Subject /Course Details

Subject /Course Name

Environmental science

Subject /Course Code

ANC0302 / ANC0402

Year –II

Semester –III/IV

Syllabus

Unit: IV

- **UNIT-IV (Pollution and Solid Waste Management)**
- **Air pollution:** sources of air pollution, Primary and secondary air pollutants. Origin and effects of SO_X, NO_X, CO_X, CFC's, Hydrocarbon,, control of air pollution.
- **Water pollution:** sources and types of water pollution, Effects of water pollution, Eutrophication,
- **Soil pollution:** Causes of soil pollution, Effects of soil pollution
- **Noise Pollution:** Major sources of and effects of noise pollution on health,
- **Radioactive and thermal pollution:** sources and their effects on surrounding environment.
- Solid waste disposal and its effects on surrounding environment
- Climate change, global warming, acid rain, ozone layer depletion,

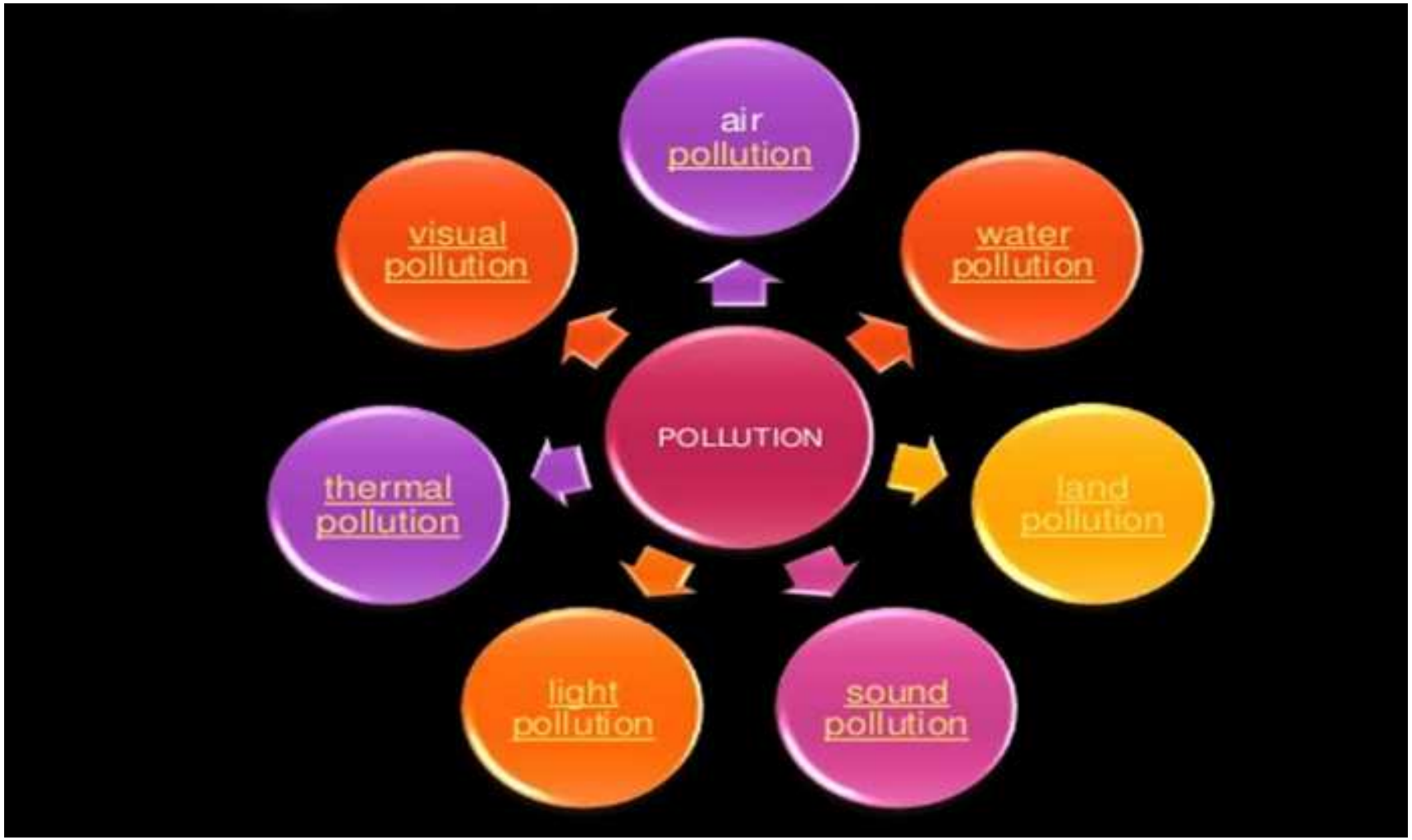
Content

- Environmental pollution and and its types
- Causes, effects control measures of Air and Water pollution, noise pollution
- Causes, effects control measures of Thermal and nuclear pollution
- Climate change and green house effects
- Global warming
- Acid rain and ozone layer depletion
- Water and air borne diseases
- Residual impurities in drinking water
- Toxic wastes and carcinogens

Environmental Pollution(CO4)

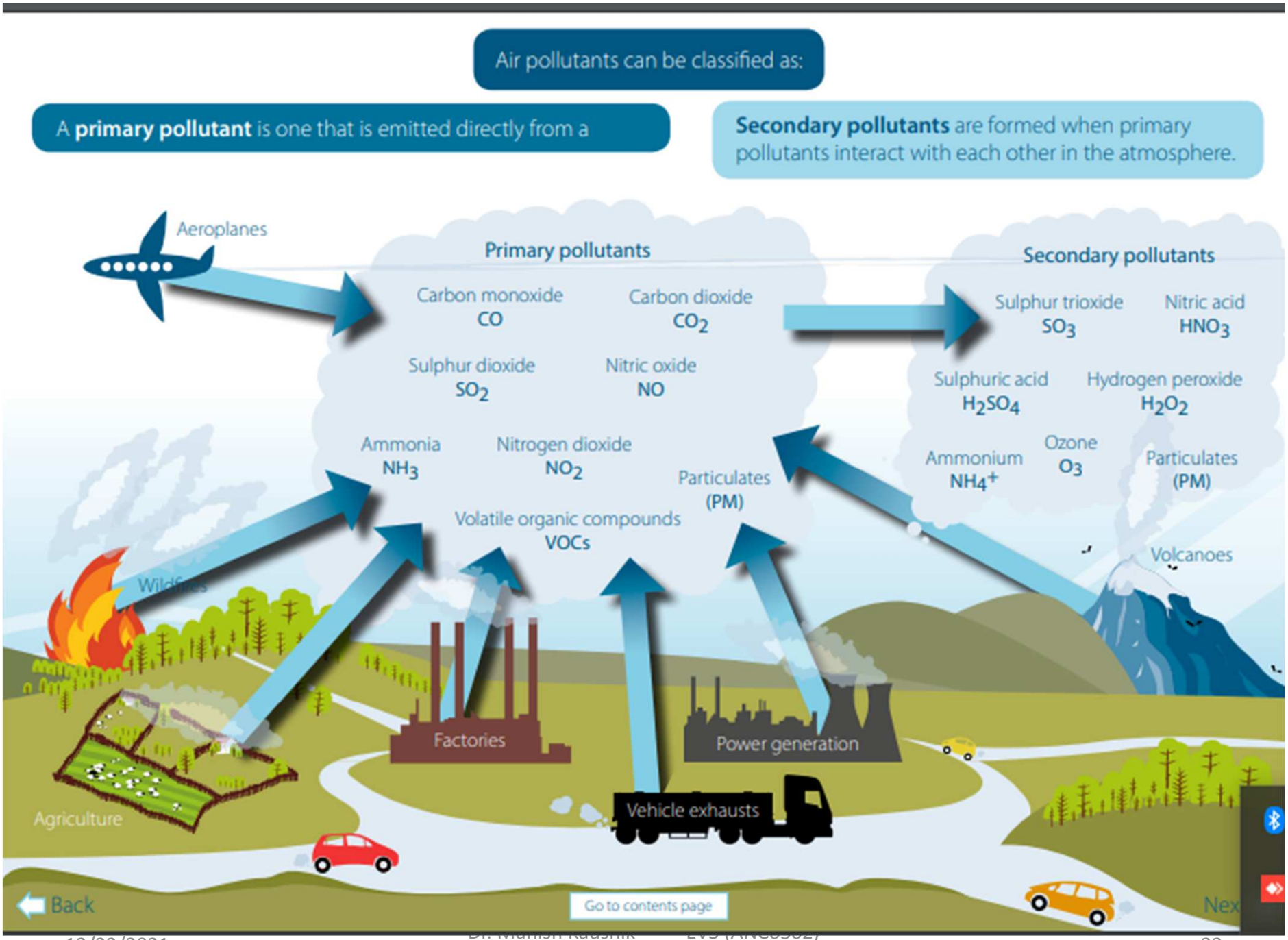
- Pollution-Undesirable change in characteristics of nature
- Pollutants- Any materials or agents responsible for pollution are known as pollutants

Types of Pollution(CO4)



Types of pollutants-(CO4)

- **Classification of Pollutants**
- According to the form in which they persist after release into the environment.
- **Primary pollutants:** These are persistent in the form in which they are added to the environment, e.g. **DDT, plastic, CO, CO_2, oxides of nitrogen and sulphur, etc**.
- Secondary Pollutants: These are formed by interaction among the primary pollutants. example, **peroxyacetyl nitrate (PAN)** is formed by the interaction of **nitrogen oxides** and **hydrocarbons**.
- According to their existence in nature
- **Quantitative Pollutants:** These occur in nature and become pollutant when their concentration reaches beyond a threshold level.
- E.g. carbon dioxide, nitrogen oxide.
- **Qualitative Pollutants:** These do not occur in nature and are human-made. E.g. fungicides, herbicides, DDT etc.


