Lesson Learned Briefing

No.: LL11-0020

Title: Gas Cylinder Gasket Melted Due To Reaction with Anhydrous Hydrogen Chloride

Event: LBNL Event

Event Date: 06/03/2011

Category: ES&H - Gases

Lesson Learned Statement:
Watch for Incompatible Materials in all Chemical Processes.

Discussion:
A Beamline scientist at the Lawrence Berkeley National Laboratory Advanced Light Source (ALS) used a re-configured stainless steel regulator for an upcoming experiment. The reconfiguration consisted of changing out a 350 CGA with a 330 CGA for anhydrous Hydrogen Chloride use. The Lab's Regulator Shop performed the change-out of the CGA and supplied a "white plastic" gasket to seal the high-pressure fitting. After the ALS pressure safety check, the researcher used the regulator to fill a small chamber with a small amount of HCl. Following the filling, the regulator and the filling system were evacuated.

When the HCl Lecture Bottle was taken off-line, it was noted that the "white plastic" gasket had reacted with the anhydrous Hydrogen Chloride and melted (see attached photo). Apparently, the white plastic gasket was not made out of an inert material such as Teflon, but made out of a plastic that de-polymerized when in contact with HCl.

All construction materials that can come in contact with toxic or reactive gases (or any material) must be compatible. Even though this situation at the ALS did not result in any release of HCl, it should be used as a warning for all researchers. In order to keep this potential incident from happening again, everyone involved in using hazardous gases, from the actual users to the suppliers of parts, needs to know the materials being used and their compatibility with the materials of construction. This not only applies to gasket material, check valves, and seals, but also to tubing and reaction vessels. A good practice to follow is: Unless ALL the materials used throughout the

process can be shown to be compatible, the materials must be considered incompatible. A Material Compatibility Chart of for most gases can be found at: http://www.praxair.com/praxair.nsf/0/786B1AAF01AF102A85256FCF0050BEA5/$file/H-1-3.pdf

CORRECTIVE ACTIONS:
(1) The Lab Regulator Shop was notified of this melted gasket occurrence due to the use of incompatible material. The shop will ascertain that all materials are compatible with the gas being used. The experimenter's Activity Hazards Document should specify the person responsible for reviewing the compatibility between the gas and the materials of construction, including the gasket.
(2) According to the compatibility chart, Teflon is compatible with anhydrous Hydrogen Chloride. A vendor of Teflon CGA gaskets has been located, and a variety of Teflon gaskets has been received and will be available for ALS staff and users.
(3) A Lab-wide distribution of this Lessons Learned will go to Gas users identified through the Job Hazard Analysis system.

Priority Boxes: ☐ ORPS Reportable ☐ OSHA Recordable ☐ PAAA ☐ Other

ISM Code: Analyze the Hazards

Uploaded documents/attachments:
Gasket.jpg

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