

Executive Summary

New laboratory tests reveal the familiar “new shower curtain smell” may be toxic to our health. Polyvinyl chloride (PVC) plastic shower curtains purchased at Bed Bath & Beyond, Kmart, Sears, Target, and Wal-Mart all contain avoidable toxic chemicals including volatile organic compounds (VOCs), phthalates, organotins and metals. Some of these chemicals are volatile, so they are released into the air inside our homes. This new study reveals that PVC shower curtains can release as many as 108 volatile organic chemicals. Some of these chemicals cause developmental damage as well as damage to the liver and central nervous, respiratory, and reproductive systems. In addition, some chemicals were found in the air 28 days after a PVC shower curtain was unwrapped and hung. This investigation shows that PVC shower curtains are significant contributors to indoor air pollution.

Volatile Vinyl—The New Shower Curtain’s Chemical Smell summarizes the results of a two-part laboratory study of the toxic chemicals contained in and released from PVC shower curtains. The first part of this study measured the concentration of chlorine, phthalates, organotins and metals in five PVC shower curtains and VOCs in one curtain purchased at popular retailers. The second part measured the concentrations of VOCs evaporating from a shower curtain in a test chamber over a 28-day period.

Key Findings

PVC Shower Curtains Release Over 100 Chemicals into the Air.

- 108 different volatile organic compounds were released from the shower curtain into the air over the course of the study.
- Toluene, cyclohexanone, methyl isobutyl ketone (MIBK), phenol, and ethylbenzene were detected in the greatest concentrations during the 28-day period. The USEPA also

found all of these substances except cyclohexanone in a study of chemicals off-gassing from PVC shower curtains.

- Forty different VOCs were detected in the chamber after 7 days; 16 VOCs were detected after 14 days; 11 after 21 days; and 4 after 28 days.
- The level of Total VOCs measured was over 16 times greater than the recommended guidelines for indoor air quality established by the U.S. Green Building Council and Washington State Indoor Air Quality Program.
- Seven of the chemicals released by the shower curtain are classified as hazardous air pollutants by the United States Environmental Protection Agency (EPA) under the Clean Air Act.
- Two of the chemicals detected, toluene and ethylbenzene, are on California’s Proposition 65 list. This law prohibits companies doing business in California from exposing individuals to chemicals known to cause cancer or reproductive toxicity without first giving clear and reasonable warning, and from discharging such chemicals into drinking water.
- VOCs can cause eye, nose, and throat irritation; headaches, loss of coordination; nausea; and damage to the liver, kidney, and the central nervous system. Some VOCs can cause cancer in animals; some are suspected or known to cause cancer in humans.

PVC Shower Curtains Contain High Levels of Phthalates.

- All five curtains tested contained the phthalates di(2-ethyl hexyl) phthalate (DEHP) and diisononyl phthalate (DINP).
- DEHP was the principal phthalate in three



of the shower curtains: 25% by weight in the Wal-Mart curtain, 24% in the Bed Bath & Beyond curtain, and 16% in the Target curtain.

- DINP was the principal phthalate in two other curtains: 39% by weight in the Sears curtain and 38% in the Kmart curtain. The Sears curtain also contained a considerable concentration of DEHP (4.8%).

“It is typical for most shower curtains to have a “weird plastic smell” but not like this!! The smell of this curtain was honestly UNDESCRIBABLE! Imagine strong paint, mixed with formaldehyde, bleach, and other pungent chemicals! I still decided to hang it up, but decided to take it down after EVERYONE in the house got nauseous.”*

- Some phthalates have been linked to reproductive problems including shorter pregnancy duration and premature breast development in girls and sperm damage and impaired reproductive development in males.
- Since phthalates are not chemically bound to the shower curtain, they can easily migrate from within the curtain to its surface. They may slowly evaporate into the surrounding air and eventually cling to household dust.

PVC Shower Curtains Contain High Levels of Volatile Organic Compounds.

- Twenty-seven VOCs were detected in the Wal-Mart shower curtain at varying levels. Toluene, 2-butanone, and methyl isobutyl ketone (MIBK) were found at the highest

concentrations. Other VOCs were found at significant, but lower, levels including ethylbenzene, m/p-xylene, and o-xylene.

- The concentration of Total VOCs in the Wal-Mart shower curtain was estimated at 20,000 parts per billion (ppb). This concentration was so high that the analytical equipment was saturated, halting further chemical analysis.

PVC Shower Curtains Contain Organotins.

- The organotins dibutyl tin and monobutyl tin were found in 3 of 5 or 60% of the shower curtains tested (the Wal-Mart, Kmart, and Target curtains).
- Some organotins affect the central nervous system, skin, liver, immune system and reproductive system.
- Since the organotins are not chemically bound to the shower curtain, they can easily migrate from within the curtain to its surface. From there, some organotins are likely to evaporate into the air, but this matter needs to be further explored.

PVC Shower Curtains Contain Lead, Cadmium and Other Metals.

