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Air pollution: Causes, effects and solution

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Abstract

Air pollution refers to any physical, chemical or biological change in the air. It is the contamination of air by harmful gases, dust and smoke which affects the plants, animals, and humans drastically. There is a certain percentage of gases present in the atmosphere which lead to pollution. An increase or decrease in the composition of these gases is harmful for survival. This imbalance in the gaseous composition has resulted in an increase in earth's temperature which is known as global warming. Air pollution takes place when a large quantity of dust, soot, and other harmful gases get into the air and is considered the most harmful form of pollution. There are four principal sources of air pollution. The first cause is mobile sources such as cars, buses, trucks, and trains. Secondly, the stationary sources such as power plants, oil refineries, industrial facilities, and factories. Third are area sources such as cities, agricultural areas, and wood burning fireplaces. The last main causes of air pollution are the natural sources such as wind-blown dust, forest fires, and volcanoes.

The hazardous effects of air pollution on the environment include: Diseases, global warming, acid rain, ozone layer depletion and animal plant effect. Air pollution has resulted in several respiratory disorders and heart diseases among humans. The cases of lung cancer have increased in the last few decades. Children living near polluted areas are more prone to pneumonia and asthma. Many people die every year due to the direct or indirect effects of air pollution.

Due to the emission of greenhouse gases, there is an imbalance in the gaseous composition of the air. This has led to an increase in the temperature of the earth. This increase in earth's temperature is known as global warming. This has resulted in the melting of glaciers and an increase in sea levels. Many areas are submerged under water. The burning of fossil fuels releases harmful gases such as nitrogen oxides and sulphur oxides in the air. The water droplets combine with these pollutants, become acidic, and fall as acid rain which damages human, animal and plant life.

The air pollutants suspend on the water bodies and affect the aquatic life. Pollution also compels the animals to leave their habitat and shift to a new place. This renders them stray and has also led to the extinction of a large number of animals species. The release of chlorofluorocarbons, halons, and hydrochlorofluorocarbons in the atmosphere is the major cause of depletion of ozone layer. The depleting ozone layer does not prevent the harmful ultraviolet rays coming from the sun and causes skin diseases and eye problems among individuals. On an individual level, we can reduce our contribution to the pollution problem by carpooling or using public transportation. Additionally, buying energy-efficient light bulbs and appliances or otherwise reducing our electricity use will reduce the pollutants released in the production of electricity, which creates the majority of air pollution. These effects of air pollutants on human health and their mechanism of action are briefly discussed.

Keywords: pollutants, greenhouse gases, ozone layer, global warming

Introduction

The World Health Organization defines air pollution as *"The presence of materials in the air in such concentration which are harmful to man and his environment."*

The present-day atmosphere is quite different from the natural atmosphere that existed before the Industrial Revolution (circa 1760), in terms of chemical composition. If the natural atmosphere is considered to be "clean", then this means that clean air cannot be found anywhere in today's atmosphere.

Defining "air pollution" is not simple. One could claim that air pollution started when humans began burning fuels. In other words, all man-made (anthropogenic) emissions into the air can be called air pollution, because they alter the chemical composition of the natural atmosphere. The increase in the global concentrations of greenhouse gases CO₂, CH₄, and N₂O, can be called air pollution using this approach, even though the concentrations have not found to be toxic for humans and the ecosystem. One can refine this approach and only consider anthropogenic emissions of harmful chemicals as air pollution. For example, anthropogenic emissions of chlorofluorocarbons (CFCs) were once considered safe because they are inert in

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the lowest part of the atmosphere called the troposphere. However, once these chemicals enter the stratosphere, ultraviolet radiation can convert them into highly reactive species that can have a devastating effect on stratospheric ozone. Similarly, anthropogenic CO₂ emissions from combustion processes were considered safe because they are not toxic, but the long-term accumulation of CO₂ in the atmosphere may lead to a climate change, which could then be harmful to humans and the ecosystem.

