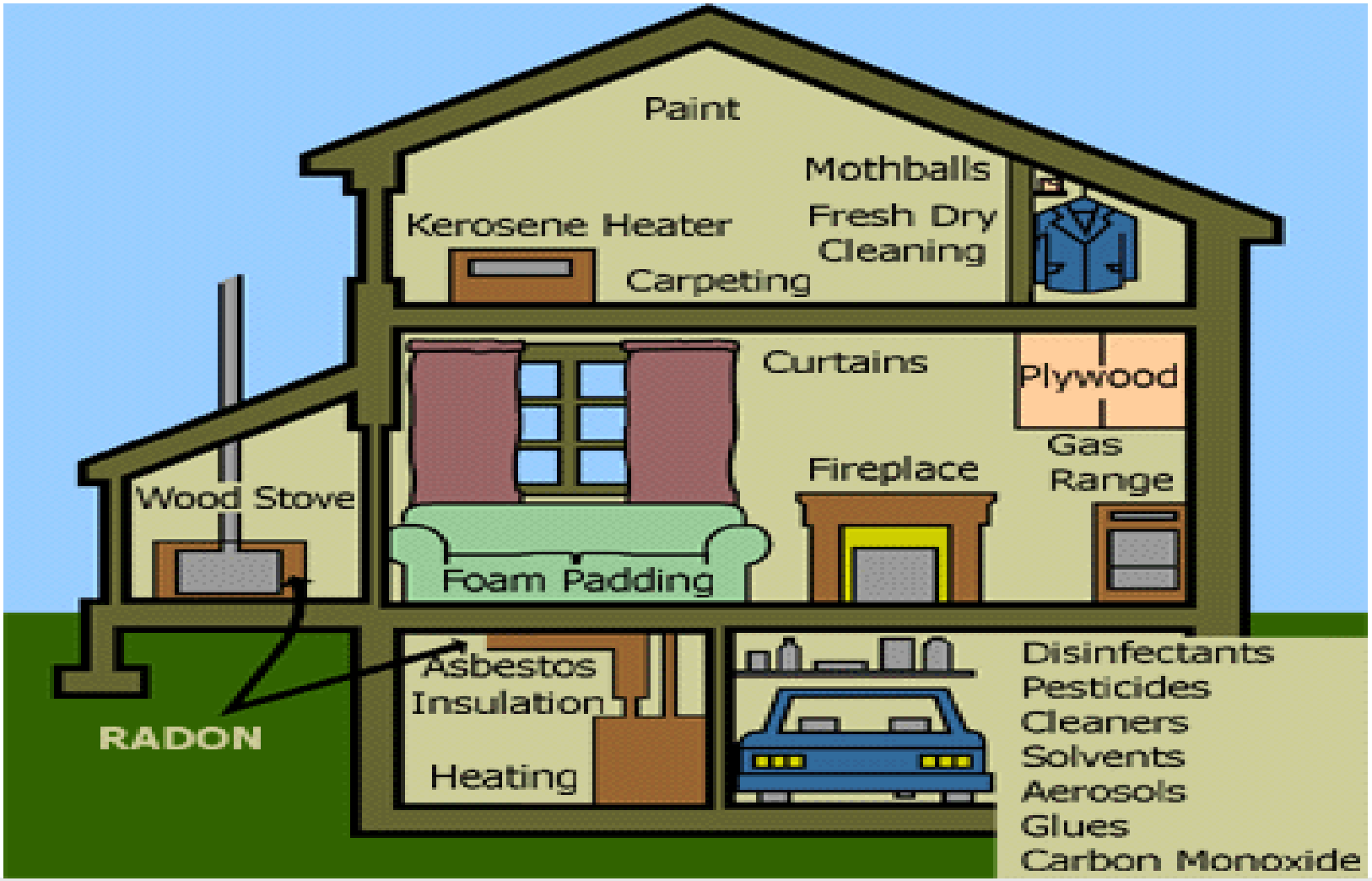
Pollutants	Sources and side effects
Chloroform	Sources: disinfectants Side effects: cancer
Para-dichlorobenzene	Sources: air fresheners, camphors Side effects: cancer
Tetrachloroethylene	Sources: vapour from cloth-dryer liquid that left in clothes Side effects: heart disorder, damages to kidney and cancer

