

## The VOC Dilemma Involving Fragranced Consumer Products

Consumers have some control regarding the variety of volatile organic compounds (VOCs) that exist in their indoor air environment. They can peruse labels to determine product ingredient content and use the Household Product Database (<http://householdproducts.nlm.nih.gov/>) to determine this information for products that are in the database. However, they face a dilemma when determining the VOCs emitted from fragranced consumer products. The dilemma involves the fact that U.S. and Canadian regulations do not require the disclosure of all ingredients in a consumer product or of any ingredients in a mixture called "fragrance". The European Union has taken a step towards protection of consumers by mandating that 26 fragrance chemicals that cause "contact" allergic reactions must be identified on the label of consumer products ([http://ec.europa.eu/health/scientific\\_committees/opinions\\_layman/perfume-allergies/en/citizens-summary-allergens.pdf](http://ec.europa.eu/health/scientific_committees/opinions_layman/perfume-allergies/en/citizens-summary-allergens.pdf)), but there don't appear to be any regulations regarding labeling of VOCs from fragrances.

Fragranced consumer products include laundry and personal care products, cleaning supplies, and air fresheners as well as many others. Steinemann, et.al. (Environmental Impact Assessment Review **29** (2009), 32-38 and Environmental Impact Assessment Review **31** (2011), 328-333) reported studies involving the determination of VOCs from various products, which included "green" products, in the fragranced consumer products category. The studies were performed using head space analysis combined with gas chromatography/mass spectrometry (GC/MS).

In the 2009 study, which comprised three air fresheners and three laundry products, nearly 100 VOCs were determined, but were not found on the product labels. Ten of the VOCs were regulated as toxic or hazardous under Federal laws and three (acetaldehyde, chloromethane, and 1,4-dioxane) were classified as hazardous air pollutants. Only VOCs greater than 300  $\mu\text{g}/\text{m}^3$  (i.e., 300 ng/L) were reported. Similar results were found in the much broader 2011 study, which comprised 25 fragranced consumer products and reported all VOCs above 100  $\mu\text{g}/\text{m}^3$ . The VOC emissions from "green" products were not considerably different from emissions from the other products. The most frequently reported VOCs from all samples studied included limonene, alpha-pinene, beta-pinene, ethanol, 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde, benzyl acetate, acetone, and cymene isomers.

The Steinemann studies highlight the confusion consumers face in understanding the VOCs present in their indoor air environment, despite perhaps their best efforts to control this environment. In conclusion, the studies show a wide variety of fragranced products, even those labeled as "green", contain high levels of VOCs. Therefore, the best way for consumers to control their level of VOCs is to prudently limit their usage of fragranced products.

### About Prism Analytical Technologies, Inc.

Prism Analytical Technologies, Inc. is a leading consultative air testing laboratory in the United States that is devoted to the chemical identification and analysis of contaminants in the air. We are a recognized leader in the development and deployment of ambient air testing methodologies for Fortune 100 and 500 companies, industrial hygienists, and environmental consultants. Prism's science-based technologies and wide range of air testing support help clients solve indoor air quality, process control, industrial, and environmental challenges.