Air pollutants can be classified as:
A primary pollutant is one that is emitted directly from a
Secondary pollutants are formed when primary pollutants interact with each other in the atmosphere.
Aeroplanes
Primary pollutants
Carbon monoxide
CO
Carbon dioxide
CO_2
Sulphur dioxide
SO_2
Nitric oxide
NO
Ammonia
NH_3
Nitrogen dioxide
NO_2
Particulates
(PM)
Volatile organic compounds
VOCs
Secondary pollutants
Sulphur trioxide
SO_3
Nitric acid
HNO_3
Sulphuric acid
H_2SO_4
Hydrogen peroxide
H_2O_2
Ammonium
NH_4^+
Ozone
O_3
Particulates
(PM)
Volcanoes
Wildfires
Factories
Power generation
Vehicle exhausts
Agriculture
Back
Go to contents page
Nex

Air pollution(CO4)

- **Gaseous air pollutants**
  - CO, CO_2, Sox, Nox etc
- **Particulate air pollutants**
- **Mist, Fumes, PAN, Pb particles, Smog**

Air pollution(CO4)

- **Gaseous air pollutants**
- Oxides of Carbon: CO_2 and CO
  - CO, is a product of incomplete combustion, it is a deadly poisonous gas in high concentration
  - Sources: automobiles, furnaces, domestic fire, forest fire, burning of coal in power plants
  - CO_2 is release from burning of fossil fuel and domestic fire
- Oxides of Nitrogen:N_2O, NO, NO_2, NO_3
  - NO formed during lightening discharge
  - Small amount is also released by denitrifying bacteria
- Oxides of Sulphur: SO_2, SO_3
  - Sources: burning of fossil fuel in power plants, smelting of Sulphur contain ores, coal pits, volcanic eruption
- Hydrocarbons: Methane, ethane, toluene, n-butane, isopentane, acetylene
  - Sources: automobile industrial exhaust

Classification and effect of air pollution(CO4)

Particulate pollutants

•Particulate pollutants are matter suspended in air such as dust and soot.

•Major source of SPM (suspended particulate matter) are industries, vehicles, power plants, construction activities, oil refinery, railway yard, market place, industries, etc.

•Their size ranges from **0.001 to 500** (µm) in diameter.

•Particles less than 10 µm float and move freely with the air current.

•Particles which are more than 10 µm in diameter settle down.

•Particles less than 0.02 µm form **persistent aerosols**.

•According to the Central Pollution Control Board (CPCB), particulate size **2.5 µm or less in diameter (PM 2.5)** are responsible for causing the **greatest harm to human health**.

•These fine particulates can be inhaled deep into the lungs and can cause breathing and respiratory symptoms, irritation, inflammations and **pneumoconiosis** (disease of the lungs caused due to inhalation of dust.

•It is characterized by inflammation, coughing, and fibrosis – excess deposition of fibrous tissue).

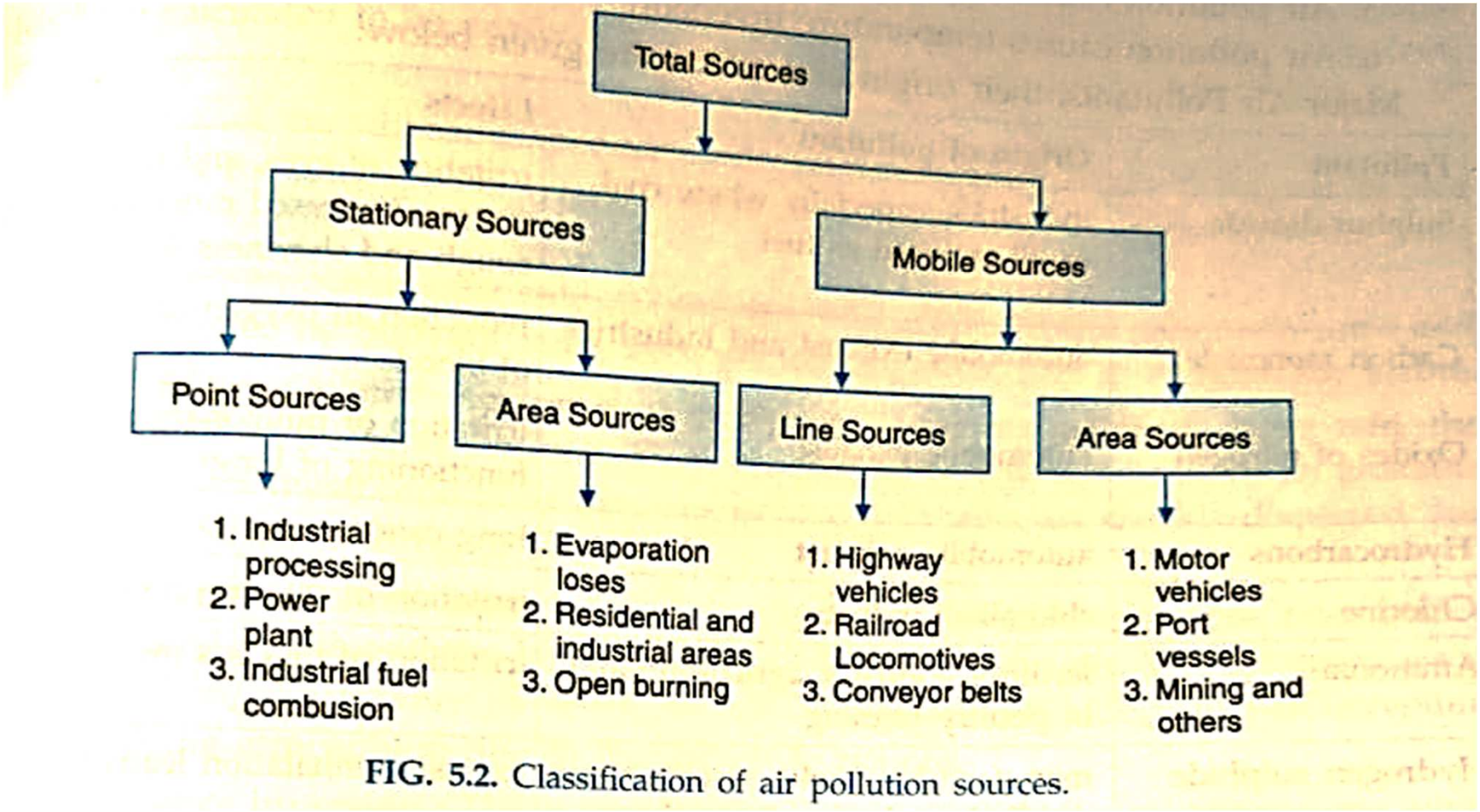
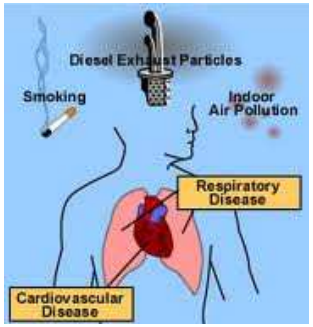


FIG. 5.2. Classification of air pollution sources.

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.
- Oxides of Nitrogen causes Headache, respiratory irritation, corrosion of teeth, loss of appetite.
- Mercury damage the brain and nervous system.
- Lead damage the liver, kidney and abnormalities in fertility



Pollutant	Origin of pollutant	Effects
Sulphur dioxide	industries, especially where coal or oil are used as fuel	irritation of eyes, and respiratory system, increased mucus production, cough and shortness of breath
Carbon monoxide	automobile exhaust and industries	reduction in oxygen-carrying capacity of blood
Oxides of nitrogen	automobile exhaust	irritation of pulmonary tract affecting functioning of lungs
Hydrocarbons	automobile exhaust	lung cancer
Chlorine	chloralkali industry	irritation of mucous membrane
Ammonia	fertiliser, industry, agriculture and in poultry farming	irritation of mucous membrane
Hydrogen sulphide	manufacture of coke, viscose rayon, distillation of tar and petroleum	excessive inhalation leads to death
Acids and aldehydes	chemical industries	eyes. nose and throat irritation
Suspended particulate matter (SPM)	industries, automobile exhaust	respiratory diseases
Dust	industries and automobile exhaust	silicosis
Asbestos	roofings, brake linings	asbestosis
Lead	automobile exhaust	cumulative poison, impairment of central nervous system
Manganese	mining operations	damages nerves and reproductive system
Benzene	automobile exhaust and manufacture of chemicals	leukemia, chromosomal damage
Pesticides	manufacture and application of pesticides	depression; leads to death if inhaled in excess

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 of air pollution (CO4)

Environmental Effects Along with harming human health, air pollution can cause a variety of environmental effects:

- Acid rain
- Eutrophication
- Haze
- Effects on wildlife.
- Ozone depletion.
- Crop and forest damage.
- Global climate change.

effect of air pollution (CO4)

Acid rain

- It is precipitation containing harmful amounts of nitric and sulfuric acids.
- These acids are formed primarily by nitrogen oxides and sulfur oxides released into the atmosphere when fossil fuels are burned.
- These acids fall to the Earth either as wet precipitation (rain, snow, or fog) or dry precipitation (gas and particulates).
- Some are carried by the wind, sometimes hundreds of miles.
- In the environment, acid rain damages trees and causes soils and water bodies to acidify, making the water unsuitable for some fish and other wildlife.
- It also speeds the decay of buildings, statues, and sculptures that are part of our national heritage.
- Acid rain has damaged Massachusetts lakes, ponds, rivers, and soils, leading to damaged wildlife and forests.

- **When CO_2 reacts with water, carbonic acid is formed.**
  $CO_2(g)+H_2O(l)\rightarrow H_2CO_3(aq)$

