



Controls for Peroxide Forming Chemicals

Lawrence Berkeley National Laboratory Lessons Learned

LL-2001-04

Concern Statement: Several containers of surplus “peroxide forming compounds,” including diethyl ether and tetrahydrofuran, were recently discovered in one of our scientific divisions. Peroxide forming compounds undergo an auto oxidation reaction after being exposed to atmospheric oxygen to form organic peroxides and hydroperoxides. Peroxides are unstable compounds and may detonate when subjected to shock, heat or friction.

Applicable to: Researchers and staff in wet chemistry labs and other chemical facilities.

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Incident

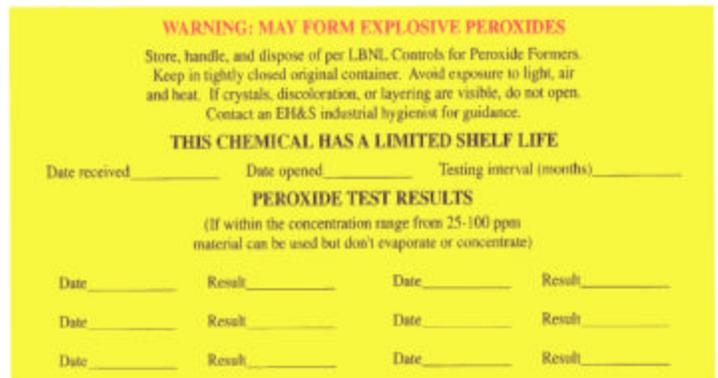
The discovery of these chemicals occurred during a laboratory cleanout. These appeared to have exceeded their safe storage time and had no evidence of being tested for explosive peroxides. The chemical containers (eight in all) had to be set aside for special handling and stabilization by an external environmental consulting company trained and equipped to handle reactive chemicals. Because of the uncertainty surrounding these materials, the consultants assumed the chemicals were potentially explosive. Accordingly, they wore flak jackets and other protective gear, placed the suspect containers in a specially designed blast containment device, and required a special security escort to the Laboratory’s Waste Handling Facility for stabilization and further processing. This required a considerable amount of time and effort, with costs exceeding \$6,000.

Cause

The researcher did not follow LBNL guidelines to properly manage the storage of the peroxide forming compounds. It was later learned that the suspect chemicals may have been tested, but the researcher had failed to write the test date and results on the containers. As a result, the environmental firm was obligated to handle the material as potentially explosive.

Recommended Actions

- ❑ Peroxide forming compounds must be labeled with the date opened, the date they were tested for peroxides, and the test results. A label was developed for this purpose and is available through Stores (extension 5087). Peroxide Test Strips, which are available through Lab Safety Supply, Inc. [Part No. 271731, Phone No., (800)543-9910] are recommended for periodic testing.
- ❑ Although it has not been determined what peroxide concentration is explosive, it is generally accepted in the safety community that at peroxide concentrations from 25 to 100 ppm, the chemical may be used, but shouldn’t be distilled or concentrated. At concentrations greater than 100 ppm, the material should be considered as potentially explosive.
- ❑ The Laboratory has [peroxide control procedures](#) which cover safe handling, storage, use, testing, labeling and disposal. A list of common peroxide forming chemicals and peroxide testing intervals is in the guidelines, but it should not be considered all-inclusive. Chemical users are cautioned to review [Material Safety Data Sheets](#) to determine the hazardous properties of their chemicals, including not only peroxide formation but also other chemical or physical changes that could result in a dangerous condition.



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Further Information

Any questions regarding this incident or the lessons learned may be directed to Larry McLouth (x5286). For information on safe chemical handling, contact the [EH&S Industrial Hygienist](#) assigned to your Division. For other lessons learned, go to: http://www.lbl.gov/ehs/html/lessons_learned.htm

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