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Air Pollution in the Course of Study Related to the Biological Science at Various Levels

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***Abstract* - Air pollutants can seriously harm materials, crops and to livestock. They can spoil fabrics, surface coatings, metals and other commercial materials, sulher compounds can Corrode or damage many metals, stones, electrical equipment, painted surface, textiles, paper and leather. These pollutants create the pollution in the air. Industrial wastes, petrol and diesel automobiles etc. and thermal power stations make pollution in the air. The air pollution effects all life activities of all animals and plants also.**

Keywords: pollutants, Aerosols, wastes, Smog, Pollution.

I. INTRODUCTION

Pollution is an undesirable change in the physical chemical or biological characteristics of air, water and soil that may harmfully collect the life or create a potential health hazard of any living organism. Pollution is that direct or indirect change in any component of the biosphere that is harmful to the living components and in particular undestrable for man, affecting adversely the industrial progress, cultural and natural assets or general environment.

Air pollution is the contamination of air due to the presence of substances in the atmosphere that are harmful to the health of humans and other living beings. Air pollution can cause diseases, allergies and even death to humans and other animals. The pollution of air, therefore, may have a profound influence on living organisms. Unfortunately, an alarming quantity of gases, particulate material, fumes, vapours and smoke is discharged daily into the atmosphere. Some of it settle down or is brought down by precipitation but much of the injurious material stays back in the atmosphere. The gaseous cover over the surface of earth essentially consists of 78% nitrogen, 20.95% oxygen, 0.93% argon, 0.03% carbon dioxide, a number of other gases and water vapours. In addition to these gases air also contains a variety of particulate matter which includes dust, pollen grains, algae, bacteria, fungal spares etc. so also a various odours, fumes a vapours which occur in dmall traces. In this huge and diverse admixture, a number of substances harmful to a biological system also occur. But their concentration is usually, so low that they hardly pose any problem.

II. PARTICULATE MATTER (AEROSOLE)

Particulate matter or aerosols, in the air is the result of both natural and homam processes, the former contributing globally about nine times more than the latter or about 2.3 billion tons annually versus 296 million tons. Particulates may be minute solid particles or liquid droplets as small as a cluster of several molecules or as large as a visible dust particle. The very fine particles behave more like a gas and are subject to Brownian motion; coagulation, and condensation, large particulates are more like solid matter and are influenced by gravity. Large or primary particulates range in size from 1 to 100 micro meters, the model point being around 10 micrometers are injected directly into the atmosphere from such human sources as industrial smokestack, gravel crushers, and blast furnaces and from such natural sources as forest fires and ocean spray. (Fergusson, 1992). They also arise from oil fires ignited by purposeful action, as occurred during the 1991 Gulf War in Kuwait (Linden 1991; Hobbs and Radka 1992). The smaller, or secondary, particles, range in size from less than .01 micrometer to about 1 micrometer, the model point being around 0.1 micrometer, and result largely from chemical reactions in the atmosphere on both natural and anthropogenic components. The secondary acidic particles including sulfates and nitrates are responsible for reducing visibility and causing erosive damage to materials in the form of "acid rain" (Shaw 1987). The smaller of the secondary particulates result from photochemical reactions, the larger by coagulation or condensation of photo chemically generated particles. Larger primary and secondary particulates settle out of the atmosphere by gravity; the smaller particulates tend to be washed out by precipitation.

Industrial Chimney Wastes

There are a number of Industries which are source of air pollution. Petroleum refineries are the major source of gaseous pollutants. The chief gases are SO_2 and NOx. Mathura - based petroleum refinery is posing threat to Taj Mahal in Agra and other monuments at Fatehpur Sikri complex. Cement factories emit plenty of dust, which is potential health hazard, stone crushers and hot mix plants also create a menace. The SPM levels in such areas of stone crushing are more than five times

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the industrial safety limits. There are many food and fertilizer industries which emits gaseous pollutents. The chief gases are SO_2 and NOx. Mathura based patroleum refinery is posing threat to Taj Mahal in Agra and other monuments at Fatehpur Sikri complex, cement factories emit plenty of dust, which is potential health hazard. Stone crushess and hot mix plants also a create amenace The SPM levels in such areas of stone crushing are more than five times the industrial safety limits. There are many food and fertiliser industries which emit grisery pollutants. There are also chemical manufacturing indlustries which emit acid Vapours in air. During last few years the number of industrial units in Delhi, increased from about 20,000 to 55,000 Nearly 40,000 of these are located in predominantly residential areas.

