



The University of Akron  
OHIO'S POLYTECHNIC UNIVERSITY  
College of Polymer Science  
and Polymer Engineering

Office of Operations - Safety Office

# LESSONS LEARNED

## June 2017 – Tin 4 Chloride Spill

### What happened?

A 3<sup>rd</sup> year graduate researcher opened an aluminum chemical package containing Tin (IV) tetrachloride ( $\text{SnCl}_4$ ) on the lab bench. When the researcher pulled the bottle out of the container the bottle accidentally hit the bench counter causing the bottle to crack. The Tin (IV) Chloride immediately began to react with the air creating a small vapor cloud of Hydrogen Chloride (HCl) gas. The student recognized the problem taking the bottle directly to the hood and placing it in a beaker of  $\text{H}_2\text{O}$ . The compound violently reacted with the water to form a larger amount HCl gas expanding into the 2<sup>nd</sup> floor hallway of Olson. The 2<sup>nd</sup> floor was evacuated, and then EOHS pulled the fire alarm to evacuate the entire building. The fire department responded with HAZMAT (hazardous materials trained firefighters) and upon discussion with the researcher the fire department opted to enter the building on full breathing apparatus, test the atmosphere for the density of the gas in the building, and shut the sash to let the gas ventilate through the emergency exhaust on the hood. Once the air in the building was determined to be safe after 2 hours, Olson was reopened.



### What was the cause?

Researcher accidentally bumped the bottle of Tin (IV) chloride against the edge of the bench top as they went to put it into the flammable cabinet. Researcher put the bottle in a beaker of  $\text{H}_2\text{O}$  increasing the reaction.

### What went right?

- Researcher was wearing safety glasses, lab coat and gloves.
- Researcher knew the hazards of the Tin (IV) Chloride prior to working with it and knew it reacted with air.
- EOHS/Safety and PI were contacted.
- Student worked responsibly and professionally with EOHS, Safety and fire department.
- Lab specific safety training was conducted prior to working in the lab.

### What went wrong?

- Researcher contacted a CPSPE lab manager instead of contacting 330-297-2911. This delayed safety response.
- Researcher tried to dilute the chemical reaction by putting it into a beaker of water which expanded the problem.
- Fire alarm was pulled and students and staff remained in the building.

### What corrective action was taken?

- Researcher was found to have made a mistake with his actions to resolve the problem. However, did contact someone to get help and assisted in the response efforts very professionally.
- **Student was not disciplined for this accident because Safety was alerted.**

How can incidents like this be prevented? (In this case the researcher did all of these things but accidents will still happen. It is minimizing the risks prior to an event that is important).

- **Never work alone.**
- **Always take increased care when taking chemicals out of the package. Chemicals can be shipped damaged.**
- **If gas is visible from a reaction with air, put the bottle down, or in the hood and push the emergency ventilation button as you immediately exit the lab.**
- **Storing the chemical in the refrigerator since the chemical is less reactive at a lower temperature.**
- **Purchasing smaller volume container of the chemical.**

### Resources:

Dr. Michael DeBord – University of Akron, Environmental Health and Occupational Safety

