

What Happened?

A researcher was working with Sodium hexafluorophosphate (NaPF_6) and had placed a capped vial containing the sample in a Buchi oven for heating (transferred in a glove box). The researcher later realized that the cap should have been removed before heating the oven. In an attempt to rectify the situation, the researcher opened the Buchi to air, and moved it with the still-hot vial to a fume hood, which immediately produced a white vapor. The rapid cooling of the compound may have caused the generation of this vapor. We believe the exposure to moisture produced HF (hydrofluoric acid) fumes. There is evidence of this in the etching of the glass vial.

Both NaPF_6 and its decomposition products, such as sodium fluoride and phosphorus pentafluoride are highly toxic ingestion, inhalation, or skin contact with these substances can cause serious health issues. HF is highly toxic as well. There is no likelihood of F_2 being formed under these conditions.

As a precaution, the researcher applied calcium gluconate cream, which is typically used for hydrofluoric acid exposures. Due to the use of this cream, the researcher was advised to contact EH&S and seek medical observation.

Lessons Learned: Factors Contributing to the Issue:

- 1. Insufficient Chemical Knowledge:** There was a lack of understanding regarding the chemical properties of the reagents being used, particularly the air and moisture sensitivity of NaPF_6 .
- 2. Working Outside Regular Hours on a new procedure:** Operations were conducted past 5 PM, leading to limited available assistance and support. Further, this was the first time that the researcher attempted this procedure.
- 3. The researcher was trained but was not using a checklist.**
- 4. Lack of Understanding of Emergency Procedures:** The researcher did not understand emergency shutdown procedures provided during training. No SOPs were available to reinforce verbal training.

These factors highlight the importance of clear and comprehensive training, adherence to working hours, thorough knowledge of chemical reagents to prevent similar issues in the future, and the use of a checklist when there are multiple steps in prescribed process.