



AIR PURIFIER

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ABSTRACT

Allergens like smoke, mold, pollen, bacteria, viruses, and pet dander can cause damage to the lungs and the immune system. These contaminants cannot be seen by the naked eye but can be filtered out by air purifiers. These purifiers typically use filters, electrical attraction, or ozone purification.

Air filters use fine sieves that filter particles with air circulation. This filter exchanges the air in the room by using a fan to draw the air through the purifier. The impurities remain on the filter leaving pure air to continue on through the machine, the smaller the particles it can trap onto the filter.

Key Words: *Activated charcoal, dc exhaust fans, HEPA filter*

I.INTRODUCTION

An air purifier or air cleaner is a device which removes dust particles and gases from the air in a room. The purification process is done by the following:-

Filter:-based purification traps airborne particles by size exclusion. Air is forced through a filter and particles are physically captured by the filter.

Activated carbon:- can adsorb volatile chemicals on a molecular basis, it changes contaminants from a gaseous phase to a solid phase.

After the purification of the air, the purified air is let out through small spherical air vents at the bottom of the air purifier.



II. ACTIVATED CHARCOAL

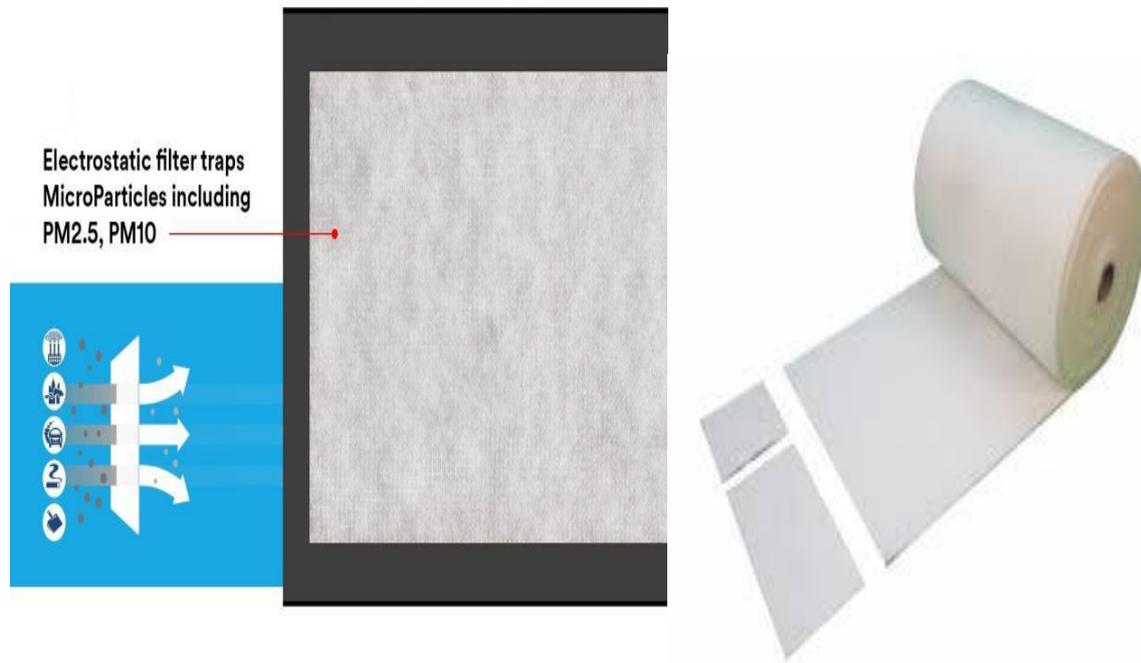
The adsorption process when using activated carbon must reach equilibrium thus it may be difficult to completely remove contaminants. Activated carbon is merely a process of changing contaminants from a gaseous phase to a solid phase, when aggravated or disturbed contaminants can be regenerated in indoor air sources. Activated carbon can be used at room temperature and has a long history of commercial use. It is normally used in conjunction with other filter technology, especially with HEPA. Other materials can also absorb chemicals, but at higher cost.



III. HEPA FILTER

HEPA air filters are made from very tiny glass fibres that are made into a tightly woven paper. They are guaranteed to trap 99.97% of airborne particles above 0.3 microns. The more times the air passes through the HEPA filter the cleaner the air will be.

HEPA filters are composed of a mat of randomly arranged fibres. The fibres are typically composed of fiberglass and possess diameters between 0.5 and 2.0 micrometres. Key factors affecting its functions are fibre diameter, filter thickness, and face velocity. The air space between HEPA filter fibres is typically much greater than 0.3 μm . The common assumption that a HEPA filter acts like a sieve where particles smaller than the largest opening can pass through is incorrect and impractical. Unlike membrane filters at this pore size, where particles as wide as the largest opening or distance between fibres cannot pass in between them at all, HEPA filters are designed to target much smaller pollutants and particles.