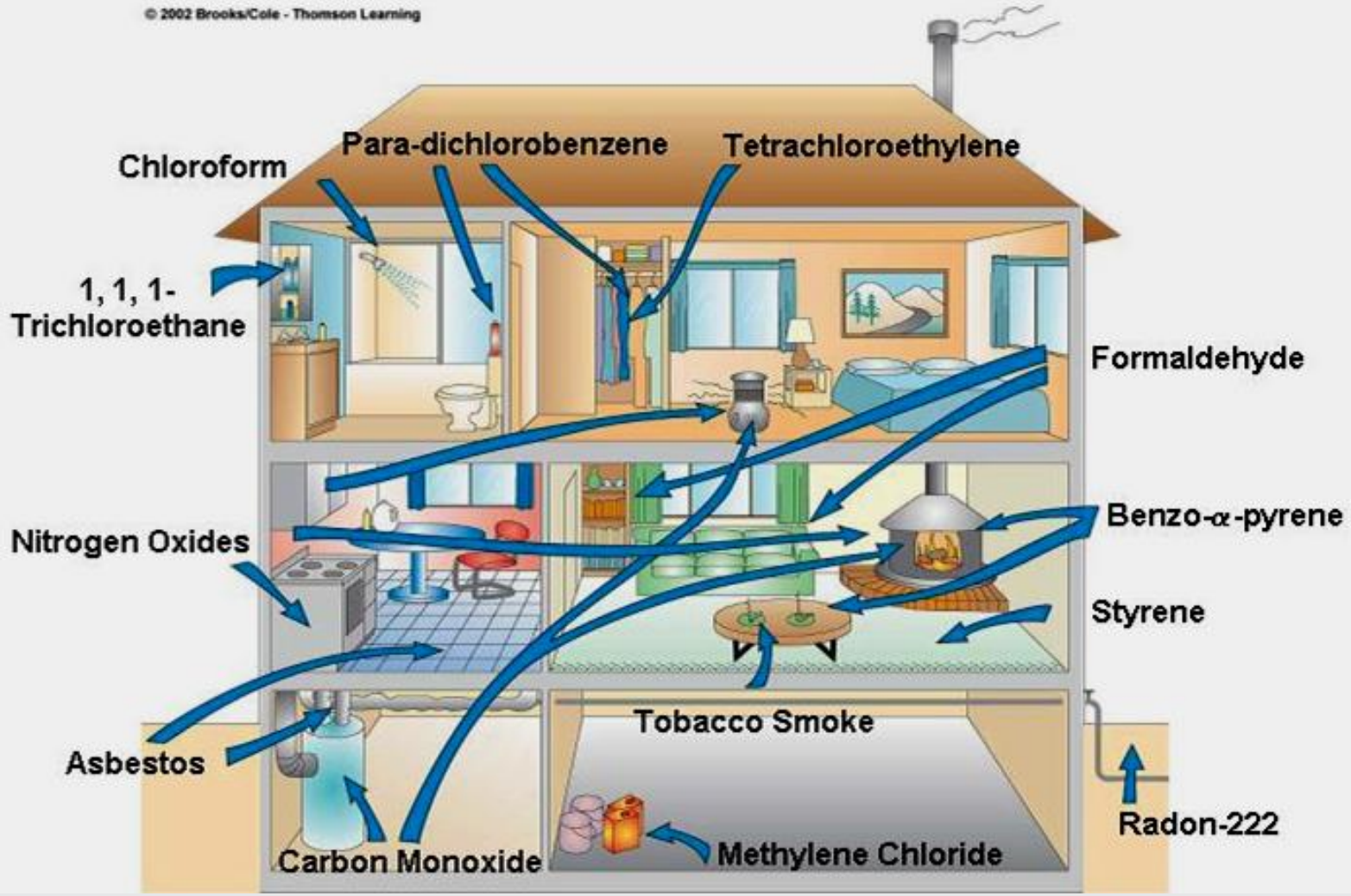
Formaldehyde	**Sources: wood board frame and sofa containment** **Side effects: eye, skin, throat and lung irritations, headache**
Benzo-a-pyrene	**Sources: smoke from cigarettes and wood board** **Side effects: lung cancer**
Styrene	**Sources: carpets and plastics** **Side effects: damages to kidney**
Radon-222	**Sources: radioactive soil and foundation stone** **Side effects: lung cancer**