Another drawback of this approach is that it does not consider natural emissions as air pollution even though they can be very harmful, such as gases and particles from volcanic eruptions, and smoke from forest fires caused by natural processes (lightning strikes). So besides anthropogenic emissions, it is useful to also consider geogenic emissions and biogenic emissions as contributors to air pollution. Geogenic emissions are defined as emissions caused by the non-living world, such as volcanic emissions, sea-salt emissions, and natural fires. Biogenic emissions come from the living world; such as volatile organic compound (VOC) emissions from forests and CH₄ emissions from swamps⁷. Human activity can also influence geogenic and biogenic emissions. For example, human applications of nitrogen fertilizers in agriculture can result in increased biogenic emissions of nitrogen compounds from the soil. Also, humans can affect the biogenic emissions of VOC by cutting down trees or planting trees. Lastly, geogenic emissions of dust from the earth's surface can be altered if the surface is changed by human activity.

Effect of air pollutants and its harmful effects

Air pollutants are broadly classified into particulate and gaseous. The particulate substances include solid and liquid particles. The gaseous include substances that are in the gaseous state at normal temperature and pressure. The air pollutants have adverse effect on human beings, animals, vegetation, buildings. Air pollutants also change earth's climate. Aesthetic sense is also influenced by air pollutants. The different air pollutants and their effects are as follows:

1. Particulate Matter

It is of two types-settleable and suspended. The settleable dusts have a particle longer than 10 (am. The smaller particles are able to remain suspended for long periods in the air. The important effects of particulate matter are.

1. Dust and smoke particles cause irritation of the respiratory tract and produces bronchitis, asthma and lung diseases.
2. Smog is a dark or opaque fog which is formed by the dust and smoke particles causing condensation of water vapours around them as well as attracting chemicals like SO₂, H₂S, NO₂, etc. Smog harms plant life through glazing and necrosis besides reduced availability of light. In human beings and animals it produces respiratory troubles.
3. Particulate matter suspended in air, scatters and partly absorbs light. In industrial and urban areas, sunlight is reduced to 1/3 in summer and 2/3 in winter.
4. At a concentration above 150 g/100m³, cotton dust in ginning process produces pneumoconiosis or lung fibrosis called byssinosis. Lung fibrosis produced in other industries includes asbestosis (in asbestos industry), silicosis (stone grinders), siderosis (iron mill), coal miners' pneumoconiosis, flour mill pneumoconiosis, etc.

2. Carbon monoxide

It accounts for 50% of the total atmospheric pollutants. It is formed by incomplete combustion of carbon fuels in various industries, motor vehicles, hearths, kitchens, etc. Carbon monoxide combines with haemoglobin of blood and impairs its oxygen carrying capacity. At higher concentration, carbon monoxide proves lethal.

3. Nitrous oxide

They are produced naturally through biological and non-biological activities from nitrates, nitrites, electric storms, high energy radiations and solar flares. Human activity forms nitrogen oxides in combustion process of industries, automobiles, incinerators and nitrogen fertilizers. Nitrogen oxides act on unsaturated hydrocarbons to form peroxy-acyl nitrates or PAN. It gives rise to photochemical smog. They cause eye irritation, respiratory troubles, blood congestion and dilation of arteries.

4. Carbon dioxide

Due to excessive combustion activity, the content of CO₂ has been steadily rising. As carbon dioxide accumulates in the atmosphere it absorbs more and more of the reflected infrared radiation. This could cause an increase in temperature referred to as the green house effect. Melting polar ice caps and glaciers could cause sea levels to rise, flooding most of the major population centres and fertile lands.

5. Phosgene and methyl isocyanate

Phosgene (COCl₂) is a poisonous and suffocating volatile liquid which is employed in dye industry and synthesis of organic compounds. Release of phosgene and MIC in industrial accident of Bhopal (Dec. 2, 1984) killed over 2500 and maimed several thousand persons.

