

Flinn Suggested **Disposal Methods**

FLINN METHOD

#1a Organic Acid Halides and Acid Anhydrides

Products in this class readily react with water, amines and alcohols. They are also generally corrosive and their vapors are lachrymators. Acid halides and acid anhydrides may be RCRA listed and/or characteristic wastes due to their reactivity or flammability. Leftover organic acid derivatives remaining in an experiment may be hydrolyzed to water-soluble products of low toxicity that can be flushed down the drain. The reactions are exothermic; immerse the reaction vessel in ice water to control the heat.

Examples

Adipoyl chloride and acetic anhydride

Saturated solution of sodium carbonate (200 g Na₂CO₃/L)

Materials Required

Hydrochloric acid, HCl, 3 M

Ice-water bath (optional)

Large glass or polyethylene container

pH paper

Stirring rod

Overview

Acid halides and acid anhydrides are reactive derivatives of carboxylic acids. These substances react with water to form the original organic acid or its conjugate base in basic solution. Excess acid halide or acid anhydride remaining in a reaction mixture may be decomposed with saturated sodium carbonate solution. The acid anhydride or acid halide reacts with water, and the products of that reaction, which are acidic, immediately react with sodium carbonate to form a salt of the acid. Most carboxylic acid salts are innocuous and may be flushed down the drain. Gaseous carbon dioxide is also produced, also forms, which will produce a fizzing as the reaction proceeds. The reaction of acetic anhydride proceeds as follows:



Note that one mole of sodium carbonate is required to fully neutralize one mole of the original acid halide or acid anhydride. To push the reaction to completion, a twofold molar excess of sodium carbonate is recommended. At 25 °C, a saturated sodium carbonate solution contains about 2 moles of sodium carbonate per liter of solution. Sodium hydroxide solution (2 M) may be substituted for saturated sodium carbonate in this procedure.

Both adipoyl chloride and sebacoyl chloride contain two chlorine atoms per molecule. Use a fourfold molar excess of sodium carbonate solution to hydrolyze these compounds.

Procedure

1 Perform this procedure in a fume hood. Wear chemical splash goggles, chemical-resistant gloves and a lab coat or chemical-resistant apron.

2 Place a saturated solution of sodium carbonate in a large glass or plastic container.

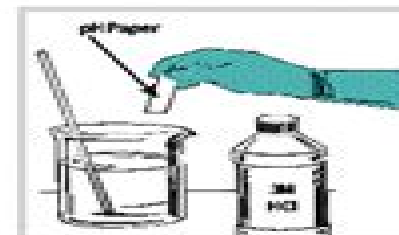
3 Slowly add a few milliliters or grams of the acid halide or anhydride to the container while constantly stirring. You can tell the decomposition reaction is occurring when the material begins to dissolve. The evolution of gaseous carbon dioxide should also be evident.

4 If a noticeable temperature rise is observed, place the container in an ice-water bath.

5 Continue slow addition of the acid derivative while stirring until all the compound has been consumed.

6 When a clear solution has been obtained, cool it to room temperature and neutralize to pH 7 with 3 M hydrochloric acid.

7 Flush the neutral mixture down the drain with a 20-fold excess of water.



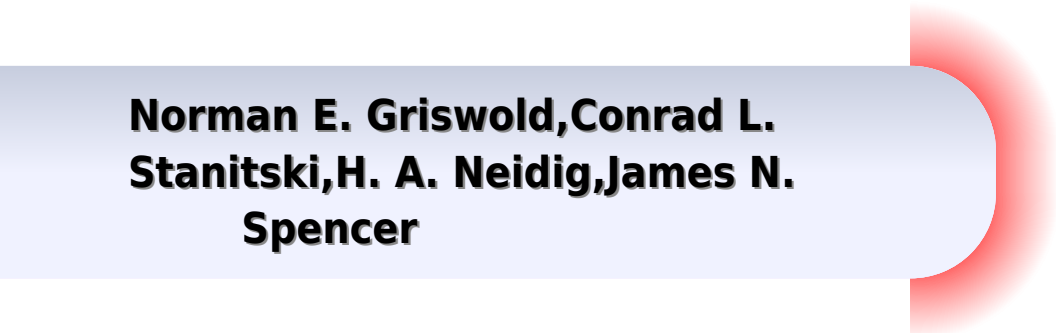
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1-800-452-1261

