UC Irvine
Environmental Health & Safety

Lessons Learned

Sonicator Bath Exposure to Solvent Fumes

March 2026

What Happened?

On March 31st, 2026, a graduate student in a chemistry laboratory on campus used their lab's sonicator bath, located on an open bench in a side room of the main lab space. This sonicator bath is designed to hold water only. The graduate student turned on the sonicator to warm up the bath and soon noticed a strong chemical smell. After several minutes, they determined that the smell came from the sonicator, inadvertently inhaling excessive fumes upon close-up discovery. Other lab members came into the room to alert the graduate student that the main lab smelled like acetone. By this time, the graduate student started to feel dizzy, nauseous, and teary-eyed. They realized that someone put acetone into the sonicator bath. The students turned off the sonicator and aired out the lab, which included opening doors that lead to clean office areas, and stayed out of the area until the fumes had dissipated. This was done despite the presence of a ventilation purge system that can be activated from within the lab space.

The lab has unwritten procedures regarding the shared use of their equipment. The lab designates and documents students responsible for each piece of equipment based on expertise. If someone on campus asks the lab to use their equipment, the requester is connected to the appropriate lab member. The designated lab member uses their judgement to determine if they are willing to share the equipment and proceeds to train the requester if appropriate. This training is not documented. In the case of this incident, the student who added the acetone was not part of the exposed student's lab and did not follow this process.

Direct Cause:
Acetone was improperly added directly into a water-only sonicator bath, resulting in the release of acetone vapor when the sonicator was operated.

Root Cause:
The exposed student's lab has established, but undocumented, procedures for sharing their lab equipment and conducting training. These procedures were not clearly communicated to, or followed by, the individual from a neighboring lab who added acetone to the sonicator, and thus they were not trained in the use of the equipment.

Contributing Factors:

- Lab personnel can freely move between other labs on the same floor of the building, which allowed for equipment use by others without the owner's knowledge or permission.
- New students observed more experienced students working with the other lab's equipment in the past.
- Sonicator was not located in a fume hood.
- Sonicator was not inspected prior to operation, though the exposed student was aware that it had been previously used by a student in another lab.
- Equipment sharing and training process was not clearly posted or consistently shared with neighboring labs.
- Student who put acetone in the sonicator did not leave any signage or information to indicate that the equipment had been used.
- Failure to use ventilation purge system allowed for acetone vapors to remain in the space for longer than necessary, escape the lab into office areas, and potentially expose other lab personnel.

Steps to Prevent Reoccurrence:

- Ensure that all personnel who use lab equipment are appropriately trained in its use. This training should be documented.
- Ensure that the equipment sharing process is documented as a standard operating procedure. Include training requirements.
- Consider storing shared chemical equipment with the potential for misuse in a fume hood or under local exhaust ventilation to prevent negative consequences of accidental misuse.
- Ensure that the equipment sharing process is clearly communicated with neighboring PIs and lab personnel, which may include signage, a written procedure, and reoccurring education to account for personnel turnover.
- Post signage near shared equipment that indicates unauthorized use is prohibited.
- Post the documented process for access and training near shared equipment and include who to contact.
- Inspect all lab equipment, especially those that inherently involve hazardous chemicals, before use.
- Use designated ventilation purge systems in the event of a hazardous vapor release into the lab.
- Ensure that doors connecting hazardous areas with office/non-hazardous areas remain closed.
- Implement a usage log to ensure that anyone who uses shared equipment documents who they are and when they used it.
- Sonicators that are designed only for water must never be filled directly with a solvent or other hazardous material. This process must instead be performed using an appropriate sealed container immersed in the water.
- Post a sign by the sonicator that states the sonicator must only be filled with water; no solvents or other hazardous chemicals are to be used in the bath.
- Develop or acquire a standard operating procedure for working with sonicators and other shared equipment and ensure it is available near the work area.
- All labs should ensure that lab personnel are trained to be responsible for the work that they do, which includes ensuring that lab processes and procedures are followed and that equipment is used properly.