III. THERMAL POWER STATIONS

There are a number of thermal power stations and super thermal power stations in the country. The National Thermal Power Corporation (NTPC) is setting up four mammoth coal - powered, power stations to augment the energy generation. These are At Singrauli in UP, Korba in M.P., Ramagundam in Andhra Pradesh and Furakka in W. Bengal. The coal consumption of thermal plants is several million tones. The chief pollutants are fly ash, oxides of sulphur and nitrogen, carbon monoxide, hydrocarbons, aldehydes and particulate matter. The three thermal power stations at the Indraprastha Estate, Rajghat and Badarpur in Delhi are the main source of air pollution. The Indraprastha plant daily consumes 3,500 to 4,000 of coal when all the five units function. Badarpur, the largest consumes daily about 10,000 ton of Coal.

IV. COMMON SOURCES OF AIR POLLUTION

Following commonest sources of air pollution are as under:

1. Carbon monoxide, mostly released from motor vehicles, heating and industries. Major portions of atmospheric carbon monoxide (CO) results from engines powered with petroleum derivatives and used for transportation purposes.
2. Sulphur oxides, mostly released from power-generating plants and industrial concerns.
3. Nitrogen oxides, mostly released by motor vehicles, power plants and Industries.
4. Hydrocarbons, mostly discharged by a motor vehicles and inclustries.
5. Pasticulate matter, mostly from industries, power plants and refuse disposal. Most of this particulate matter has not yet been adequately identified.
6. Naturally produced air pollutants e.g. pollen, Vokanic gases, marsh gase, etc.
7. Metals such as nickel, beryllium, arsenic, tin, vanadium, titanicom, lead, cadmium, etc., which have been detected in the atmosphere in the form of solid particles or liquid droplets or gases. Mostly they come from fumes and dust from metallurgical processes, also from seas prey and volcanic ash etc.

V. PHOTO CHEMICAL SMOG

Photo chemical smog is caused in the presence of sunlight, by hydrocarbons and other organic substances and nitrogen oxides, most of a which arise from the fumes and the exhaust of motor vehicles. Smog formation seems to involve complecated chemical reactions amongst the various pollutants of the atmosphere perhaps the chief reaction being the formation of certain free redicals of oxygen, hydrocarbons, and nitrogen dioxide. Nitrogen dioxide is a brownish gas and when present in abnormal concentrations it can impart its colour to the smog. The various chemical reactions involved in smog formation include such substances as preoxides, aldehydes, ketones, peroxides, sulphur trioxide and certain metal particles.

Photochemical smog contains water mixtures of ozone nitrogen dioxide, nitrates, and other gases or dry particles. Intermittent fog in the same geographical area can be acidic with high concentrations of nitric acid. All these components of photo chemical smog are quite toxic to agricultural crops and forest trees. Photochemical smog is known to cause serious health hazards.

Photochemical smog is highly oxidising polluted atmosphere comprising largely of O_3, Nox, H_2O_2; organic peroxides, PAN, and PB_2N. This is produced as a result of photochemical reaction among NOx, hydrocarbons and oxygen. This pollution causes eye irritation and reduces visibility. Some sulphates and nitrates can also be formed in photo chemical smog due to oxidation of sulphur containing components (SO_2, H_2S) and Nox (N_2O_5, NO_2). HNO_3 and nitrates are important toxicants of smog. They cause damage to plants, human health hazards and corrosion problems.

VI. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The atmosphere is primarily gaseous in nature, but may carry suspension of liquids such as water is clouds and solids such as dust from the ground, smoke from fires, or salt from ocean spray. The gaseous constituents of the lower part of the air are usually thoroughly mixed and of uniform composition except where gases are entering or leaving the atmosphere at places where there are volcanoes, fires, smelters, cities, and vegetations.

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Industrial plants release various kinds of fumes that usually include water vapour, carbon dioxide, sulphur dioxide and solid particles. The sulphur dioxide is poisonous and in great enough concentration will kill surrounding vegetation and animals.

Active volcanoses usually yield large quantities of gases which, especially in the explosive stage, are difficult to sample, these include hydrogen sulphide sulphur dioxide, carbon dioxide carbon monoxide, hydrochloric acid, hydrogen, nitrogen, oxygen, argon, ammonia, commanium chloride, and possible others. If some of these settle over the nearby vegetations, the results are likely to be disastrous before they can be diluted and distributed into the air.

