

Lessons Learned

Shattered Glass Flask

April 2024

What Happened?

On April 1, 2024, a graduate research student in a campus laboratory planned to dry a side product in a synthesis procedure. He wore a flame-resistant (FR) lab coat, safety glasses and nitrile gloves. No other researcher was present in the lab space at that time. The solution containing the side product was in a 100 mL round bottom flask, and at first, most of the solvent was removed using a rotary evaporator, in short “rotavap”. The water bath was at about 40° C. While the rotavap was running, the researcher noticed that the flask seemed “warped” while spinning, but he did not take any action. As part of the next step in the procedure, the researcher needed to connect the round bottom flask to the high-vacuum system and install a glass adapter on the flask. The glass adapter has a small rubber O-ring to seal the connection between the flask and the system. While he was pushing and turning the adapter into the flask head to seal the connection, the flask shattered in the palm of his hand, where the bottom of the flask was resting.

He noticed blood on both of his gloves immediately, removed them, and proceeded to the sink in the lab to wash the blood off his hands. He squeezed paper towels in his hands to dry them and stop the bleeding. The researcher called his partner, who then drove him to the ER. The resulting injury was lacerations in his hands in three different places.

Direct Cause:

The glass flask used in the procedure shattered from the force used to install a glass adapter.

Root Cause of the Incident:

The researcher did not react to his observation of damaged glassware or check for cracks / other defects in the flask. He did not stop the rotavap and utilize another undamaged flask for the procedure.

Primary factors that contributed to the incident:

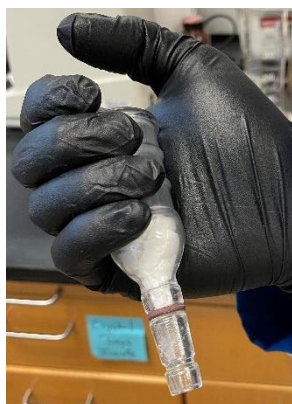
Fatigue can play a major role in incidents that occur late in the evening and after a long day of working in the laboratory. The individual involved in this incident was most likely rushing to finish the process and end the workday and it may have contributed to not following the SOP and checking for any broken equipment or glassware and neglecting standard laboratory techniques. Additionally, the shock of the injury and the fact that no other person was in the laboratory to assist, caused the researcher to not follow the proper emergency response.

What steps can be taken to prevent this type of incident from occurring again:

- Do not work alone in the lab. If you must work alone, inform others of your activities and plan for potential emergencies.
- Do not put flasks in the palm of your hand when applying pressure on it. Hold the flask at the neck or close your hand around it instead (please reference the pictures below).
- Check glassware for physical weaknesses (“stars”) that could be damaged by exposure to very high or very low pressure before use.
- Do not use glassware that appears warped, wobbly, or compromised in any way.
- Call 911 from any phone for emergency medical assistance.

Please refer to the following photos illustrating the recommendation on how to handle laboratory glassware properly:

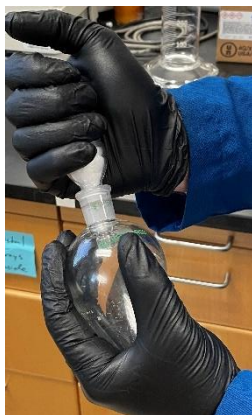
Glass adapter:



Best practice to properly hold a glass flask when attaching an adapter:

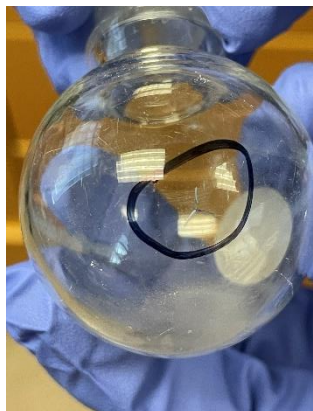


instead of...



“Starred” glassware:

It is sometimes not easy to recognize a small crack (“star”) in glassware. Note the circled areas on the photos below:



Warped or wobbly glassware:



Where to Get Help or More Information:

For more information or assistance, please contact EHS at (949) 824-6200 or at safety@uci.edu