CONTAINER VENTING CAPS

Container over-pressurization incidents continue to occur in University laboratories. Examples include:

- In 2004, a plastic bottle containing Piranha etch waste (sulfuric acid and hydrogen peroxide) burst in an Engineering fume hood at SFU. The cause was generation of oxygen gas that over- pressurized the capped container. Result: Chemicals were dispersed throughout lab. Luckily, nobody was in the lab during the "explosion."
- In 2012 at UVic, a researcher was working with a nitric acid bath to clean equipment and disposed of 500mL of nitric acid (unknown concentration) into a 20L Aqueous Acidic waste container. Approximately 4-5L of acidic waste was already in the container. About 15-20 minutes later a loud explosion occurred in the chemical storage area and the container was found lodged in the ceiling. Result: The researcher was injured and an environmental remediation contractor needed to be hired to decontaminate the facility.
- In 2007, a graduate student prepared an etchant solution containing nitric acid and ethanol at SFU. The tightly capped glass bottle was placed in a fume hood. A few minutes later it exploded. Cause: Nitrogen dioxide gas over-pressurized the bottle. Result: A researcher was injured and lab surfaces were contaminated with acid residue. The fume hood sash was also damaged (see picture).

Container Venting Caps may have prevented these incidents

A vented cap liner has been developed (Circumvent ®) to relieve pressure in containers while maintaining integrity against liquid leaks/spills. The liner membrane has a unique micro-porous structure that prevents liquids from passing through, yet safely allows free passage of gas. The liner vents pressure through the screw threads - **no hole is necessary in the cap.** The liner is resistant to a wide range of chemicals including acids, bases, solvents, oils, and pesticides.

OHSE purchased a supply of these caps for distribution to departments. Caps are available in one size and will fit many bottles, including most 4L, 2.5L, and wide-mouth 0.5 L containers.

Users must initially test-fit the cap to verify screw thread compatibility. Using an empty and rinsed container, add several ounces of water, attach/tighten the cap, and invert while checking for leakage. If no water leaks from the container, the cap is acceptable. Before using the container for waste, please empty the water, deface the label, and attach a neon green hazardous waste sticker when the first waste is added.

Demo:
http://www.psix.com/cv_products_circumvent.htm

NOTE: The cap is designed to vent slowly and WILL NOT release pressure from an instantaneous reaction. USE PRUDENT PRACTICES AND GOOD JUDGEMENT! If you are pouring acid waste always wear proper personal protective equipment and work in a fume hood. If you expect an immediate reaction, let the materials react and vent before affixing and tightening the cap

Contact the OHSE Department at 721-8971 or ohs@uvic.ca for questions/comments.