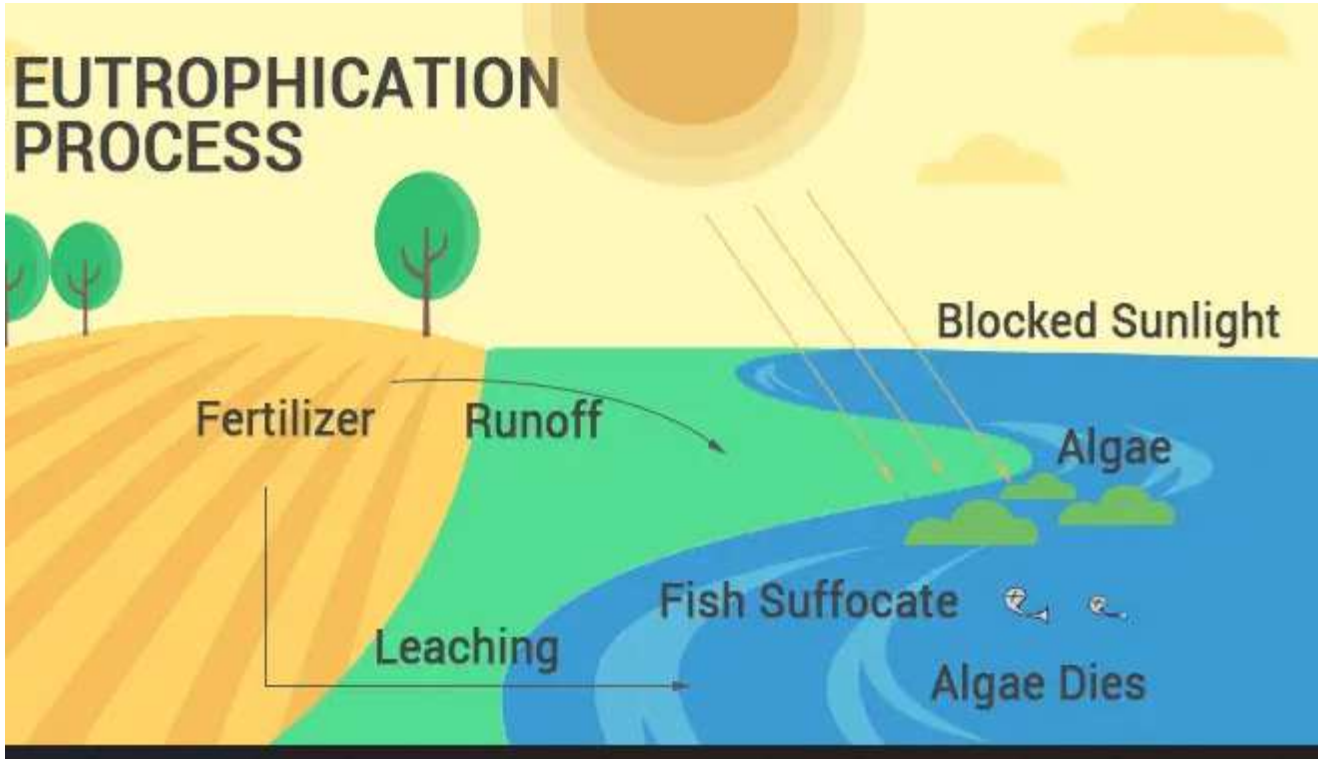
- **When SO_2 reacts with water, sulfurous acid is formed.**
  $SO_2(g)+H_2O(l)\rightarrow H_2SO_3(aq)$

- **When NO_2 reacts with water, nitric acid is formed.**
  $2NO_2(g)+H_2O(l)\rightarrow HNO_2(aq)+HNO_3(aq)$

Effect of air pollution (CO4)

Eutrophication

- It is a condition in a water body where high concentrations of nutrients (such as nitrogen) stimulate blooms of algae, which in turn can cause fish kills and loss of plant and animal diversity.
- Although eutrophication is a natural process in the aging of lakes and some estuaries, human activities can greatly accelerate eutrophication by increasing the rate at which nutrients enter aquatic ecosystems.
- Air emissions of nitrogen oxides from power plants, cars, trucks, and other sources contribute to the amount of nitrogen entering aquatic ecosystems.



Effect of air pollution (CO4)

Haze

- It is caused when sunlight encounters tiny pollution particles in the air.
- Haze obscures the clarity, color, texture, and form of what we see.
- Some haze-causing pollutants (mostly fine particles) are directly emitted to the atmosphere by sources such as power plants, industrial facilities, trucks and automobiles, and construction activities.
- Others are formed when gases emitted to the air (such as sulfur dioxide and nitrogen oxides) form particles as they are carried downwind.

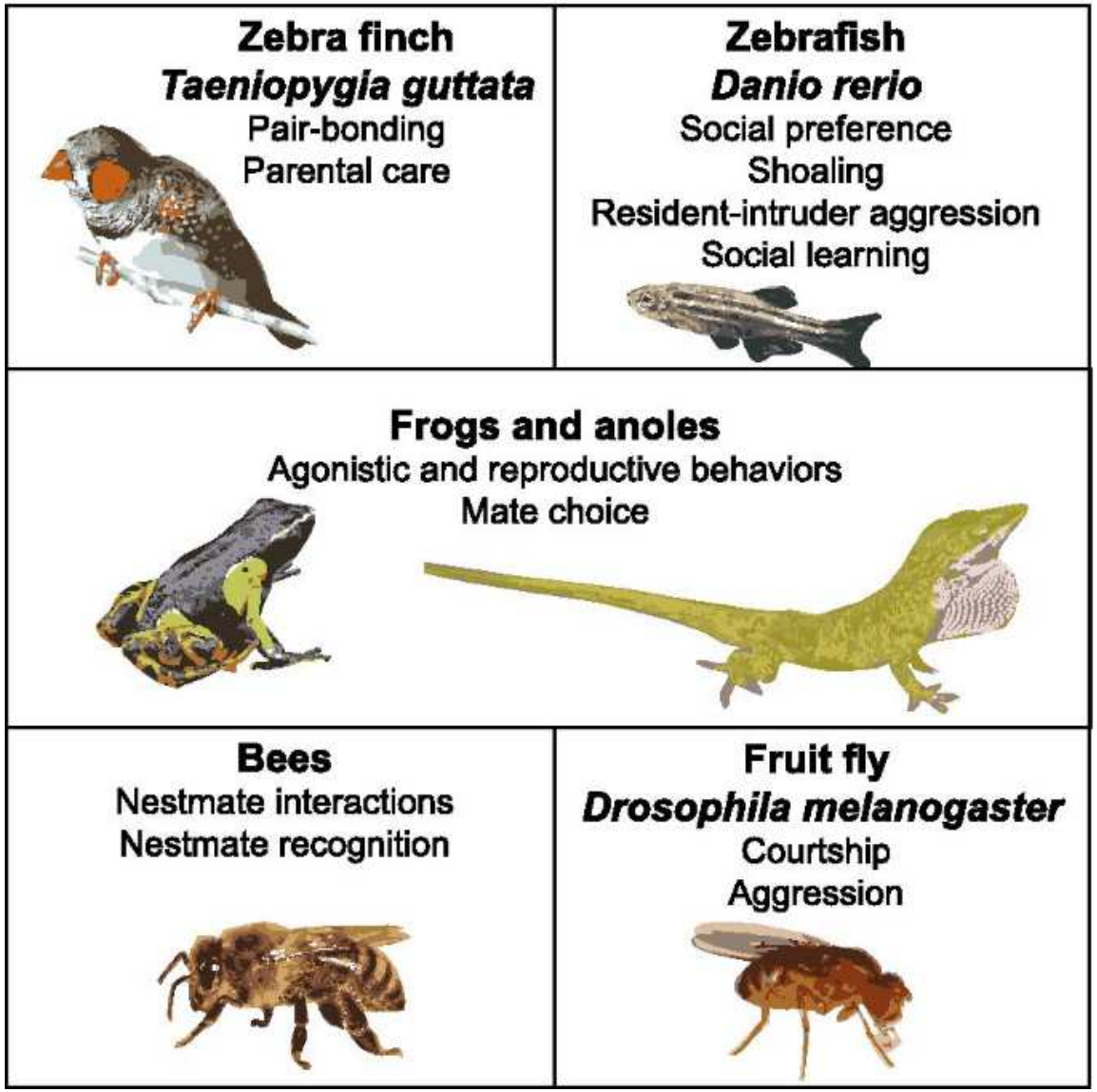
effect of air pollution (CO4)

Effects on wildlife

- Toxic pollutants in the air, or deposited on soils or surface waters, can impact wildlife in a number of ways.
- Like humans, animals can experience health problems if they are exposed to sufficient concentrations of air toxics over time.
- Studies show that air toxics are contributing to birth defects, reproductive failure, and disease in animals.
- Persistent toxic air pollutants (those that break down slowly in the environment) are of particular concern in aquatic ecosystems.
- These pollutants accumulate in sediments and may biomagnify in tissues of animals at the top of the food chain to concentrations many times higher than in the water or air.

effect of air pollution (CO4)

Effects on wildlife



effect of air pollution (CO4)

Crop and forest damage

- Air pollution can damage crops and trees in a variety of ways.
- Ground-level ozone can lead to reductions in agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased plant susceptibility to disease, pests and other environmental stresses (such as harsh weather).
- As described above, crop and forest damage can also result from acid rain and from increased UV radiation caused by ozone depletion.

effect of air pollution (CO4)

Ozone depletion

- Ozone is a gas that occurs both at ground-level and in the Earth's upper atmosphere, known as the stratosphere.
- At ground level, ozone is a pollutant that can harm human health. In the stratosphere, however, ozone forms a layer that protects life on earth from the sun's harmful ultraviolet (UV) rays.
- But this "good" ozone is gradually being destroyed by man-made chemicals referred to as ozone-depleting substances, including chlorofluorocarbons, hydrochlorofluorocarbons, and halons.
- These substances were formerly used and sometimes still are used in coolants, foaming agents, fire extinguishers, solvents, pesticides, and aerosol propellants.
- Thinning of the protective ozone layer can cause increased amounts of UV radiation to reach the Earth, which can lead to more cases of skin cancer, cataracts, and impaired immune systems.
- UV can also damage sensitive crops, such as soybeans, and reduce crop yields.

How many ozone molecules can 1 CFC destroy?
100,000 ozone molecules

$$O_{2(g)} \xrightarrow{UV} O_{(g)} + O_{(g)}$$

$$O_{2(g)} + O_{(g)} \xleftrightarrow{UV} O_{3(g)}$$

$$CF_2Cl_{2(g)} \xrightarrow{UV} \dot{C}l_{(g)} + \dot{C}F_2Cl_{(g)}$$

$$\dot{C}l_{(g)} + O_{3(g)} \longrightarrow Cl\dot{O}_{(g)} + O_{2(g)}$$

$$Cl\dot{O}_{(g)} + O_{(g)} \longrightarrow \dot{C}l_{(g)} + O_{2(g)}$$

Effect of air pollution (CO4)

Global climate change.