6. Aerosols

They are widely used as disinfectants. Other sources are jet plane emissions which contain chlorofluorocarbons. Chlorofluorocarbons are also used in refrigeration and formation of certain types of solid plastic foams. Burning of plastics produces polychlorinated biphenyls (PCBs). The latter are persistent and pass into the food chain. Chlorofluorocarbons and carbon tetrachloride react with ozone layers of stratosphere and hence deplete the same.

7. Photochemical oxidants

Hydrocarbons have carcinogen properties. Some of these are also harmful to plants because they cause senescence and abscission. In the presence of sunlight, hydrocarbons react with nitrogen oxides to produce ozone, peroxy-acyl nitrates, aldehydes and other compounds. Peroxy-acyl nitrates are a major constituent of air pollution. They cause eye irritation and respiratory diseases.

8. Automobile exhausts

They are one of the major sources of air pollution. The important pollutants are Carbon monoxide, Benzpyrene, Lead, Nitrogen oxides, Sulphur compounds and Ammonia.

9. Pollen and Microbes

Excess of microbes in the atmosphere directly damage the vegetation, food articles and causes diseases in plants, animals and human beings. Excess of pollen causes allergic reactions in several human beings. The common reactions are also

collectively called hay-fever. The important allergic pollen belong to *Amaranthus spinosus*, *Chenopodium album*, *Cynodon dactylon*, *Ricinus communis*, *Sorghum vulgare*, *Prosopis chilensis* etc.

Measures to control air pollution

- **Activated carbon** is one of the most popular forms of air pollution control. This type of control involves the use of a pollution filter, carbon, to reduce the amount of pollutants that are allowed to escape into the air. When in use, these filters absorb pollutants helping to cleanse the air of any possible toxins.
- **Biofiltration** is another effective type of air pollution control. It uses microorganisms, often bacteria and fungi, to dissolve pollutants. Industries that employ biofiltration systems include food and waste plants, pharmaceutical companies, and wastewater management facilities. While this method of air pollution control works rather well, a large space is required in order to operate a biofiltration system. Many industries do not have this amount of available space, so this method is often disregarded.
- **Change in Fuel:** This technique involves the use of less polluting fuel to reduce air pollution. Use of low sulfur fuel instead of high sulfur fuel by electric utilities is an example of this method. Remember that low sulfur fuel is much more expensive than high sulfur fuel.
- The other choice for an electric utility can be the use of natural gas as a fuel. Fuel switching based on meteorological conditions or air pollution forecasts have been used to prevent air pollution problem in many areas.
- Use of oil with low ash content or natural gas for a dryer at an asphalt plant to reduce particulate matter is another example of this method. Introduction of compressed natural gas, propane, ethanol and oxygenated fuels for automobiles have helped in the reduction of air pollutants
- Nuclear power plants are relatively pollution free when compared to the coal fired power plants. However, they have been subjects of controversy in their overall environmental impact.
- **Improve Dispersion:** This approach is based on the concept that dilution of air contaminants before they reach ground will lower the concentrations to which the population is exposed. The use of this approach for industry is discouraged by the US EPA.
- The emissions from the plant are passed through a control device before releasing to atmosphere. The pollutants are removed, destroyed or transformed in the control device before discharging into ambient air.
- The scrubbing or flue gas desulphurization (FGD) processes can be classified as (i) Throwaway or regenerative processes or (ii) wet or dry processes.

Conclusion

From this it is clear that we have numerous ways of controlling air pollution. The only thing require is to use it in appropriate form. This paper represents the different effects, cause and solutions that are employed in various industry and the use of different fuels that are immanent for the solution of air pollution. Air pollution involves spate of pollutants which creates a lot of chronic and acute diseases in human being so we have to put the foreign particles within the constraint of standard limit

References

1. wikipedia.org/wiki/Air_pollution
2. en.wikipedia.org/wiki/Pollution
3. www.ncbi.nlm.nih.gov
4. "Air Pollution Causes, Effects, and Solutions". National Geographic. 9 October 2016.
5. <http://www.epa.gov/air/basic.html>
6. <http://yosemite.epa.gov>
7. <https://www.who.int> > phe > health_topics