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AIR POLLUTION AND ITS MONITORING

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I. INTRODUCTION:

Air pollution is the introduction into the atmosphere of chemicals, particulates or biological materials that cause discomfort, disease or death to humans, damage other living organisms such as food crops, or damage the natural environment.

A substance in the air that can cause adverse effect to humans and the environment is known as an air pollutant. Pollutants can be in the form of solid particles, liquid droplets or gases. Pollutants may be classified as primary or secondary. Usually primary pollutants are directly produced from a process such as ash from volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust, etc. Secondary pollutants are not emitted directly. Rather they are formed in the air when primary pollutants react or interact.

II. MAJOR AIR POLLUTANTS:

- **Primary pollutants:**
  1. Sulphur oxides (SOx): especially sulphur dioxide, a chemical compound with the formula SO2. It is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulphur compounds, their combustion generates sulphur dioxide.
  2. Nitrogen oxides (NOx): especially nitrogen dioxide is expelled from high temperature combustion and is also produced naturally during thunderstorms by electric discharge. Nitrogen dioxide is reddish brown toxic gas which has a characteristic sharp, biting odour. It is one of the most prominent air pollutants.
  3. Carbon monoxide: (CO): is a colourless, odourless, non-irritating but very poisonous gas. It is a product by incomplete combustion of fuel such as natural gas, coal or wood. Vehicular exhaust is the major source of carbon monoxide.
  4. Volatile organic compounds: (VOCs): are important outdoor air pollutants. Methane is an extremely efficient green house gas which contributes to

enhanced global warming. Other hydrocarbon VOCs are also significant green house gases.

5. Persistent free radicals: connected to airborne fine particles could cause cardiopulmonary disease.
6. Cholorofluorocarbons (CFCs): harmful to the ozone layer emitted from products currently banned from use.
7. Radioactive pollutants: produced by nuclear explosions, nuclear events, and natural processes such as radioactive decay of radon.

- **Secondary pollutants:**

1. Particulates: created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution: the word "smog" is a portmanteau of smoke and fog. Modern smog does not usually come from coal but form vehicular and industrial emissions that are acted on in the atmosphere by UV light.
2. Ground level ozone: formed from NOx and VOCs. Ozone (O3) is key constituent of the troposphere. Photochemical and chemical reactions involving it drive many of the chemical processes that occur in the atmosphere by day and by night.

III. CONSEQUENCES: EFFECTS OF AIR POLLUTION:

1. Health Effects:

Air pollution is a significant risk factor for multiple health conditions including respiratory infections, heart-diseases, and lung cancer. The human health effects of poor air quality are far reaching but principally affect the body's respiratory system and cardiovascular system. Children aged less than five years that live in developing countries are the most vulnerable population in terms of total deaths attributable to indoor and outdoor air pollution.

2. Environmental Effects:

Poisonous air pollutants (toxic chemicals) can form acid rain. It can also form dangerous ground level ozone. These destroy trees, crops, farms, animals and continue to make water bodies harmful to humans and animals that live and depend on water.

3. **Economical Effects:**

The effect of air pollution on the economy may be a derived one. Air pollution reduces agricultural crop and commercial forest yields by billions of money each year. This in addition to people staying off work for health reasons can cost the economy greatly.

IV. CONTROL: MEASURES TO REDUCE AIR POLLUTION:

Solution efforts on pollution are always a big problem. This is why prevention interventions are always a better way of controlling air pollution. These prevention methods can either come from government or by individual actions.

- **Government level prevention:**
  - Governments throughout the world have already taken action against air pollution by introducing green energy.
  - Governments are also forcing companies to be more responsible with their manufacturing activities so that even though they cause pollution, they are a lot controlled.
  - Companies are also building more energy efficient cars which pollute less than before.
- **Individual level prevention:**
  - Encourage your family to use the bus, train or bike when commuting in order to make fewer cars on road and fewer fumes.
  - Use energy (light, water, boiler, kettle) wisely. This is because lots of fossil fuels are burned to generate electricity and so if we cut down the use, we will also reduce the amount of pollution we create.
  - Recycle and reuse things. This will minimize the dependence of producing new things.

❖ **Control Devices:**

The following items are commonly used as pollution control devices. They can either destroy contaminants or remove them from an exhaust stream before it is emitted into the atmosphere.

1. Mechanical collectors: dust cyclones, multicyclones.

2. Electrostatic precipitators: An electrostatic precipitator (ESP) or electrostatic air cleaner is a particulate collection device that removes particles from a flowing gas using the force of an induced electrostatic charge.
3. Bag houses: Designed to handle heavy dust loads, a dust collector consists of a blower, dust- filter, a filter- cleaning system and a dust receptable or dust removal system.
4. Particulate scrubbers: Wet scrubber is a form of pollution control technology. The term describes a variety of devices that use pollutants from a furnace flue gas or from other gas streams. In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid by spraying it with the liquid, by forcing it through a pool of liquid so as to remove the pollutants.

V. FACTS AND STATISTICS ABOUT AIR POLLUTION:

Air pollution affects kids more than adults due to higher concentrations of polluted air in their systems per body size. India is the country in the world with the worst air quality in the world.

In large cities, over 80% of fatal pollutants that cause lung damage come from cars, buses and other vehicles on the road. According to the WHO, there are as many deaths (1.3 million per year) in the world due to air pollution as there are deaths due to car accidents.

The Great Smog of London in 1952 was one of the worst air pollution events in history with over 8,000 deaths. The largest cause of air pollution in Europe is road transportation with over 5,000 people dying each year from lung cancer and heart attacks caused by vehicle exhaust fumes.

VI. CONCLUSION:

Air pollution can be prevented only if individuals and businesses stop using toxic substances that cause air pollution in the first place. This would require the cessation of all fossil fuel- burning processes. However we have to make rules which set stringent regulations on industrial and power supply manufacturing and handling. The regulations are to be designed to further reduce harmful emissions into the Earth's atmosphere.

VII. REFERENCES:

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