- The Earth's atmosphere contains a delicate balance of naturally occurring gases that trap some of the sun's heat near the Earth's surface.
- This "greenhouse effect" keeps the Earth's temperature stable. Unfortunately, evidence is mounting that humans have disturbed this natural balance by producing large amounts of some of these greenhouse gases, including carbon dioxide and methane.
- When ranked by their direct contribution to the greenhouse effect, the most important are:[21][*failed verific*
-

Compound	Formula	Concentration in atmosphere[28] (ppm)	Contribution (%)
Water vapor and clouds	H_2O	10–50,000(A)	36–72%
Carbon dioxide	CO_2	~400	9–26%
Methane	CH_4	~1.8	4–9%
Ozone	O_3	2–8(B)	3–7%

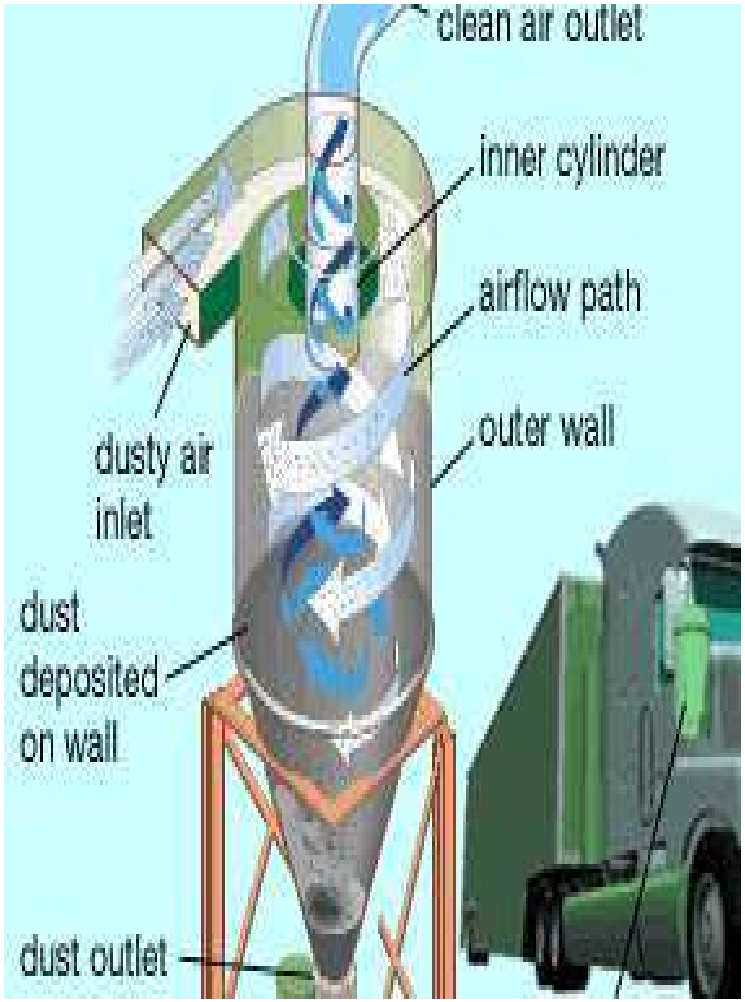
Control Measure (CO4)

- **Source control-**
- Using unleaded petrol
- Minimized use of coal
- Using fuels with low sulphur and ash content
- Encouraging people to use public transport, walk or use a cycle as opposed to private vehicles
- Ensure that houses, schools, restaurants and playgrounds are not located on busy streets
- Emission rates should be restricted to permissible levels by each and every industry
- Incorporation of air pollution control equipment in design of plant layout must be made mandatory

Common control devices for pollutants (CO4)

Cyclone separator

- A cyclone removes particulates by causing the dirty airstream to flow in a spiral path inside a cylindrical chamber.
- Dirty air enters the chamber from a tangential direction at the outer wall of the device, forming a vortex as it swirls within the chamber.
- The larger particulates, because of their greater inertia, move outward and are forced against the chamber wall.
- Slowed by friction with the wall surface, they then slide down the wall into a conical dust hopper at the bottom of the cyclone.
- The cleaned air swirls upward in a narrower spiral through an inner cylinder and emerges from an outlet at the top.
- Accumulated particulate dust is periodically removed from the hopper for disposal.



Common control devices for pollutants (CO4)

Scrubbers

- Devices called wet scrubbers trap suspended particles by direct contact with a spray of water or other liquid.
- In effect, a scrubber washes the particulates out of the dirty airstream as they collide with and are entrained by the countless tiny droplets in the spray.

Several configurations of wet scrubbers are in use.

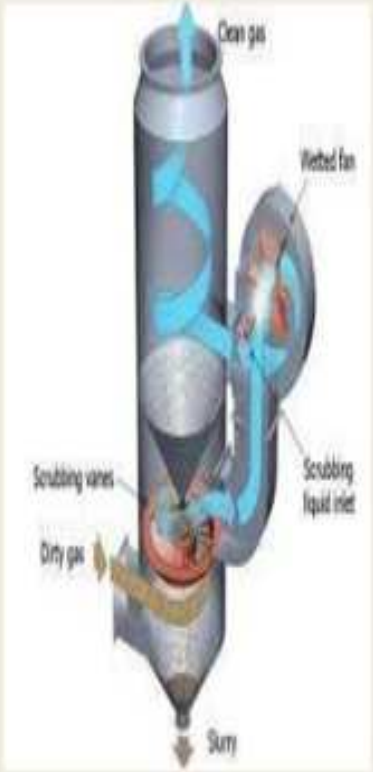
- **In a spray-tower scrubber**, an upward-flowing airstream is washed by water sprayed downward from a series of nozzles.
- The water is recirculated after it is sufficiently cleaned to prevent clogging of the nozzles.
- Spray-tower scrubbers can remove 90 percent of particulates larger than about 8 μm.

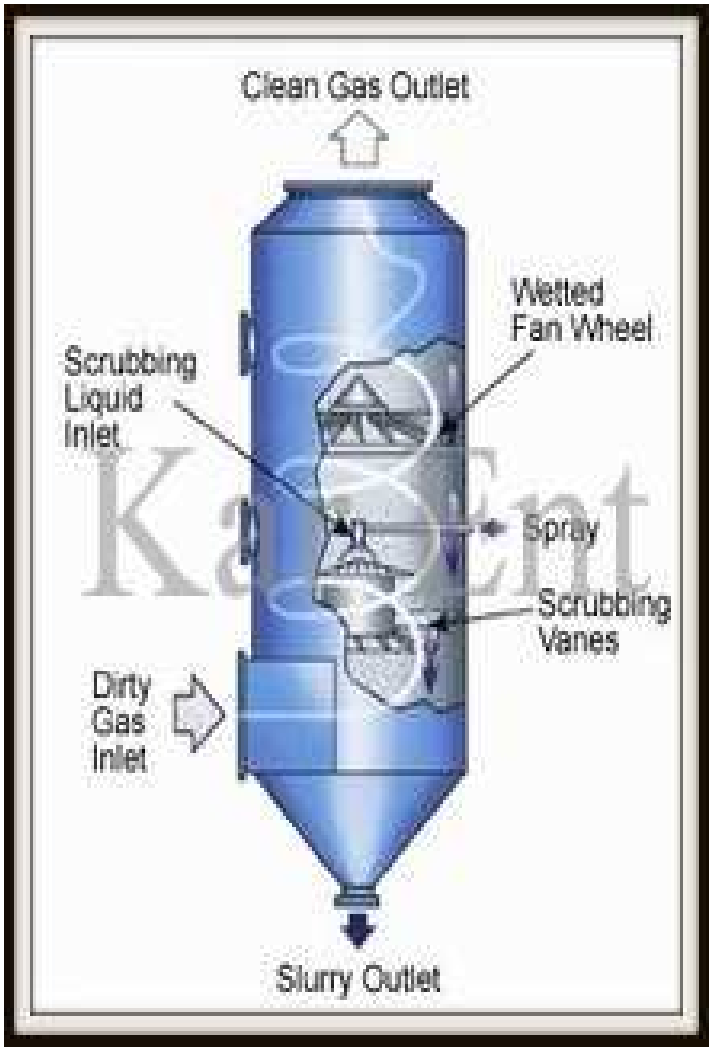
In orifice scrubbers and wet-impingement scrubbers,

- The air-and-droplet mixture collides with a solid surface.
- Collision with a surface atomizes the droplets, reducing droplet size and thereby increasing total surface contact area.
- These devices have the advantage of lower water-recirculation rates, and they offer removal efficiencies of about 90 percent for particles larger than 2 μm.

Common control devices for pollutants (CO4)

- **Wet Scrubbers** are air pollution control devices for removing particles and gases from **industrial exhaust stream.**
- It is operated by introducing the dirty gas stream with a scrubbing liquid as water. Then gases are collected in the scrubbing liquid.
- Wet scrubbers are usually the most appropriate **air pollution-control device** for collecting both, particulate and gas in a single system alone.

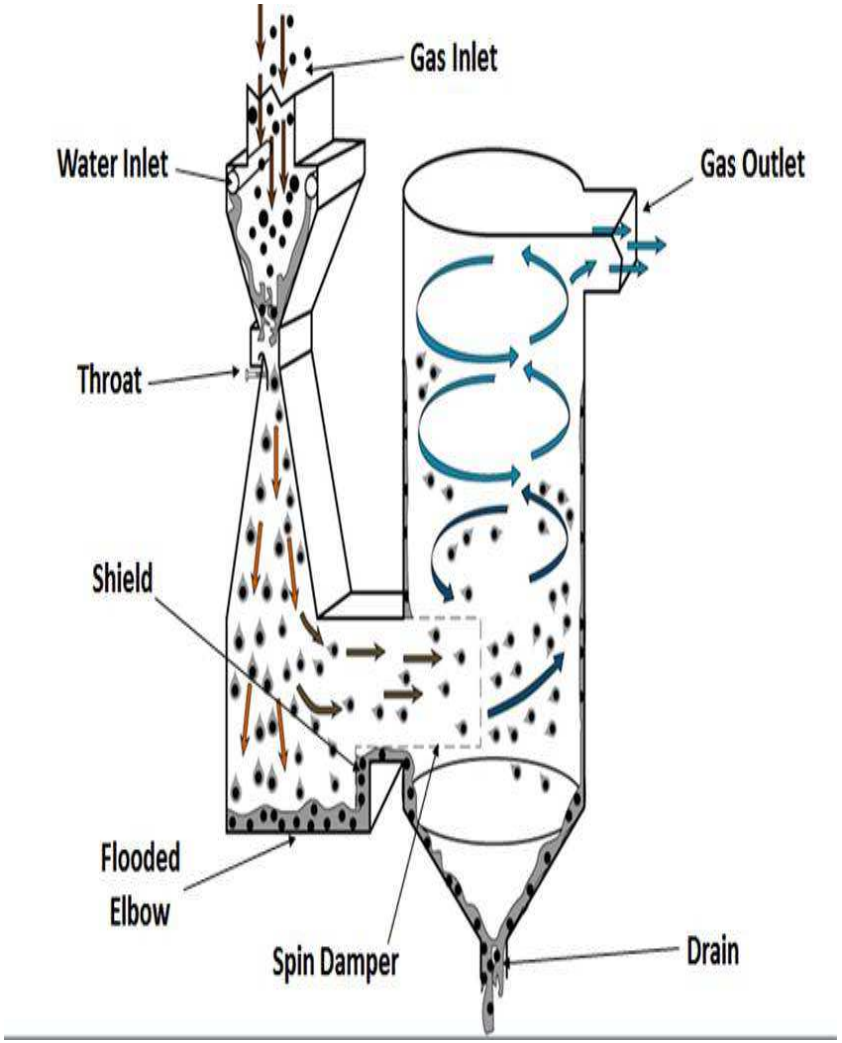




Common control devices for pollutants (CO4)