IV. WOODEN CASING

The components of the filter are kept in a wooden box which is tightly packed. If the wooden box is sealed air wont escape and the process will not be affected.



V. MATERIAL REQUIRED

1. Dc fan
2. HEPA filter
3. Activated charcoal



4. Metal Mesh
5. Wood

VI.PROCEDURE:

1. Impure air is allowed to enter the purifier with the help of DC fan.
2. Firstly , impure air containing dust , smog and other small particles are allowed to pass through the HEPA filter which captures large particles like smog ,dust mites ,pollen , road dust , human hair and micro particles like PM2.5 (Particulate Matter of diameter <2.5 micrometer).
3. Then the air passes through the next filter which consist of powdered form of activated charcoal which adsorbs harmful gases like CO₂ ,SO₂ , NO₂ , etc.
4. Take the weight of the charcoal before the experiment gets started on a digital weighing machine for accuracy.



VII.OBSERVATIONS:

- 1.After 1 hour of the experiment there is a change in weight of the charcoal sample taken.
2. Again taking the weight of the charcoal sample after the experiment on digital balance for accuracy.



VIII.PRECAUTIONS:

1. The wooden casing should be sealed tightly so that the air does not escape through the spaces opened.
2. The filters should she maintained properly with proper arrangement.
3. Not to be placed near any liquid.

IX.APPLICATIONS :

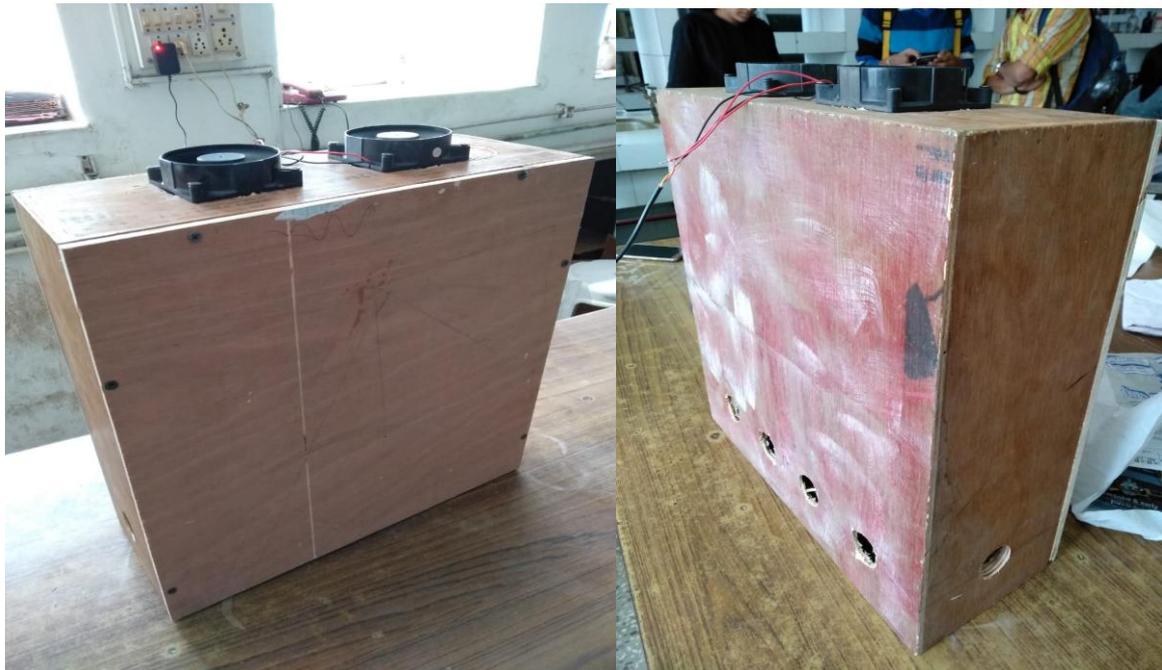
1. The device can be used in small scales to prevent wastage of electricity.
2. The device can be used anywhere as its portable. Can be used in places where electricity is scare.

X.LIMITATIONS :

1. Monthly maintenance is mandatory.
2. The air is not 100% purified.

XI.CONCLUSIONS :

1. The air is 70% purified.
2. The device is eco friendly and it does not emit any harmful gases.
3. Most of the harmful gases and dust particles are removed.



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