Please... Read the Narratives

Important narratives precede these specific chemical disposal methods! Please read each narrative carefully! Do not use these procedures if you are not comfortable with the chemistry. Do not use these procedures without first consulting with your local government regulatory officials. These procedures may not be used in some jurisdictions. All procedures involve some hazards and risks. Once again... read the narratives that precede these specific chemical disposal methods.

Flinn Chemical Disposal Manual

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Spencer**



Flinn Chemical Disposal Manual:

Laboratory Manual for Biotechnology and Laboratory Science Lisa A. Seidman, Mary Ellen Kraus, Diana Lietzke Brandner, Jeanette Mowery, 2022-12-23 Provides the basic laboratory skills and knowledge to pursue a career in biotechnology Written by four biotechnology instructors with over 20 years of teaching experience it incorporates instruction exercises and laboratory activities that the authors have been using and perfecting for years These exercises and activities help students understand the fundamentals of working in a biotechnology laboratory Building skills through an organized and systematic presentation of materials procedures and tasks the manual explores overarching themes that relate to all biotechnology workplaces including forensic clinical quality control environmental and other testing laboratories Features Provides clear instructions and step by step exercises to make learning the material easier for students There are Lab Notes for Instructors in the Support Material see tab below Emphasizes fundamental laboratory skills that prepare students for the industry Builds students skills through an organized and systematic presentation of materials procedures and tasks Updates reflect recent innovations and regulatory requirements to ensure students stay up to date Supplies skills suitable for careers in forensic clinical quality control environmental and other testing laboratories [Pocket Guide to Chemical and](#)

[Environmental Safety in Schools and Colleges: Safe chemical disposal](#) ,1990 **Safety Manual for Indian Laboratories**

Dr Ajay Kumar Gupta, Pritanshu, 2014-06-05 This lab manual is designed to ensure safe working in laboratories Content is basically according to Indian conditions The manual puts emphasis on adherence to lab rules and regulations There is detailed information regarding safe handling of lab equipments and chemicals This lab manual answers all the basic questions arises in a beginner s mind while working in lab Labs have different conditions according to respective areas so one section is devoted to each type of lab conditions Considering incidences of minor and major accidents due to ignorance and negligence in laboratories this manual has been prepared This manual explains each and every topic in simple and easy language It also includes do s and don ts of lab so as to clearly envisage necessary instructions to be followed in labs

Chemical Demonstrations Bassam Z. Shakhashiri, 1992 Describes and gives instructions for lecture demonstrations covering acids and bases and liquids solutions and colloids [The NSTA Ready-reference Guide to Safer Science](#) Kenneth Russell Roy, 2007 As a science educator you know the importance of using best safety practices to protect your students physically during hands on science instruction But do you know how to protect yourself legally even in aging facilities and crowded labs Learn the regulations and how to apply them with this clear easy to use guide to both safety practices and legal standards

Basic Laboratory Methods for Biotechnology Lisa A. Seidman, Cynthia J. Moore, Jeanette Mowery, 2021-12-28 Basic Laboratory Methods for Biotechnology Third Edition is a versatile textbook that provides students with a solid foundation to pursue employment in the biotech industry and can later serve as a practical reference to ensure success at each stage in their career The authors focus on basic principles and methods while skillfully including recent

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Science Demonstration Projects in Drinking Water (Grades K-12) ,1990 *Concise Manual of Chemical and Environmental Safety in Schools and Colleges* ,1988 BSCS Science & Technology ,2005

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