Venturi scrubbers

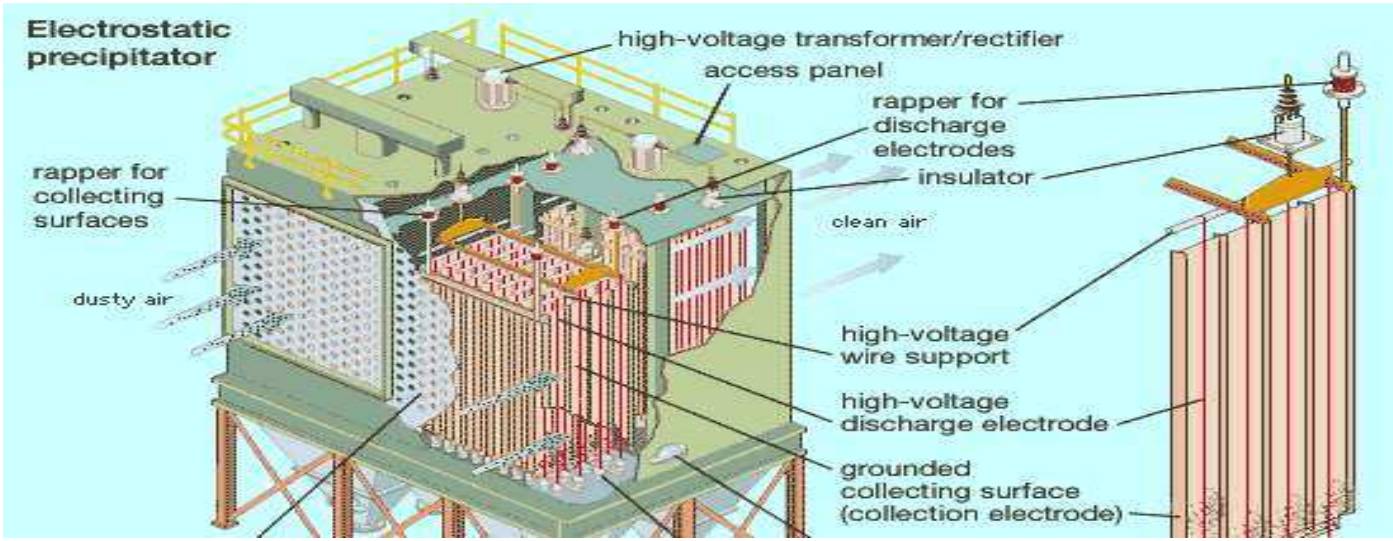
- These are the most efficient of the wet collectors, achieving efficiencies of more than 98 percent for particles larger than 0.5 μm in diameter.
- Scrubber efficiency depends on the relative velocity between the droplets and the particulates.
- Venturi scrubbers achieve high relative velocities by injecting water into the throat of a venturi channel—a constriction in the flow path—through which particulate-laden air is passing at high speed.



Common control devices for pollutants (CO4)

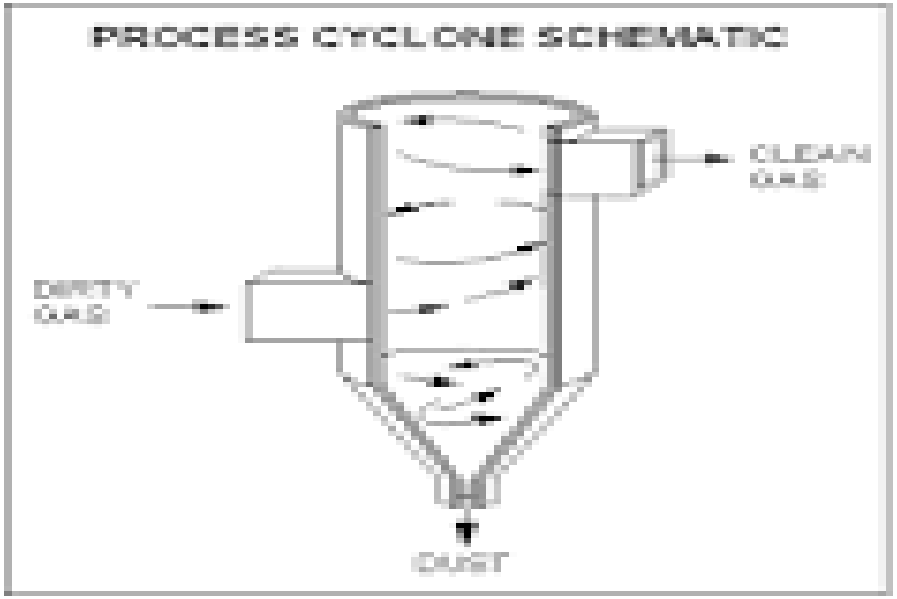
Electrostatic precipitators

- Electrostatic precipitation is a commonly used method for removing fine particulates from airstreams.
- In an electrostatic precipitator, particles suspended in the airstream are given an electric charge as they enter the unit and are then removed by the influence of an electric field.
- The precipitation unit comprises baffles for distributing airflow, discharge and collection electrodes, a dust clean-out system, and collection hoppers.
- A high voltage of direct current (DC), as much as 100,000 volts, is applied to the discharge electrodes to charge the particles, which then are attracted to oppositely charged collection electrodes, on which they become trapped.



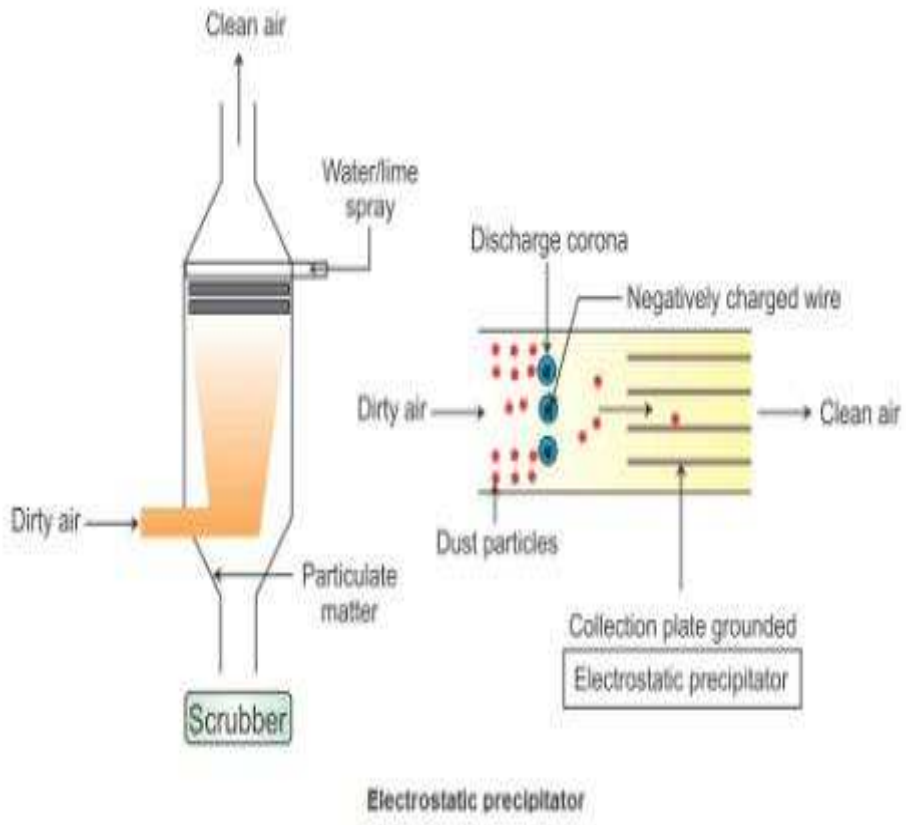
Common control devices for pollutants (CO4)

- Carbon absorbers
- Fabric filters or bag houses
- Catalytic reactors
- Electrostatic precipitators (ESPs)



Common control devices for pollutants (CO4)

- In a typical unit the collection electrodes comprise a group of large rectangular metal plates suspended vertically and parallel to each other inside a boxlike structure.
- There are often hundreds of plates having a combined surface area of tens of thousands of square meters.
- Rows of discharge electrode wires hang between the collection plates.
- The wires are given a negative electric charge, whereas the plates are grounded and thus become positively charged.



