CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

J2002

Project Title

Particulate Matter Emission from Air Fresheners: A Quantitative Study

Abstract

Objectives/Goals

Indoor pollution may be ten times higher than outdoor pollution and air fresheners may be contributing to particulate matter pollution. Air fresheners are omnipresent in many households. They come in two broad categories: instant action and continuous action. Instant action air fresheners include atomizers, spray bottles and aerosols. Continuous action air fresheners include plug-ins, scented candles and fragrance gels. I focused on aerosol air fresheners, scented candles and plug-in oils. The goal of this study was to link increased indoor air pollution to the use of air fresheners and to quantify the amount of particulate matter introduced by each type of air freshener.

Methods/Materials

I purchased nine different air fresheners. I researched their Material Safety Data Sheets and their list of ingredients. The instrument used to detect the particles was a Particle Counter, which I borrowed. This instrument uses the principle of light scattering to count and discriminate particles by their size. Fine particles are smaller than 2.5 micrometers (PM2.5) while coarse particles are between 2.5 and 10 micrometers (PM10-2.5). Control experiments were conducted to determine the amount of PM naturally present in the room before each trial. Each experiment was repeated multiple times, for a total of 27 trials and 54 tests.

Results

The instant action aerosols emitted the highest levels of particulates with Glade being the highest emitter of offending particulates. The candles were the second highest emitters. Even though low numbers of particles were emitted during the burning cycle, extinguishing the flame by blowing the candle out generated very high levels of elemental carbon and particulate matter. Plug-in air fresheners emitted the fewest numbers of particles due to their mechanism for releasing fragrance.

Conclusions/Discussion

Candles and plug-ins are designed to run for extended periods of time, and deliver a subtle, yet noticeable, fragrance in the room. Air freshener aerosols are meant to provide high levels of fragrance in the room instantly to eliminate foul odors. Air pollutants have been ranked in the top five environmental risks to public health. According to my results using any type of synthetic air fresheners significantly increases the level of indoor particulates.

Summary Statement

I tested and compared the numbers of fine and coarse particles emitted by a variety of commonly used household air freshenhers.

Help Received

I borrowed the particulate counter from the University of San Diego.