The decay of marshes, swamps, and soil litter is a source of gaseous emanations into the air, Green plants in the presence of sunlight exchange oxygen in place of carbon dioxide but animals, nongreen plants, and green plants in the dark reverse the process.

During the past several decades, an increase in carbon dioxide (CO2) and other green house gases has resulted in an increase in global temperatures, there is still considerable uncertainty regarding the effects of global warming on rainfall. Grass lands are more vulnerable to changes in rainfall than forests or deserts. Shrubs and trees will invade grasslands with an increase in rainfall changes in grasslands will also depend on the intensity of grazing, as intensive grazing brings on desert shrubs.

In India about 230 million tons of coal was consumed in 1990-91, more than hells per half of which, about 118.7 million tones, were bounded by Thermal Power Generation sector to produce elecricity, Fly-ash content of Indian coal ranges between 28-42% and about 12% of the total ash centent in coal escapes as smoke, fly-ash or aerosols. With the present rate of consumption of coal we are introducing about 13-16 million tons of fly-ash into the atmosphere. Automobile exhausts are another important source of particulate pollution. While petrol driven vehicle emit only 1.8 kg of aerosols for every 1000 liters of fuel used. The total consumption of Petroleum products in India was around 55 million tons in the year 1990-1991, much of which was kerosene, petrol, and diesel. Diesel powered vehicles inject about 14 kg of aerosols into inject about the air for the same volume of diesel Used. Apart from these various mining and processing operations, processing of agricultural produce, handling and processing of agricultural and produce handling and processing fibres like cotton jute, hemp, air etc. and most of the large or small - scale industrial establishments generate their share of aerosols. This should serve to illustrate the enormous magnitude of aerosols which we are introducing in the atmosphere in India alone.

In 1980 India started manufacturing the toxic gas methyl isocyanate (MIC), which is used to make Sevin (Carbaryl), a pesticide that can kill more than 100 types of insects attacking 100 different crops. For reasons unknown water entered one of three underground storage tanks that held some 40 tons of MIC, building up pressure and causing a leak. For unknown reasons, the safety serubber chimneys, filled with the deoxifying sodium hydroxide solution through which the gas should have escaped, failed to tunction. The outcome was that the noxious MIC gas started seeping from the tank, and the northwesterly winds spread it over the densely populated city of Bhopal. Within days and with no known treatment or antidote, MIC mained more than 100,000 people and killed more than 2,500 making Bhopal the worst industrial accident over.

Though not a natural constituent of air, zinc occurs in the air around zinc smelters and this airbom zinc may be hazardous to human health, Air borne zinc occurs mostly in the form of white zinc oxide fumes. Scrap zinc refineries also emit zinc into the air, as do brass and bronze bronze refineries. Some zinc is also produced as a bye - product in the refining of copper, lead and steel from scrap. Therefore, these refineries can act as a source of air pollution of zinc. Open health furnaces have been estimated to emit 20-25 emit 20-25 gm of zinc per hour from the refining the of galvanized iron scrap.

Mercury is volatile, is found in rocks and soils, and is undoubtably present in the air as a contaimimant, largely as a result of human activities such as the use of mercury - containing fungicides, paints and cosmetics. Safety limits for mercury are not known, but less than 0.1 ug/m3 of organic mercury may be permissible provided that no methyl mercury is allowed at air.

Like zinc and mercury, cadmium is not a natural air pollutant occurs in air as a result of industrialization and human activities. Some major sources of emission of cadmium in air include the metal industries engaged in extraction, refining of zinc, lead, and copper. Some cadmium can also be released into the air during the manufacture of pesticides and phosphate fertilizers and plants are known to be able to absorb cadmium from soils.

Fluorides and arsenic found in air have caused serious injuries to live stock and cattle such pollutants can settle on fodder and become concentrated there, when eaten, this fodder poisons the cattle. Polluted air of big cities also contains or carcinogenes, e.g. benzopyrene, and other polycyclic compounds. Some sources of benzopyrene are

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tobacco smoke, automobile exhaust and effluents from industry and electric power stations, Since the life sciences along with the physical sciences have received much more attention to revise and refresh courses there is an urgent need now to lay emphasis on the protection of environment all over the world and to provide a better life to the living beings of this planet in order to maintain a environment and proper balance between the environment and human survival it becomes imperative to incorporate concepts of immediate concern that have direct complications not only to theory but practical work and their subsequent application for environmental protection and human survival maintain the ecological and biochemical to maintain and then the ecological balance.

The study of such concept as air pollution should be specifically introduced the course of study related to the biological sciences at various levels.

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