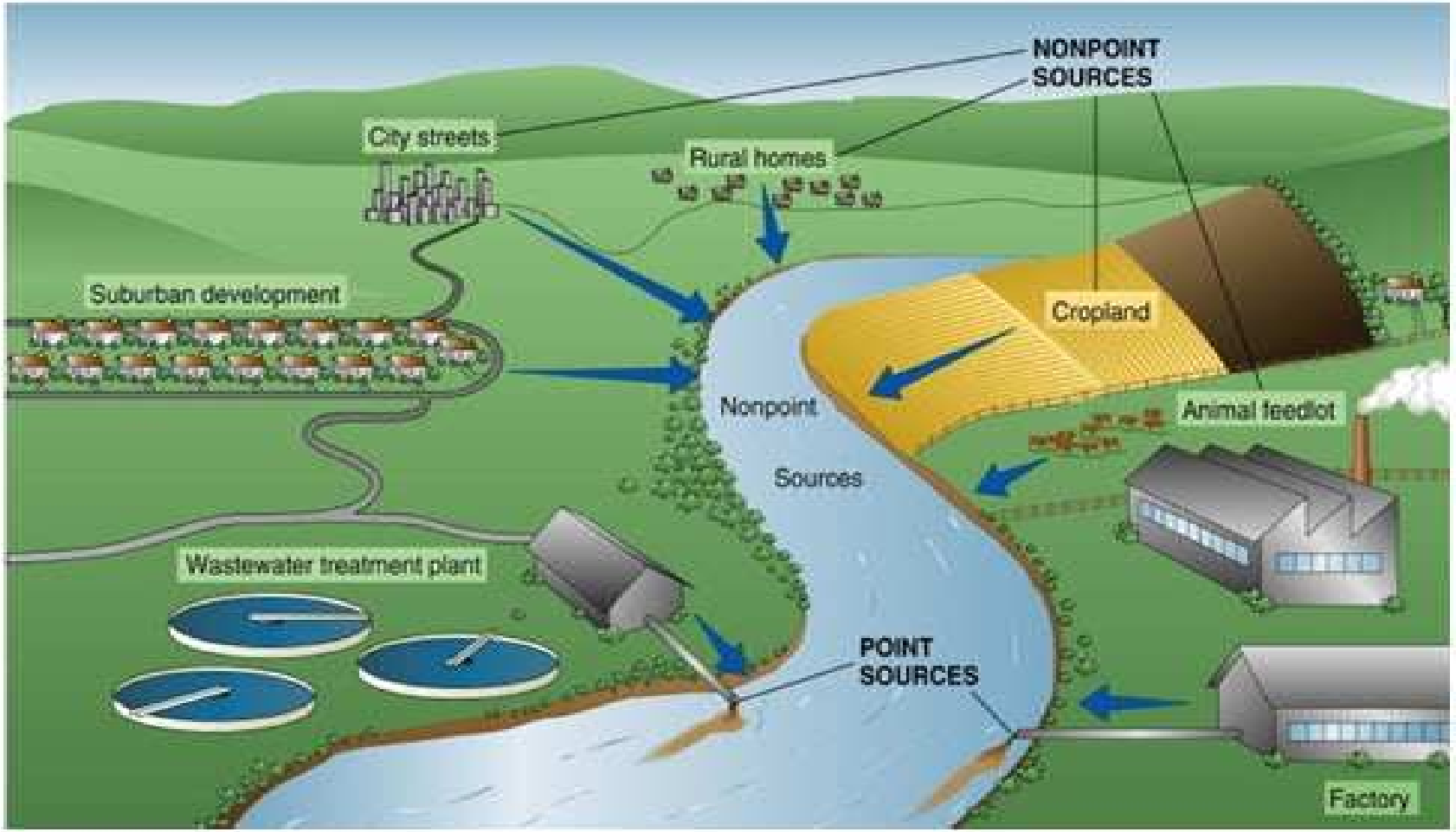
Electrostatic precipitator

Water pollution (CO4)

- The addition of harmful organic and inorganic chemicals as well as biological chemicals which change the physical and chemical properties of water is known as water pollution

SOURSES OF WATER POLLUTION (CO4)

- Point sources like municipal and industrial discharge pipes
- Non-Point sources like mining runoff and acid rain



Water pollutants (CO4)

- Organic pollutants
- Inorganic pollutants
- Suspended solid and sediments
- Radioactive materials
- Thermal pollution

Effects of water pollution (CO4)

- Death of aquatic (water) animals
- Disruption of food-chains
- Diseases
- Destruction of ecosystems
- Increase in Algal Blooms
- Oil Spill Ramifications
- Bioaccumulative and non-biodegradable pesticides are accumulated in animal bodies.

Noise pollution (CO4)

- Increase in the noise in the atmosphere is called sound pollution or noise pollution.
- Noise is a loud and unwanted or unpleasant sound.

Sources (CO4)

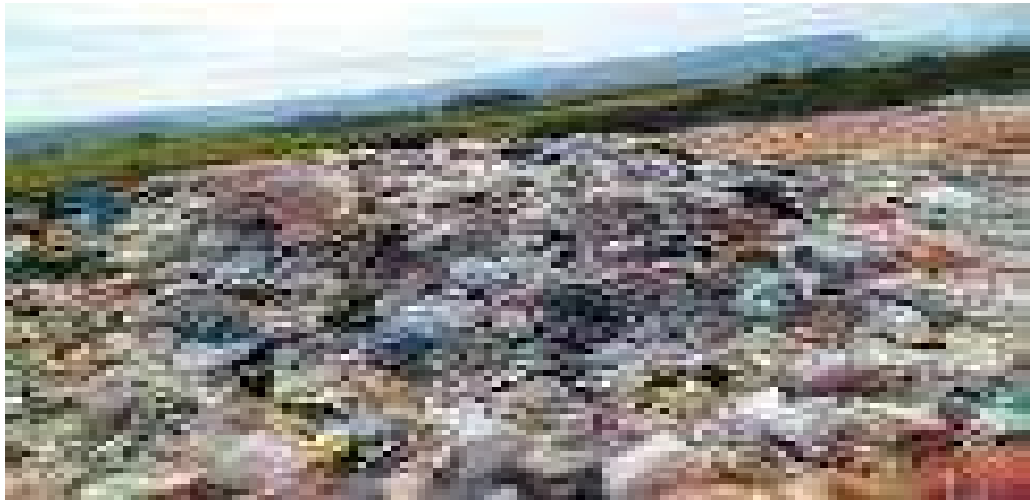
- Industrial Sources:
- Transport Vehicles:
- Household
- Public Address System
- Agricultural Machines
- Defense Equipment

Control measures (CO4)

- Construction of soundproof rooms for noisy machines in industrial and manufacturing installations must be encouraged.
- Use of horns with jarring sounds, motorbikes with damaged exhaust pipes, noisy trucks to be banned.
- Noise producing industries, airports, bus and transport terminals and railway stations to sighted far from where living places.
- Vegetation (trees) along roads and in residential areas is a good way to reduce noise pollution as they absorb sound.

Soil pollution (CO4)

- Soil pollution occurs when the presence of toxic chemicals, pollutants or contaminants in the soil is in high enough concentrations to be of risk to plants, wildlife, humans and of course, the soil itself.



Soil pollution sources(CO4)

- Industrial wastes
- Urban wastes
- Agricultural practices
- Radioactive pollutants
- Biological agents
- Mining sources
- Construction sources

Soil pollution Effects(CO4)

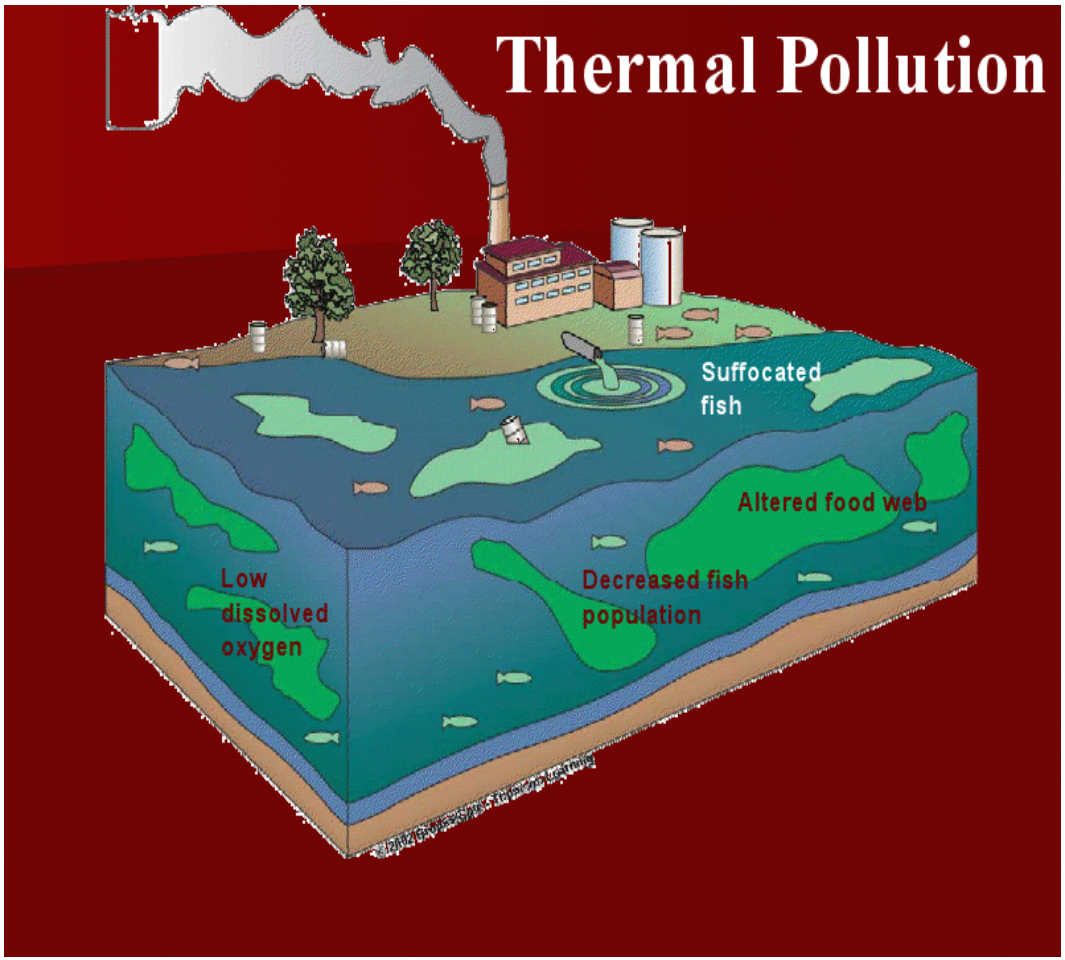
- Contaminated lands and environments can:
  Cause problems in the human respiratory system.
  Cause problems on the skin.
  Cause various kinds of cancers.

Control measures(CO4)

- Proper dumping of unwanted materials:
- Production of natural fertilizers
- Proper hygienic condition: People should be trained regarding sanitary habits.
- Public awareness
- Recycling and Reuse of wastes
- Ban on Toxic chemicals

Thermal pollution(CO4..)

- An increase in the optimum water temperature by industrial may be called as “Thermal Pollution”



Sources of thermal pollution(CO4)

- Coal-fired Power Plants:
- Industrial Effluents
- Nuclear Power Plants:
- Hydro Electric Power
- Domestic Sewage:
- Removal of trees along the shore line increases solar incidence and hence warms up the water along with deforestation
- Dumping of waste warm water by nuclear plants.

Effects(CO4..)

- Changed dissolved oxygen
- distribution of organisms among major and minor communities.
- Changes to reproductive powers and increased susceptibility to disease
- Life span become shorter
- Eggs and larvae of some animals die at high temperature of water.
- The biodiversity of aquatic ecosystem may disturb
- Oxygen concentration decreases in hot water
- Warmer water also increases respiration rate i.e., aquatic animals consume oxygen faster and it increases the chance of diseases.
- Rate of photosynthesis is affected.
- Some aquatic animals e.g. Fishes migrate to a suitable environment.