Methylene chloride	**Sources: peeling paints** **Side effects: neural disorder and diabetes**
Smoke from cigarettes	**Sources: cigarettes** **Side effects:** **lung and respiratory system cancer, heart damage**
Carbon monoxide	**Sources: kerosene cooking stove, board, damaged fire stove (in living room)** **Side effects: headache, improper heartbeats, excessive sleepiness**

Nitrogen oxide	Sources: wood board Side effects: lung irritation, fever to children, headache
1,1,1-Trichloroethane	Sources: aerosol spray Side effects: headache and respiratory difficulties
Asbestos	Sources: pipe isolation and tile Side effects: lung damages and cancer


SOURCES OF INDOOR POLLUTANTS
Outdoor Air Pollutants
Chemicals Released from Modern Building & Furnishing Materials
Molds & Bacteria
Chemicals from Cleaning Products
Cumbustion Gases from Fireplaces & Woodburning Stoves
Cigarette Smoke contains some 4,000 Chemicals
Animal Hair & Dander
Chemical Fumes from Paints & Solvents
Carbon Monoxide Fumes from attached garage
Gases including Radon seeping through foundation


Paint
Mothballs
Fresh Dry Cleaning
Kerosene Heater
Carpeting
Curtains
Plywood
Gas Range
Fireplace
Wood Stove
Foam Padding
Asbestos Insulation
Heating
RADON
Disinfectants
Pesticides
Cleaners
Solvents
Aerosols
Glues
Carbon Monoxide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Chloroform
Para-dichlorobenzene
Tetrachloroethylene
1, 1, 1-
Trichloroethane
Formaldehyde
Nitrogen Oxides
Benzo-α-pyrene
Styrene
Tobacco Smoke
Asbestos
Radon-222
Carbon Monoxide
Methylene Chloride

PRIMARY AIR POLLUTANTS

CARBON MONOXIDE (CO)

NITROGEN DIOXIDE (NO_2)

SULPHUR DIOXIDE (SO_2)

SUSPENDED PARTICULATE MATTER

CARBON MONOXIDE

Description: Colourless, odourless and poisonous gas.

Sources: Incomplete combustion of fossil fuels, cigarette smoking and motor vehicle exhaust.

Effects: Reduces ability of blood to carry oxygen which causes headache, anemia, coma and brain cell damage.

NITROGEN DIOXIDE

Description: Reddish-brown chemical found in smog.

Sources: Burning fossil fuels and industrial processes.

Impacts: Lung irritation, aggravates asthma and reduces visibility.

SULPHUR DIOXIDE

Description: Colourless gas, major source of acid deposition.

Sources: coal burning power plants

Impacts: Acid deposition, breathing problems, property damage, soil, aquatic life damage.

SUSPENDED PARTICULATE MATTER (SPM)

Description: Particles in the air, range from small to large size.

Sources: Burning fossil fuels (diesel), dust, smoke, fog, unpaved roads.

Impacts: lung damage, asthma,

increases risk of respiratory infection.

OZONE

At upper level, ozone shields Earth from sun's harmful UV rays

At ground level, ozone is harmful pollutant.

Description: Highly reactive irritating gas with an unpleasant odour.

Sources: Formed by chemical reaction with VOCs and NOx from cars, power and chemical plant exhaust

VOCs + NOx + heat + Sunlight = Ground Level Ozone (O_3)

Impacts: Breathing problems, eyes, nose , mouth irritation, lung disease, and crop damage.

HYDROCARBONS

Description: It can be gases, liquids, waxes or polymers.

Sources: Decay of plants, burning of wet logs and agricultural wastes.

Impacts: Carcinogenic. It causes plant damage even at low concentrations.

LEAD

Description: Solid toxic metal and its compounds emitted as PM

Sources: Paint, smelters, storage battery , leaded petrol.

Impacts: Neurological problems, carcinogen.

