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# Smog Depletion Tower: A Smart Cost Effective and Eco-friendly Solution for Reduction of Photochemical Smog

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**Abstract -** *There are many treatments for water and land, but apart from water and land we were in danger of preserve our air. We are in need of oxygen supply that too in pure form. Smog depleting tower proves to be an ideal solution in terms of environment and energy friendly. Smog is a kind of visible air pollution. In simple language smog can be defined as the combination of fog present in atmosphere and air pollutants.*

*There are three types of smog that are photochemical smog, volcanic smog, sulfurous smog. Apart from this we are going to deal with only photochemical smog. The photochemical smog is a type of smog produced when ultraviolet light from the sun reacts with nitrogen oxides in the atmosphere.*

*This smog depleting tower sucks dirty air like a giant vacuum cleaner. This releases purified air using low electricity. Ionization technology is used to purify the polluted air. In which air ionizers are used in air purifiers to remove particles from air. Air borne particles are attached to the electrodes in an effect similar to static electricity.*

*Our nose can filter particulate matter 10 but it cannot filter less than particulate matter 2.5. When the size of polluted harmful air is inhaled it can directly be passed through lungs. This tower is effective in industrial and commercial areas.*

*The aim of research work is to study and find out effects of photochemical smog and the purification of polluted air. On the basis of research we are going to find the best solution for the purification of polluted air..*

***Key Words*: Smog[1], Particulate matter (PM)[2], Photochemical smog[3]**

## 1. INTRODUCTION

During 20th century smog is ridiculous problem to developed & developing cities in the all over world. Smog affects on the life cycle of human and city which causes disturbances and problems. The term "Smog" is basically derived from the merging of two words that are smoke and fog. In simple language smog can be defined as the combination of air pollutant sand fog present in the atmosphere. Air pollutants contains fine particles ,ground level ozone, various gases produced from vehicles and industries like carbon monoxide (CO), sulfur dioxide (SO2), fuels like petrol, diesel etc.

The smog is yellowish or blackish fog formed due to above reason. When the sunlight and its heat reacts with the gases present in atmosphere and fine particles, smog is formed. The main sources of these precursors Repollutant released directly into the air by gasoline and diesel –run vehicle, industrial plants and activities, and heating due to human activities like bonfire, burning of waste materials etc. Coal fires can be emits significant clouds of smoke that contribute to the formation of winter smog. Smog is harmful and it is evident from the components that form it and effects that can happen from it. It is harmful to human, animals, plants and the nature as a whole. It can cause health problems such as asthma, emphysema, chronicbronch it is and other respiratory problems as well as eye irritation and reduce resistance to colds and lung infection due to tiny toxic particles known as particulate matter (PM10) can be inhaled. It also affects the growth of plants.

This project of smog depleting to be shows problem evolved through photochemical smog an their solution. Photochemical smog consisting of it is a modern solution on this growing smog problem.

## 2. RESEARCH METHODOLOGY

### 2.1 Problem Statement

In general there are three types of smog, that are Photo chemical smog, Volcanic smog, Sulfur smog. Photo chemical smog is produced when ultra violet lights from the sun reacts with nitrogen oxides in the atmosphere. It is visible as a brown haze and is most prominent during the morning and afternoon. It is consist of mixture of bad chemicals. The chemicals like nitrogen oxides, volatile organic compounds (VOCs), ozone, peroxy acytyl nitrate (PAN). This project is related to problems and solution of photo chemical smog caught in various places. Photochemical smog is generally produced in cities and it may stay there for long period due to thesaurus. Smog can be form faster and be more severe

in cold areas. When temperature inversion occurs and winds are stagnant, severe smog and ground level ozone problem exist