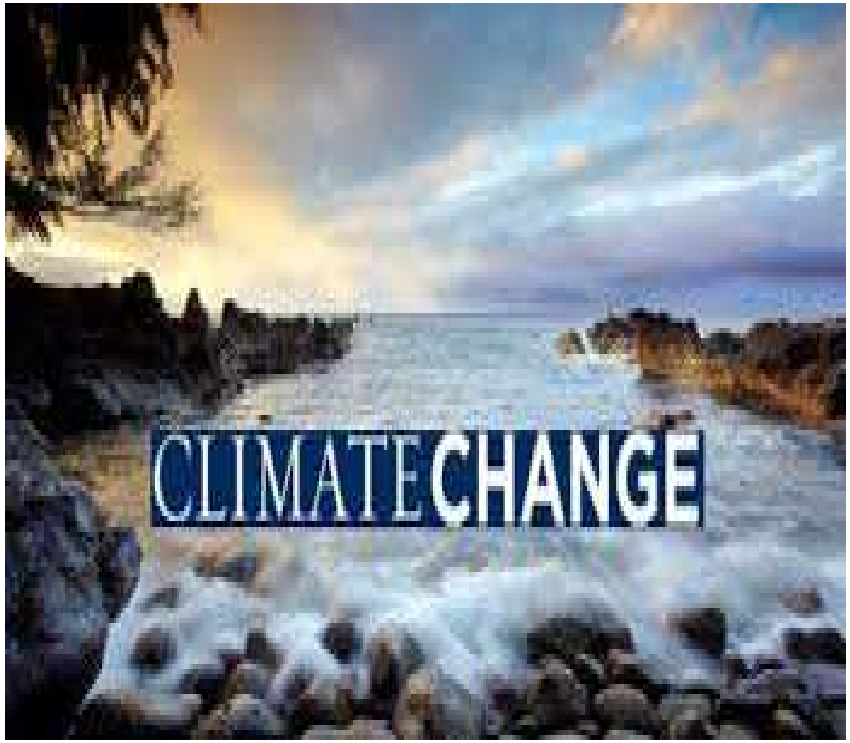
Control measures(CO4..)

- Cooling towers: Use of water from water systems for cooling systems for cooling purposes, with subsequent return to the water way after passage through a condenser, is called cooling process
- Cooling Towers:
- Artificial Lake:

Climate change(CO4..)

- Climate is the average weather of an area. It includes general weather conditions, variations according to seasons etc

- **Activities related to climate change**
- Industrlisation
- Heavy transportation
- Use of fossil fuels
- Population explosion
- Unsustainable agriculture
- Urbanization
- pollution



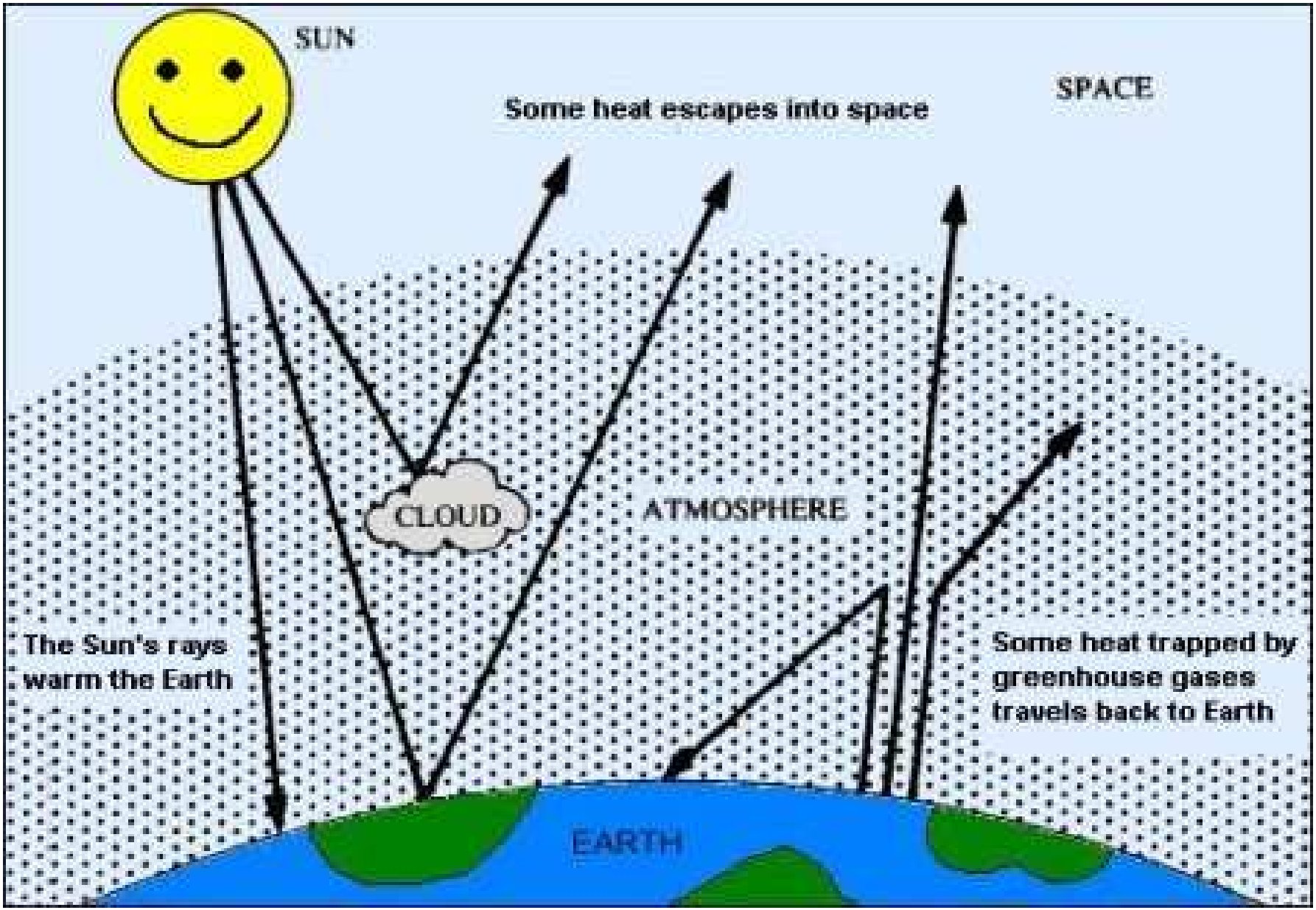
Activity related to climate change(CO_4)

Effects of climate change(CO4..)

- Extinction of species
- Pollutions
- Disturb in water cycles
- Chances of floods and droughts increases
- Global warming
- Acid rain
- Productivity of crop decreases.

Prevention(CO4..)

- Cut down the current rate of use of CFCs and fossil fuels.
- Use energy more efficiently.
- Shift to renewable energy resourses.
- Shift from coal to natural gas.
- Plant more trees.
- Stabilize population growth


SUN
SPACE
Some heat escapes into space
CLOUD
ATMOSPHERE
The Sun's rays warm the Earth
Some heat trapped by greenhouse gases travels back to Earth
EARTH

Green house gases(CO4..)

- The GREENHOUSE GASES are very important and are mainly:
- *water vapor*.
- *carbon dioxide*
- *nitrous oxide*
- *Ozone*

Control measure(CO4..)

- Reduction in consumption of fossil fuels such as coal and petroleum
- Use of bio-gas plants
- Use of nuclear power plants
- Increasing forest cover
- Use of unleaded petrol in automobiles
- Installation of pollution controlling devices in automobiles (catalytic converter) and industries (Electro Static Precipitators, Bag filters, Wet scrubbers etc)

Global warming(CO4..)

- Global Warming is the increase of Earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which trap heat that would otherwise escape from Earth.
- **Causes of global warming**
- Forest Fires
- Man-induced Deforestation
- Fossil Fuels:
- Landfill**s-** Most of the time that garbage is burnt which releases toxic gases including methane into the atmosphere and causes global warming

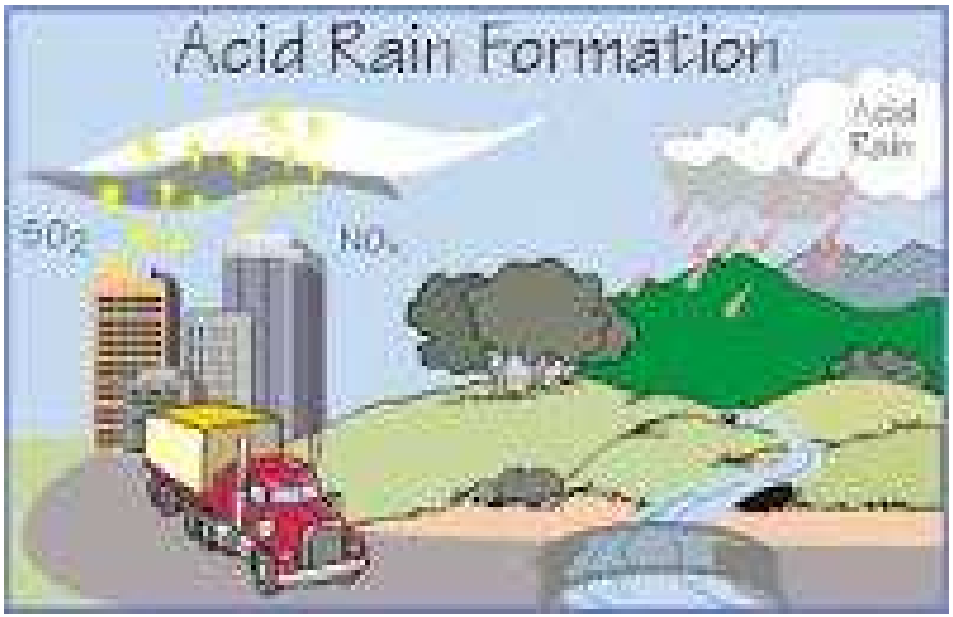
- Overpopulation**:** Since carbon dioxide contributes to global warming, the increase in population makes the problem worse because we breathe out more carbon dioxide in the atmosphere.
- Mining**:** Oil and coal are two main culprits in producing greenhouse gases

Prevention(CO4..)

