



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Quentin C. Bertrand	Project Number J1103
Project Title Quantitative Determination of Particulate Matter Emissions from Air Freshener Aerosols	
Abstract Objectives/Goals Indoor pollution can be ten times more severe than outdoor pollution and aerosols may be an important part of particulate matter pollution. Air freshener aerosols are omnipresent in most households. The purpose of this project was to link increased indoor air pollution to the extensive use of air freshener aerosols and to quantify the amount of particulate matter induced by air freshener sprays. Methods/Materials I purchased six different air freshener sprays. To determine their chemical composition I researched their Material Safety Data Sheet 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 the 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 experiment were conducted to determine the amount of PM naturally present in the room. Each aerosol was sprayed for a calculated number of seconds and the data were recorded. Each experiment was repeated three times, for a total of 18 trials and 36 tests. Results All samples increased the level of PM2.5 and PM10-2.5 by at least a factor of two and up to 32 times the original (control) particulate levels. The level of fine particles was always higher than coarse particles. Four of the six sprays emitted so many particles that the instrument was saturated and was not able to record the data peaks. Clorox 4-in-One and Febreze were the lowest particulate emitters tested. Conclusions/Discussion All of the sprays emitted particulates at levels that saturated the instrument except Febreze. Glade had the highest recorded fine particulate peak levels at 9,164 particles per second compared to the control peak levels at 350 fine particles per second. These results confirmed that air freshener sprays used in a confined environment contribute significantly to particulate matter pollution. For high particulate matter emitting aerosols, the sensor was quickly saturated. A second generation of particle counter is actually in development, which may have a wider range of detection.	
Summary Statement The purpose of this project was to link increased indoor air pollution to the use of air freshener aerosols.	
Help Received I borrowed the particle counter from the University of California San Diego	