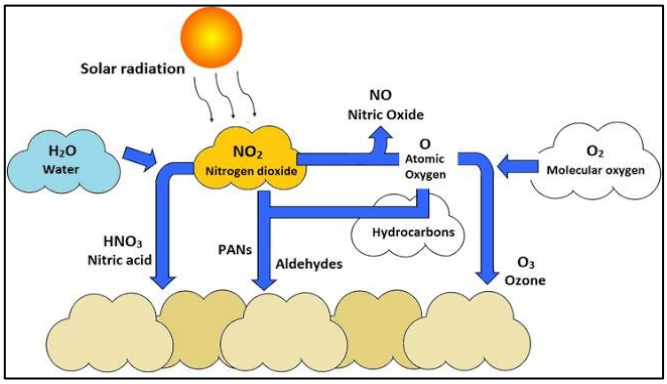


**Fig -1 :** Photochemical Smog[9]

## 2.2 Collection of Data

**Table No – 1** Values of AQI and PM

| Airv Quality Index Particulate Matter | Minimum Value | Safe At Under | Maximum Value |
|---|---|---|---|
| AQI For $PM_{2.5}$ | 91 | 50 | 142 |
| AQI For $PM_{10}$ | 64 | 80 | 56 |
| AQI For $O_3$ (Ozone) | 22 | 50 | 114 |
| AQI For $NO_2$ (Nitrogen dioxide) | 34 | 50 | 81 |
| AQI For CO | 15 | 40 | 50 |
| Temperature | 11°C | 26°C | 36°C |
| Humidity | 24% | 50% | 92% |

## 2.3 Conceptual Model Design

- The tower works in simple way, it sucks in dirty air like a giant vacuum cleaner.
- Due to applied potential voltage difference, all the particles get positively charged, and the ground is negatively charged, resulting in downward dragging force on the pollutants in air. This is called as ionization technique.
- Ionization technique then filters it.
- The technology is safe and there are no secondary by products causing any pollution.

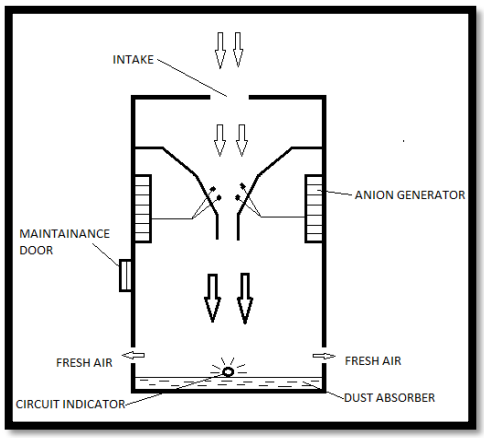


**Fig - 2** : Smog Depleting Tower Setup

## 2.4 Experimental Procedure

1. The smog free tower is initially place in a closed room.
2. Benton Resin is used to produce smoke. Since it is an organic compound on burning it will produce smoke mixed with carbon.
3. out through the outlet at the top of the tower. This air sucked into the tower through the vacuum pump attached at the top of the tower.
4. The toggle switch is now switched to ionizer from vacuum pump
5. Carbon in the smog is positively charged ion and the negative ions are produced using negative ion generator through circuiting.
6. This will attract the charged carbon to the collector in the form of impurities.
7. Charge carbon then collected separately and the treated air is now sent
8. Here, we are using filter paper to analyze the quality of the air
9. The filter paper (filter paper which can filter particulate matter of size PM2.5) is soaked in distilled water and it is kept at the outlet of the tower.
10. The black spots on it show the concentrated impurities of the purified smog.
11. The results are noted.[7]

## 3. RESULT AND DISCUSSION

In this present study we observed that ionization technique works effectively to decrease CO content present in air. It is safe to say that if this technique

implied on large scale it can help to reduce various air pollutants.

## 4. CONCLUSIONS

- Smog Depleting Tower (SDT) can be used as cost effective equipment to reduce gaseous pollutants such as CO, CO2 etc.. Hence it is very useful to face and overcome upcoming problem of smog formation around the world. It is one of nature's tools for maintaining and cleaning the air.
- Though positive and negative ionization exist together naturally in the atmosphere, and abundance of negative ionization appears to have very beneficial effects on humans, animal and plants while an abundance of positive ionization seems to be detrimental.
- Prototype model with minor modifications can be implemented on life size scale toachieve maximum efficiency in removing various air pollutants present in air.
- The efficiency of Smog Depleting Tower.

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