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Subject: Yellow Alert: Phosgene Generated From Chloroform

Title: YELLOW - **Phosgene Generated from Chloroform**

Identifier: INEEL Lessons Learned # 98247
Date: May 25,1998

Lessons Learned Statement: Phosgene can be generated from chloroform. Chloroform stabilized with alcohol should be purchased, and the chemical should be treated as time-sensitive. An industrial hygienist should be contacted before using a container of chloroform that is six months old or older.

Discussion of Activities: Researchers at the University of California, Los Angeles were using a three-year-old bottle of chloroform. They noticed that the people working with the chloroform were becoming quite ill. Subsequent analysis showed concentrations of 15,000 ppm of phosgene in the head space of the bottle and a 1.1% concentration of phosgene in the bulk solution. Exposure to 20 ppm for 1-2 minutes can cause severe lung injury and 570 ppm for 1 minute can cause death. The chloroform was stored properly and was stabilized with amylene. (Note: Chloroform comes in three basic varieties: a) no stabilizer present, b) stabilized with amylene, and c) stabilized with an alcohol such as ethanol.)

A search of the literature has shown that the generation of phosgene from chloroform was a well-known phenomenon 50-100 years ago when chloroform was used as an anaesthetic. Evidently, the generation of phosgene from chloroform has since been forgotten since there are no warnings on material safety data sheets for chloroform, including chloroform that has not been stabilized.

Recommended Actions:

1. Unless program requirements prohibit it, chloroform that is stabilized with alcohol should be purchased in the future. Alcohol is usually added in greater concentrations than amylene so it provides better protection from phosgene generation. Also, there is evidence that amylene may not prevent phosgene generation.

2. Chloroform should be treated as a time-sensitive chemical. This is especially true of chloroform that is either not stabilized or is stabilized with amylene.

3. An industrial hygienist should be contacted before using a container of chloroform that is six months old or older so that they can test for the presence of phosgene.

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Functional Categories (User-Defined): Occupational Safety and Health
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Follow-up Action: Information in this report is accurate to the best of our knowledge. As a means of measuring the effectiveness of this report, please notify Terry Pierce at (208) 526-4288 (or by electronic mail at txp@inel.gov) or the INEEL Lessons Learned Program Office at (208) 526-1530 (e-mail at mae@inel.gov or lmitll@inel.gov) of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.