- Reduction in consumption of fossil fuels such as coal and petroleum
- Use of bio-gas plants
- Use of nuclear power plants
- Increasing forest cover

Acid rain(CO4)

- Acid rain refers to a mixture of deposited material, both wet and dry, coming from the atmosphere containing more than normal amounts of nitric and sulfuric acids
- Simply, it means rain that is acidic in nature due to the presence of certain pollutants in the air due to cars and industrial processes



Causes of Acid rain(CO4)

- Heavy deforestation
- More use of fossil fuels
- Heavy industrialization
- Transportation activity
- Mining activity

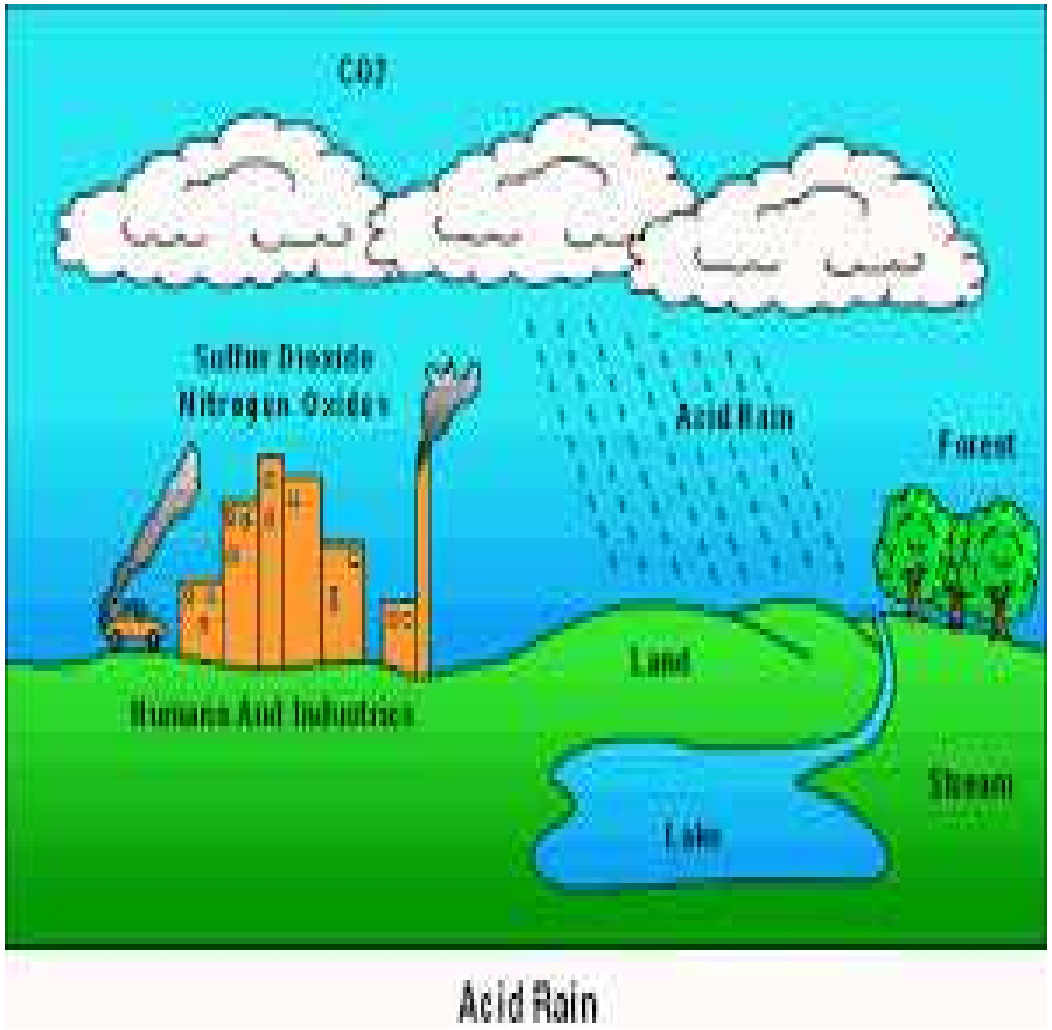
Gases responsible for Acid rain(CO4)

- CO_2
- SO_2
- SO_3
- NO_3

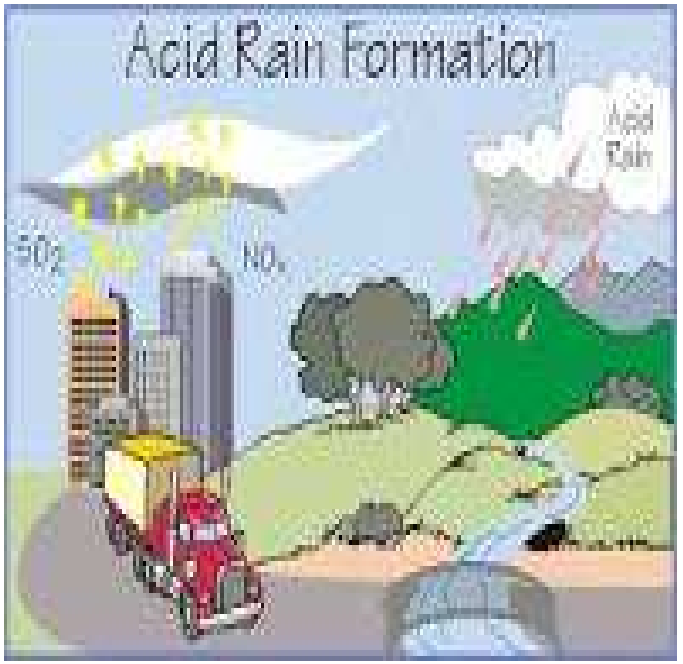
Chemical Reactions

- $CO_2 + H_2O \quad H_2CO_3$
- $SO_3 + H_2O \quad H_2SO_4$
- $NO_2 + H_2O \quad HNO_3$
- $SO_2 + H_2O \quad H_2SO_3$

Acid rain(CO4)



Acid Rain



Solution of Acid rain(CO4)

- Minimize the use of high sulphur coal
- Stop using fossil fuel
- Encourage the use of CNG, and LPG in vehicles
- Minimize air pollution
- Grow more trees

Ozone layer depletion(CO4)

- One group of gases is particularly likely to damage the ozone layer. These gases are called CFCs, Chloro-Fluoro-Carbons

Ozone layer depletion(CO4)

- CFCs are used in some spray cans to force the contents out of the can.
- They are also used in refrigerators, air conditioning systems and some fire extinguishers. They are used because they are not poisonous and do not catch fire.
- Chlorofluorocarbons: Used in freezers, air cooling component, dry-cleaning agents, hospital sterilants.
- Methyl Chloroform:
- Hydro chlorofluorocarbons:
- Halons
- Carbon Tetrachloride: Mainly

Solution of ozone layer depletion(CO4)

- Minimize the use of high sulphur coal
- Stop using fossil fuel
- Encourage the use of CNG, and LPG in vehicles
- Minimize air pollution
- Grow more trees

Faculty Video Links, Youtube & NPTEL Video Links and Online Courses Details

- Self Made Video Link:

- Youtube/other Video Links
- https://www.youtube.com/watch?v=7qkaz8ChelI, https://www.youtube.com/watch?v=NuQE5fKmfME, https://www.youtube.com/watch?v=9CpAjOVLHII, https://www.youtube.com/watch?v=yEci6iDkXYw, https://www.youtube.com/watch?v=yEci6iDkXYw

Weekly Assignment(CO4)

1.What is meant by environmental pollution? Discuss the requirement of a non polluted environment.

2.What are the causes of environmental pollution? List all environmental pollutants and their sources.

3. Define water pollution and enlist various sources of water pollution. What are the effects of water pollutants on humans.

4. Define Air pollution and enlist various sources of air pollution. What are the effects of air pollutants on humans and on nature.

5. Describe the causes, effects of soil pollution which effect the soil productivity.

6. Discuss the causes, effects and control measures of noise pollution.

7. Define Thermal pollution and enlist various sources of Thermal pollution.

.8 Discuss the causes and effects of climate change?

9. Write short notes on causes, consequences and remedial measures of Green house effects?

10. Discuss the causes , effects and control measure of acid rain?

11. What is meant by ozone shield? How CFC and ozone depleting substances affect ozone shield?

MCQ s(CO4)

- 1. Among the following, the only secondary pollutant is:
- (a) Sulphur tetra oxide (b) Ozone
- (c) Carbon monoxide (d) Sulphur dioxide
- Answer-b
- 2. The major photochemical oxidant is:
- (a) Hydrogen peroxide (b) Ozone
- (c) Nitrogen oxides (d) Peroxyl acetyl nitrate(PAN)
- Answer ---c
- 3. The highest heating value is of:
- (a) Garbage (b) Rubbish
- (c) Hospital waste (d) Agricultural wastes
- Answer---b
- 4.Which of these is a management option for air pollution:
- (a) Regulation and standard (b) Emission changes
- (c) Transport planning (d) All of the above
- Answer---d
- Answer---
- 5. Increase in fauna and decrease in flora would be harmful due to increase in?
- (a) Disease (b) CO2
- (c) O2 (d) Radioactive pollution
- Answer---b

Old Question Papers

- New syllabus autonomous

Expected Questions for University Exams(CO4)

1.What is meant by environmental pollution? Discuss the requirement of a non polluted environment.

2.What are the causes of environmental pollution? List all environmental pollutants and their sources.

3. Define water pollution and enlist various sources of water pollution. What are the effects of water pollutants on humans.

4. Define Air pollution and enlist various sources of air pollution. What are the effects of air pollutants on humans and on nature.

5. Describe the causes, effects of soil pollution which effect the soil productivity.

6. Discuss the causes, effects and control measures of noise pollution

7. Define Thermal pollution and enlist various sources of Thermal pollution. What are the effects of thermal pollution on water bodies.

Summary(CO4)

- *Sources of air pollution*
  - Natural pollution - volcanic eruptions, forest fires, biological decay.
  - Man – made activities – Thermal power plants, agricultural activities.
- *Classification---Primary pollutant* – these are those emitted directly in the atmosphere in harmful form like CO, NO.
  - *Secondary pollutant* – these may react with one another or with the basic components of air to form new pollutants.
- It may be defined as “the alteration in physical, chemical and biological characteristics of water which may cause harmful effects on human and aquatic life.
-
- Types, effects and sources of water pollution
-

  <u>*Infectious agents*</u>:
- *Example:* Bacteria, viruses, protozoa and parasitic worms.
- Sources: Human and animal wastes.
- Effects: Variety of diseases.

Summary(CO4)

- It may be defined as “the contamination of soil by human and natural activities which may cause harmful effects on living beings”.
  Types
- Industrial wastes
- *Sources*: Pulp and paper mills, chemical industries, oil refineries, sugar factories,tanneries, textile, steel, fertilizers etc.
- *Effects:* Affect and alter the chemical and biological properties of soil.
- Hazardous chemicals enter into human food chain from the soil and finally lead to serious effects.

References

- 1. Environmental studies and Environmental engineering –By Dr. H.H.Singh
- 2. A Text Book of environmental Science By Shashi Chawala
- 3. Environmental Studies By Dr B.S.Chauhan

Thank You