Each of the five shower curtains tested contained one or more of these metals: Lead, cadmium, mercury and chromium.

Heat and Humidity Can Increase the Release of Chemicals from Shower Curtains.

- This testing did not replicate temperature and humidity conditions typically found in a shower which would likely increase the concentrations of volatile pollutants released from a PVC curtain into the air of a bathroom.
- Therefore, the concentrations of these chemicals are likely to be greater during and after a shower than those reported here.

* This quote is excerpted from Target customer complaints, posted on Target.com, about odors from PVC shower curtains. Other quotes from the website are interspersed throughout the report. In response, Target has offered more PVC-free shower curtains.

Leading Retailers are Phasing out PVC Shower Curtains.

- CHEJ contacted leading retailers around the world to determine whether or not companies have developed plans to phase out PVC shower curtains.
- Bed Bath & Beyond, IKEA, JC Penney, Macys, Marks and Spencer, Sears Holdings (Sears and Kmart) and Target have all developed plans to offer more PVC-free shower curtains, but not all of these retailers have set 100% PVC-free phase-out plans and goals.
- So far, the retailers that have set these more ambitious goals are IKEA and Marks and Spencer.

No Federal Standards Exist to Prevent Indoor Air Pollution due to Toxic Chemical Releases from Products.

- This investigation highlights the fact that no federal agency has the legal authority to regulate consumer products that release toxic chemicals such as VOCs into the air inside our homes.
- Neither the U.S. Environmental Protection Agency (USEPA), which regulates the ambient air, nor the Consumer Product Safety Commission, which regulates chemicals in consumer products, can do this.
- Congress needs to step in and reform America's outdated chemical policies.

Corporate and Government Policy Recommendations.

Based on the results of this study, it is critical for companies and government to implement an immediate phase-out of PVC in all shower curtains. We recommend the following actions to prevent harm and halt toxic air pollution in people's homes.

1. Manufacturers and retailers should implement the following actions.

- Phase out PVC shower curtains and switch to safer products such as organic cotton shower curtains.

- Label the material content of shower curtains so that consumers can easily identify safer products. Shower curtains without PVC should be labeled "PVC-free." By requiring all PVC products to be labeled, consumers can readily identify where PVC is used in the home.
- Label PVC shower curtains with warnings of the chemicals present in the new shower curtain smell.

2. Governments at all levels should implement the following actions.

- Act quickly to adopt policies to protect consumers and ban the use of PVC in shower curtains.



- Adopt PVC-free procurement policies to help build markets for safer products.
- Require warning labels on PVC shower curtains. Warnings should alert consumers to the fact that over 100 chemicals can be released during use in the home. Labeling would also encourage product manufacturers to switch to safer products to avoid labeling requirements.

“I hung this shower curtain and the smell was so overwhelming it gave me a headache. I gave it a chance but ended up getting up at 2 in the morning to take it down, it was that bad. It smelled up my entire house. I had to return it and purchased the fabric one online.”

- Require that PVC shower curtains and other PVC products be collected and diverted from burn barrels and incinerators to reduce the formation of dioxins and furans; PVC should be treated as a hazardous material. As an interim measure, PVC could be disposed of in “secure” triple-lined hazardous waste landfills.
- Conduct a public campaign to educate consumers about the risks posed by PVC products such as shower curtains in the home.

3. The Consumer Product Safety Commission should recall PVC shower curtains on the market and require manufacturers to switch to safer products.

4. Federal policymakers should reform America’s outdated chemical policies that are failing to protect families from toxic chemicals already on the market that are released in our homes. The federal law regulating industrial chemicals, the Toxic Substances Control Act

(TSCA), is 30 years old, outdated, and simply does not work to protect people and the environment. PVC in shower curtains is one of many examples of the need to reform federal law to protect consumers. TSCA must be amended to:

- Require complete and credible health and safety data on chemicals and make this data publicly available;
- Require companies that legally manufacture or import chemicals into the U.S. to provide minimum toxicity data;
- Require product manufacturers to test for and publicly disclose the chemical contents of their products;
- Prohibit the use of dangerous chemicals such as carcinogens, mutagens, reproductive toxicants, and persistent bioaccumulative toxic (PBT) chemicals in products, especially those found in the home and targeted at infants and children, or that accumulate in our bodies;
- Create health-based standards for VOCs and other chemicals in the air in consumers’ homes;
- Provide consumers with information to make safer purchases by requiring the disclosure of chemical information and warning labels; and
- Provide information, funding, research, and technical resources in “green chemistry” to businesses so they can make products such as shower curtains safe for consumers with incentives to invest in green economic development to spur innovation in safer products.

5. Recommendations for Consumers.

- Avoid shower curtains made with PVC, as well as other PVC products, especially those that are flexible. These products are not always labeled although some may be labeled as “vinyl” or “PVC.” Do not buy shower curtains that are not labeled.
- Purchase PVC-free shower curtains made out of safer materials including organic cotton.