

More than 5,000 tons of toxic chemicals released from consumer products every year inside Californian homes, workplaces

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People often assume that the products they use every day are safe. Now a new study by Silent Spring Institute and the University of California, Berkeley, exposes how much people come into contact with toxic ingredients in products, used at home and at work, that could harm their health. Findings from the analysis could help state and federal agencies strengthen chemical regulations and guide manufacturers in making safer products.

Many common [products](#) like shampoos, body lotions, cleaners, mothballs, and paint removers contain toxic volatile organic compounds or VOCs—chemicals that escape as gases, accumulate in indoor air, and cause a variety of health problems including cancer. Because companies, for the most part, are not required to disclose what it's in their products or how much, it's difficult to know what people might be exposed to and the potential health effects.

"This study is the first to reveal the extent to which toxic VOCs are used in everyday products of all types that could lead to serious health problems," says lead author Kristin Knox, a scientist at Silent Spring Institute. "Making this information public could incentivize manufacturers to reformulate their products and use safer ingredients."

For the analysis, Knox and her colleagues turned to an unlikely source of data: The California Air Resources Board (CARB). For more than 30 years, CARB has been tracking VOCs in consumer products in an effort to reduce smog. In the presence of sunlight, VOCs react with other air pollutants to form ozone, the main ingredient in smog.

Under its Consumer Product Regulatory program, CARB periodically surveys companies that sell products in California, collecting information on a wide range of items—everything from hair spray to windshield wiper fluid. The data include information on the concentration of VOCs used in various types of products and how much of each product type is sold in the state. CARB does not share data on specific products.

Reporting in the journal *Environmental Science & Technology*, the researchers analyzed the most recent CARB data, focusing on 33 VOCs listed under California's right-to-know law, Prop 65, because they cause cancer, birth defects, or other reproductive harm. The law requires companies that sell products in California to warn users if their products could expose them to significant amounts of these harmful chemicals.

The team's analysis found more than 100 types of products contain Prop 65 VOCs. Of those, the researchers identified 30, including a dozen different types of personal care products, that deserve special scrutiny because they frequently contain harmful chemicals and may pose the greatest health risk. (Since CARB only reports on VOCs, many other toxic chemicals listed under Prop 65, such as lead, were not included in the analysis.)

Products used on the job are especially concerning, the authors note, because workers often use many different types of products, each of which likely contains at least one hazardous chemical. For instance, nail and hair salon workers use nail polishes and polish removers, artificial nail adhesives, hair straighteners, and other cosmetics. According to the analysis, these types of products combined contain as many as 9 different Prop 65 VOCs. Janitors might use a combination of general cleaners, degreasers, detergents, and other maintenance products, which could expose them to more than 20 Prop 65 VOCs.

"The same thing goes for auto and construction workers. All these exposures add up and might cause serious harm," says co-author Meg Schwarzman, a physician and environmental health scientist at the UC Berkeley School of Public Health who led the study. "At the most basic level, workers deserve to know what they're exposed to. But, ultimately, they deserve safer products and this study should compel manufacturers to make significant changes to protect workers' health."

Of the 33 VOCs listed under Prop 65, the researchers identified the top 11 chemicals that manufacturers should eliminate from products because of the chemicals' high toxicity and widespread use. Other findings include:

- Among products used on the body, formaldehyde was the most common Prop 65 VOC, and was found in nail polish, shampoo, makeup, and other types personal care items.
- For products used in the home, general purpose cleaners, art supplies, and laundry detergents contained the most Prop 65 VOCs.
- Adhesives contained more than a dozen different Prop 65 VOCs, highlighting that workers can be exposed to many toxic chemicals from using just one type of product.

Finally, the team used the CARB data to calculate the total amount of Prop 65 VOCs emitted from [consumer products](#) indoors, and found more than 5,000 tons of volatile Prop 65 chemicals were released from products in the state of California in 2020. Nearly 300 tons of that came from mothballs (1,4-dichlorobenzene) alone.

"Although Prop 65 has reduced the public's exposure to [toxic chemicals](#) both through litigation and by incentivizing companies to reformulate their products, people continue to be exposed to many unsafe chemicals," says co-author Claudia Polsky, Director of the

Environmental Law Clinic at UC Berkeley School of Law. "This study shows how much work remains for product manufacturers and regulators nationwide, because the products in CARB's database are sold throughout the U.S."

The new study offers solutions by highlighting the types of products manufacturers should reformulate to replace toxic VOCs with safer ingredients. The authors also suggest, based on their findings, that the U.S. Environmental Protection Agency consider regulating five additional chemicals under the Toxic Substances Control Act (TSCA). These chemicals include ethylene oxide, styrene, 1,3-dichloropropene, diethanolamine, and cumene.

For more tips on how to limit everyday exposures to harmful VOCs and other chemicals of concern, download Silent Spring's [Detox Me app](#).

More information: Identifying toxic consumer products: Novel data set reveals air emissions of potent carcinogens, reproductive toxicants, and developmental toxicants, *Environmental Science & Technology* (2023). [DOI: 10.1021/acs.est.2c07247](https://doi.org/10.1021/acs.est.2c07247)

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