

Thesis

The goal of this research is to understand the properties of criteria pollutants and to create a product that can filter ambient air pollution.

Objective/Introduction

Ranking in the top five most important world problems and ever increasing, air pollution requires immediate attention due to the continued dependency on fossil fuels. Emissions by factories and vehicles are deteriorating the environment with no backtrack to the damage, where these pollutants have also been associated with respiratory and cardiovascular damages to these body systems. It is not only to clean our environment but to improve human health that the production of devices that can aid in decreasing pollution that truly shows its importance. As an inspiration, Dr. Roosegaard demonstrated through his Smog vacuum that it is possible to remove pollutants from the air, by which we chose to counteract the six primary pollutants found in air: lead, particulate matter, ozone, nitrogen oxide, carbon monoxide, and sulfur dioxide. The goal of this project is to create a prototype of a device that can potentially filter the elements of outdoor pollution, therefore reducing it.

Hypothesis

In recent observation of increasing levels of PM and ground ozone throughout cities due to gas emissions, the development of a chemical substance by distribution through an air filtration system leads in solving air pollution, which will be able to neutralize ambient air pollution to minimize or resolve it entirely.

Specific Student Responsibilities

I will be responsible for the researching of air composition, the analyzing of air samples, creating and designing of a final product under the guidance of Dr. Jacen Moore and Research Assistant Marcos Zambora. Through experimentation, I am also responsible for consistent execution of procedures, maintenance of safety through using industrial equipment, and recording valid data. Through this project, I will learn about the chemistry behind environmental science and the use of the engineering process to create a product.

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Solution to Pollution: Filtration of Ambient Air Pollution Dr. Jacen Moore, Gisel Fregoso, Michaela James, Salvador Gonzalez Work With A Scientist Program, UTEP El Paso, TX, USA University of Texas at El Paso, El Paso, TX, USA El Paso Independent School District, El Paso, TX, USA





Project Timeline

- The project period was 5 weeks. List of Tasks per week:

 - >Begin drafting a materials list of possible equipment needed
 - >Three filters will be used for prototype:
 - 1. Diatomaceous earth, sand, and carbon charcoal
 - >Research on properties of TiO2 and UV light (function together) > Materials for prototype obtained
 - > Meeting with Dr. Chianelli for advice on constructing our prototype > Construction of the first chamber's filter
 - > Absence of members (Michaela until Wednesday, Gisel until next week) > Modifications applied onto the first filter
 - > Third filter was built, consisting of a water system that refills itself
 - > Meeting with Eva Deemer and her assistant Aleksy; she explained the
 - properties of graphene and its application onto our system
 - > Meeting with Dr. Chianelli, who corrected the concept of the properties we
 - > Meeting with Aleksy, Eva Deemer's assistant, to provide us with the graphene filter, which was obtained as a membrane 24 hours later
 - > Research on properties of each of the materials used per filter
 - > Replacement of several containers to facilitate system
 - > Insertion of tubing for water conduction; alternative method of constructing our own air vacuum was decided and materials were chosen
 - > Air vacuum was constructed and continually tested: unsuccessfully the
 - the current did not pass through, burning out the air vacuum.
 - > Water pump and tank attached onto the system
 - > Water pump and tubing was testing to distinguish the release of air pressure that would allow air molecules to transfer through
 - > Shock bag replaced air vacuum since it provided enough suction and release

> UVB light and TiO2 membrane attached onto second chamber > Entire system was plugged into outlet to determine if it operated

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