PHOTOCHEMICAL SMOG

SMOG (smoke + fog)

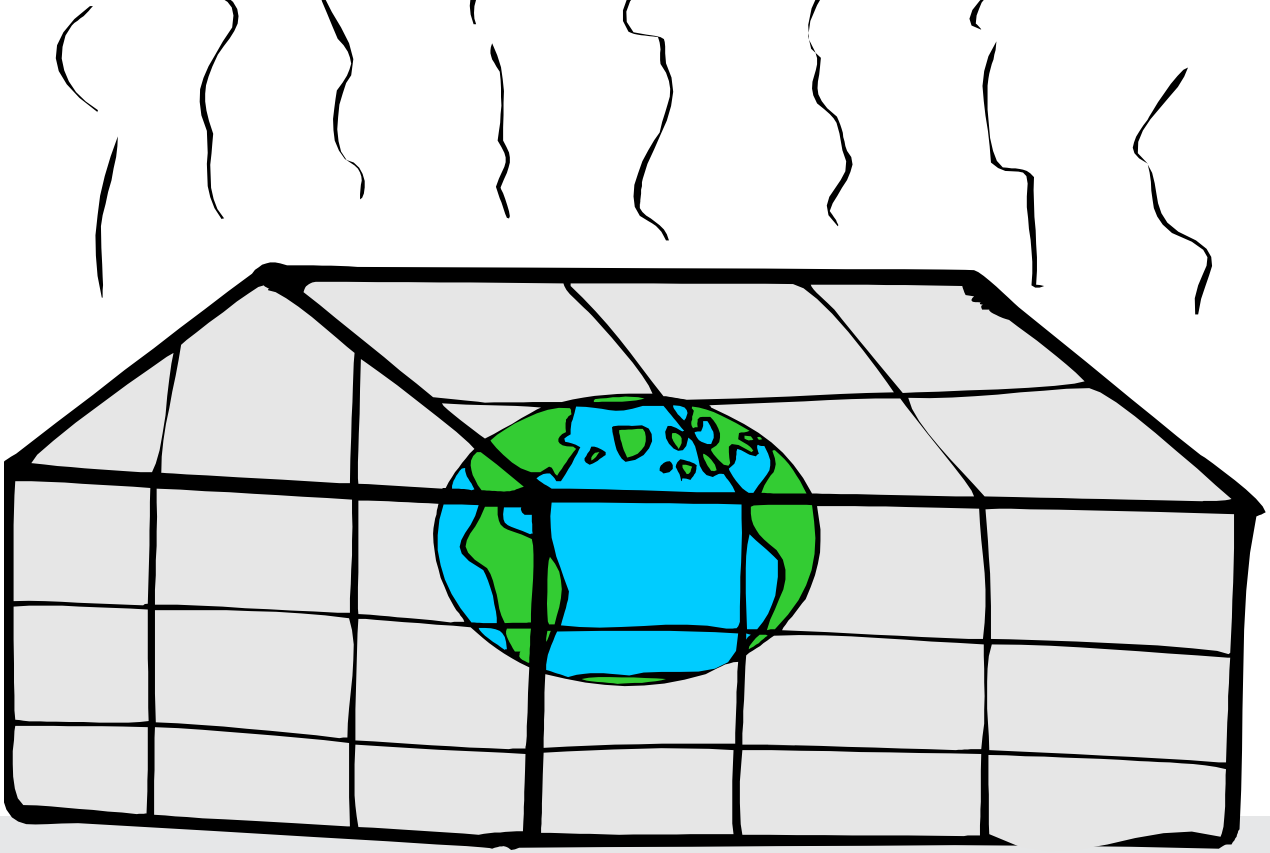
Description: Brownish smoke like appearance forms on clear sunny days over large cities with lot of automobile traffic.

(a) (b)

Photochemical smog can cause serious haze in a city

(a) Smoggy condition (b) Clean condition

The Greenhouse Effect



The Greenhouse Effect

The greenhouse effect occurs when greenhouse gases in a planet's atmosphere insulate the planet from losing heat to space, raising its surface temperature. Surface heating can happen from an internal heat source as in the case of Jupiter, or from its host star as in the case of the Earth

The Greenhouse Effect

The main gases responsible for the greenhouse effect include carbon dioxide, methane, nitrous oxide, and water vapor. In addition to these natural compounds, synthetic fluorinated gases also function as greenhouse gases

The Greenhouse Effect

The flooding of coastal cities, the desertification of fertile areas, the melting of glacial masses and the proliferation of devastating hurricanes

The Greenhouse Effect

- Energy Efficiency
- Renewable Energy
- Supply Chain
- Waste Reduction and Diversion Strategies
- Reduce Methane Emissions
- Increase Fuel Efficiency in Transportation and Logistics