

# Air Pollution: Some Facts and Perils

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## Abstract

Since the on set of industrial revaluation, rapid urbanization, migration and development of public and private transport network has impetus to economic development at the cost of environment. Although such development is integral to economic growth the problem lies in their unfettered proliferation, leading to severe environmental degeneration and pollution particularly since 1970. Hence, there is an urgent need to address and assess the problem of air quality. In this paper an attempt has been made to study and discuss the impact of air pollution on human health.

## Introduction

Air Pollution is a major environmental health problem affecting the developed and the developing countries alike. Air pollution stems from gases and air borne particles which in excess are harmful to human health and eco system. Air pollution has always been with man. Its references are mentioned in the ancient literature too. It has begun to be notice as a serious problem after a series of episodes in 20th century. These dramatic episodes have demonstrated that in extreme cases community air pollution can result in considerable loss of life and serious illness to the societies and the country. In this paper an attempt has been made to study and analyze the impact of air pollution on human health.

Air is a mixture of several gases composing primarily of hitrogen, oxygen, corbandioxide and certain inert gases. On an average a human being requires about 12 kg's of air every day for respiratory purpose: which is 12 to 15 times higher than the food in take. That is the reason why even the smaller concentration of pollution in the air will prove to be harmful and dangerous to human health.

Air pollution means the presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odour, smoke or vapour in quantities or characteristics and of duration such as to be injurious to human, plant or animal life or to property or which unreasonably interferes with the comfortable enjoyment of life

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and property (Perkins 1974).

## Concept and definition

According to the air act of Govt. of India (Amendment 1987) air pollution means any solid, liquid or gaseous substances present in the

According to Bureau of Indian Standards IS

4167 (1980). Air pollution is the presence in ambient atmosphere of substances generally resulting from the activities of man in sufficient concentration present for a significant time and under circumstances such as to interfere with comfort, health or welfare of persons or with reasonable use of enjoyment of property.

Air pollutants that are inhaled have serious impact on human health they are taken up by the blood and pumped all round the body. These pollutants are also deposited on soil, plants and in the water, further contributing to human exposure.

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## Major Sources of Air Pollution

Air pollutants consist of gaseous pollutants, odours and SPM (Suspended particulate matter) such as dust, fumes, mist and smoke. The concentration of these in and near the urban areas

causes severe pollution to the surroundings. The sources of human - created air pollution are energy generation, transportation and industries that use a great deal of energy sources. Depending on these sources and interaction with other components of air, they can have different compositions and health impacts. Since these pollutants are generally concentrated in and around urban areas, the outdoor urban pollution levels are far higher than in the rural areas.

**The following are the major sources of air pollutions.**

#### **Natural Sources**

The natural sources include dust, storms, volcanoes, lightning, sea salt, smoke, forest fire etc.

#### **Man made Sources**

These include agricultural activities, industrial, domestic wastes, pesticides, household fibers, construction an activity, solvent uses etc.

#### **Indoor Sources**

In it tobacco, smoke and combustion of solid fuels for cooking and heating are the most significant sources. In addition to the above construction materials, vapours from buildings, carpeting, air conditioning, paints and house cleaning agents and insecticides can also be treated as chemical sources of indoor air pollution.

#### **Outdoor Sources**

Smog is a type of large scale outdoor air pollutant. It is caused by chemical reactions between pollutants derived from different sources, primarily automobile exhaust and industrial emissions. Cities are often centers of these types of activities.

#### **Monitoring measures of Air pollution**

The following are some of the methods of controlling Air pollution

#### **Dilution**

The most effective method of controlling air pollution in atmosphere is to properly dilute and dispose the air pollutants as they are released from the source. This can be achieved by providing a greater height to the stacks (Chimneys). The long stack will reduce the ground level concentration of pollutants by facilitating their discharge away from the ground

and reduce ground level contamination. However, this method of dilution is a short term control measure and it is not suitable for long term control.

#### **Using Air Pollution Control Devices**

Studies reveal that Air pollutants originate primarily from industrial processes. Past observations shows that more than 18 million tones of suspended particulate matter was emitted to our atmosphere out of these 50% was contributed by industries alone keeping this information in view, the following devices are used to control this type of pollutions.

