Effectiveness of Reducing Home VOC Measurements using One Inch Carbon Furnace Filters

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Introduction

- Exposure to high levels of carcinogens may lead to kidney, liver, or central nervous system damage
- Volatile Organic Compounds (VOC's) such as Acrolein, Carbon Tetrachloride, Benzene, and Chloroform are carcinogenic at high levels.
  - ❖Benzene is in paints and industrial solvents
  - ❖Acrolein is in gasoline and cooking oils.
  - ❖Chloroform is in tap water, swimming pools, and drinking water.
  - ❖Carbon Tetrachloride is in aerosol propellants, dry cleaning, varnish, lacquer, plastic glue, plastic bonders

Hypothesis

The activated carbon furnace filters will reduce the postliminary VOC levels.

Objective

This study used one inch carbon furnace filters to determine if the there is a difference between baseline and postliminary carcinogenic VOC readings in homes of older adults with asthma.

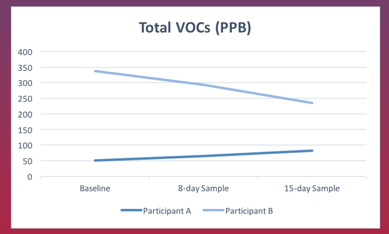
Preliminary Data

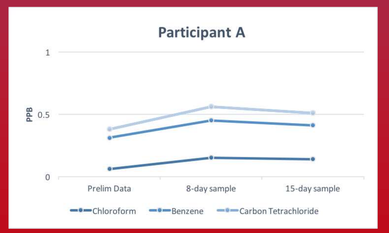
In an ongoing study examining the homes of older adults with asthma for asthma triggers, eighty-five VOC's including Carbon Tetrachloride, Benzene, Chloroform, and Acrolein were measured over 24 hours.

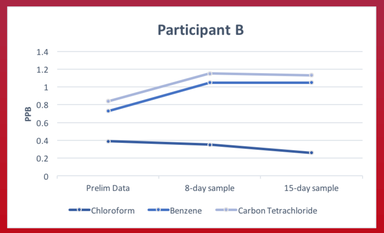
Methods

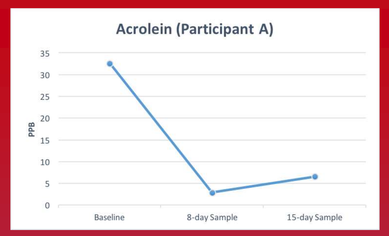
- A case study approach was used with 2 participants in the asthma study volunteered their home for VOC data collection using 1" carbon furnace filters.
- A One Inch Filtrete Allergen Plus Odor Reduction Air and Furnace Filter that contains activated carbon was carefully placed in the furnace of each home.
  - ❖ Activated carbon removes impurities in the air from unwanted chemicals, including VOCs
- Grab samples were obtained at 8-day and 15-day period using the Summa Canisters (See picture).
- VOC samples were analyzed by gas chromatography/mass spectrometry in full scan mode according to US EPA method TO-15, using a quadrapole GC (HP 6890) with a HP 5973 Mass Selective Detector.
- Data were graphically depicted to determine changes in ppb of total VOCs, Acrolein, Carbon Tetrachloride, Benzene, and Chloroform from baseline to postliminary data.

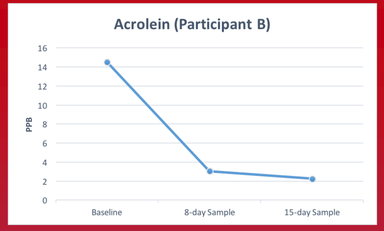
Results











Conclusions

- The hypothesis was supported only by findings from the home of Participant A for Total VOC ppb, Chloroform ppb from the home of Participant B, and Acrolein from the home of both participants.
- Findings from these two case studies do not support the use of 1" carbon filters to consistently reduce carcinogenic VOCs.
- Future studies should investigate the use of 4" carbon filters and carbon air filtration systems in reducing VOCs in homes.
- Future studies should increase the number of participants and extend the evaluation time to at least 1 month.

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