Flask Implosion

Monday, November 21, 2016

Situation

An undergraduate researcher under the supervision of an experienced graduate student was attempting to freeze-pump-thaw a recently distilled solvent to remove residual oxygen from the system. The undergrad had completed the cycle once and, upon freezing the second time in liquid nitrogen and pulling vacuum on the frozen solid, the flask imploded. This also broke the dewar holding liquid nitrogen and caused glass particulates to shower the undergrad researcher. Most of these were blocked by the fume hood sash and the researcher's PPE, but a few particulates landed on the researcher's forearm, none of which caused physical harm.

Suggestions

The implosion in question was likely caused by a micro-crack in the flask, which could have expanded due to repeated heating and cooling. To prevent this incident in the future, researchers should carefully inspect all glassware prior to use and should be wary of rapid heating/cooling.

Additionally, any vacuum work should be done within a fume hood or with a protective barrier in place to prevent physical harm. Researchers should be reminded that PPE such as lab coats and lab glasses serve not only to protect from chemical exposure, but also physical hazards in the lab. Mesh wraps are recommended to contain glass that may break due to pressure changes. Cut resistant gloves are recommended when handling broken glass and glass that may break due to pressure changes.