- a. Gravitational setting chambers
- b. Cyclone separators
- c. Fabric filters or bag filters
- d. Electro static precipitators
- e. Wet collectors or scrubbers

Uses of the above devices depend upon the size, distribution, stickiness and hygroscepicity and electrical properties of particulate matter.

#### **Gaseous Pollutants Controlling**

The principal gases of concern in air pollution control are sulfur oxides (Sox), Nitrogen Oxides (Nox) and hydro carbons (HC). To control these gases, the mechanisms are chemical engineering unit operations which include absorption, condensation and combustion.

#### **Control Techniques of So<sub>x</sub>**

Sulfur oxides include six different gaseous compounds of sulphur namely, sulphur monoxide (SO); Sulphur dioxide (SO<sub>2</sub>); Sulphur trioxide (SO<sub>3</sub>); Sulphur tetra oxide (SO<sub>4</sub>), Sulphur sesquioxide (S<sub>2</sub>O<sub>3</sub>) and sulphur hepta oxide (S<sub>2</sub>O<sub>7</sub>) ,out of two, SO<sub>2</sub> and SO<sub>3</sub> are the most significant in air pollution.

- a. Natural dispersion by dilution
- b. Using alternate fuels
- c. Process of modification
- d. Control of Sox in the combustion process, and
- e. Treatment of Fuel gas emissions

#### **Control Techniques of NO<sub>x</sub>**

Nitrogen oxide is one of the fair major photo chemical smog. Over 90% of the man made

nitrogen oxides that enter air atmosphere are produced by the combustion of various fuels. The real danger passed by  $\text{NO}_x$  at the concentrations found in mega cities in photo chemical reactions leading to smog formation. Control techniques to reduce  $\text{NO}_x$  emission from flue gases are as under.

- a. Dilution in atmosphere by increasing stack height.
- b. Modification of operating and design conditions.
- c. Treatment of flue gases.

### **Burning of Fuels**

It is considered as the main source of air pollution. Fuels like wood have very little sulphur, where as coal have 0.5-3% sulphur. Oils generally have more sulphur, but less than coal. If we burn these fuels, the sulphur in them mostly forms sulphur dioxide.

The following methods may be used in reducing sulphur present in burning.

- a. Coal cleaning
- b. Solvent refined coal
- c. Replacing petrol as motor fuel with CNG or propane.

### **Modifications of Engine design**

To reduce pollution from mobile sources such as car, trucks and planes their engine design should be modified. The exhaust gases should be made pass through catalytic converters - A special devices attached to the exhaust engine that converts several pollutants into less harmful substances.

### **Use of New Technologies**

New combustion technologies such as Magneto hydrodynamics (MHD) and fluidized bed combustion (FBC) can be used to remove 95% of sulphur contaminants in coal. Even "end-pipe-strategies" may be used to remove harmful substances from emissions and they can be converted into "harmless" substances.

### **Legislation**

Rigid laws should be enacted in addition to the existing laws with regards to

- a. Emissions standards for automobiles
- b. Emission standards for new industries

c. Ambient standard air quality for urban areas etc.

The rules and regulations should be implemented with its full spirit and violators should be punished and penalized without any discrimination.

### **Conclusion**

It is well known fact that "Air Pollution" has emerged in the post decade as a most challenging problem before the man kind, although air pollution existed even in the prehistoric time; the problem never took as menacing proportion as new. The rapid urbanization, industrialization, migration, particularly in the developing countries has lead to deterioration of environmental conditions. The problem of pollutions can not be tackled by technology alone, since social, cultural and economic aspects must also be considered while dealing with them. For any central strategy, the formulation of laws, regulations and implementation are must as the society can not be managed and governed without it. Therefore it should be borne in mind that no environmental problem can only be salved by scientists, technocrats' administrators and implementation mechanism and laws. Each and every citizen should understand his/her responsibility towards the society and should personally involve in the crusade against environmental pollution in general and air pollution in particular.

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