

**Discussion and Notes**

*Discuss where in the department the MSDS library and chemical inventory are located and the procedures or plans that are in place for updating these vital safety requirements.*

*Review the format and information provided on an MSDS and how to read an MSDS.*

*What is the department policy for posting MSDS during labs and allowing student access?*

## Science Safety and the Law

Two laws must be followed when using chemicals in school science labs to teach science. The relevant laws are the:

- ◆ Hazard Communication Standard (also called the “Right To Know” Law)
- ◆ Laboratory Standard

The purpose of this Safety Training Note is to review the provisions of these two laws and to help you, as a science department, meet the requirements of these laws.

Some confusion seems to abound in the area of hazardous materials and how the applicable laws apply to schools. Let’s set the record straight for public schools. The United States government has passed the Hazard Communication Standard and the Laboratory Standard, but these laws do not extend coverage to state and local governments. However, almost all state governments have either passed their own versions of these laws or put their stamp of approval on the federal laws and extended their jurisdiction to cover all local and state governmental bodies—including public schools. Federal jurisdiction does cover all private schools.

### Hazard Communication Standard

**Purpose:** To inform employees and students about any hazards associated with an employee’s work or student’s activity. Employees and students have the “right to know” about all hazards they might deal with in the school science laboratory.

Five requirements must be met to be in compliance with the Hazard Communication Standard.

1. Material Safety Data Sheets (MSDS) are the primary means of communicating the hazards of chemicals to an employee or student. The school district is required to acquire, update, and maintain MSDS for all hazardous chemicals used or stored in the facility and also to make those MSDS available to employees and students for informational purposes. MSDS should be kept in a binder or electronically stored at the locations where chemicals are stored and used.

A sample Material Safety Data Sheet for acetic acid is provided in the presenter’s notes.

2. An up-to-date inventory of all chemicals is required. The inventory list should tell you the name of the chemical, the quantity on hand, and its storage location. An example might be Sodium Acetate, 350 grams, Room 217, Row 1, Shelf 2.

Instructions for taking a chemical inventory can be found on pages 1056–1059 of the 2006 *Flinn Scientific Catalog/Reference Manual*.

3. A list of all hazardous materials must be assembled. Depending on your state’s requirements, a copy may also need to be provided to the local fire department. If you have an up-to-date inventory as described in item #2, this list should be very easy to assemble.
4. Teacher training should be done on an annual basis. Training should involve learning how to read an MSDS, safely use and handle chemicals, correctly use personal protection equipment, handle emergency situations, etc.

Watching the Flinn Scientific Safety Video at the start of the school year and using the Flinn Scientific Science Department Safety Training Notes every month will go a long way to meeting the Hazard Communication Standard training requirements. For more information on the Flinn Scientific Safety Video go to [www.flinnsci.com/Sections/spotlightDisplay.asp?ID=150&cat=8](http://www.flinnsci.com/Sections/spotlightDisplay.asp?ID=150&cat=8).

## Discussion and Notes

*Discuss where the CHP is kept and who is the chemical hygiene officer.*

*Have all teachers in the science department seen and read the CHP? Make plans now!*

5. A minimum standard of labeling must be observed. The label must state the name of the chemical, its concentration, how it can hurt you, and what target organs may be affected. If a solution has been prepared, write on the label the date the solution was made.

## Laboratory Standard

**Purpose:** To protect employees and students from being overexposed to hazardous laboratory chemicals.

In 1990, the federal government passed an extension of the Hazard Communication Standard written specifically for the research and academic community. Most states also passed a version of this law called the Laboratory Standard. The Laboratory Standard requires the school district to develop and implement a chemical hygiene plan and to designate a chemical hygiene officer.

A chemical hygiene plan (CHP) is a written report or manual that summarizes all of the science department's safety regulations, proper laboratory procedures for handling hazardous chemicals, and training procedures. The guiding principle or overarching goal in developing these rules and procedures should be to minimize the exposure of employees and students to hazardous chemicals. The CHP should include:

- ◆ General laboratory rules and procedures
- ◆ Personal protection equipment requirements
- ◆ Spill and accident procedures
- ◆ Chemical storage rules and procedures
- ◆ Safety equipment requirements and inspection procedures
- ◆ Employee safety training requirements
- ◆ Exposure and medical evaluation processes
- ◆ Emergency evacuation plan

Review your school's chemical hygiene plan or discuss plans on how to prepare a CHP for your school.

## Flinn Scientific Needs Your Support

Flinn Scientific has provided your Science Department Safety Training Notes. Without your valuable orders, the safety training notes and the indispensable *Flinn Scientific Catalog/Reference Manual* would not be possible. Please continue to support the efforts of Flinn Scientific by sending them your orders.

## Next Month's Topic

### Helping Students Comply with Safety Rules

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**Discussion and Notes**

## Science Safety and the Law

Complying with the Right To Know Law and the Laboratory Standard is no small task. It is a project that you will want to spread out over an extended time period. Discussing both laws and the components that make up each law is an important first step. If your school is not currently in compliance, we suggest you spend the first few months working to comply with the requirements of the Hazard Communication Standard. Once this step has been completed, you should then move on to the Laboratory Standard.

Every state has adopted the Hazard Communication Standard. Every state but five have adopted the Laboratory Standard. The states that have NOT adopted the Laboratory Standard are Delaware, Georgia, Massachusetts, North Dakota and Texas. If you teach in a public school in any of these five states, you may want to consider voluntary compliance and adopt the CHP. It is a very good procedure manual that will increase safety awareness and improve the overall safety profile for your school's science program.

The creation of a chemical hygiene plan for the Laboratory Standard can take as many as 80 hours to develop. Thanks to Flinn Scientific, you don't need to develop your own CHP from scratch. We have developed a generic chemical hygiene plan that you can quickly customize to fit your needs. Establish a committee of teachers to review the Flinn chemical hygiene plan. For your free copy of the Flinn Scientific Generic Chemical Hygiene Plan, e-mail us at [flinn@flinnsci.com](mailto:flinn@flinnsci.com). We will send you the Chemical Hygiene Plan as a Microsoft Word® file in an e-mail attachment.

For more information about what laws each individual state must follow, please consult the State-by-State Right To Know Law Analysis found on pages 1017-1019 of the 2006 *Flinn Scientific Catalog/Reference Manual*. Please note that all private, non-public schools must comply with both OSHA standards regardless of what state they are located in.

Flinn Scientific offers a software system that will help you comply with the Hazard Communication Standard. The Flinn MSDS/Chemical Inventory Software System not only keeps chemical inventory records up to date, but also provides over 1000 Material Safety Data Sheets for every chemical found in the *Flinn Scientific Catalog/Reference Manual*. For more details, go to [www.flinnsci.com/Sections/spotlightDisplay.asp?ID=139&cat=8](http://www.flinnsci.com/Sections/spotlightDisplay.asp?ID=139&cat=8).

### Materials (one per staff member)

- ◆ Flinn Scientific Science Department Safety Training Notes, Volume 7-1
- ◆ Sample Material Safety Data Sheet (attached)
- ◆ A copy of your school's Chemical Hygiene Plan or Flinn Scientific's Generic Chemical Hygiene plan

The safety meeting should take only 6-8 minutes to present. The discussion period will vary depending on the issues that need to be addressed. In our experience, this discussion will usually generate many questions about the two laws and how best to get into compliance.

It is important to keep a copy of these safety training notes and a signed attendance sheet to verify that regular safety training meetings are being held. The sign-up sheet is almost as important as the training notes and is usually the first item that is reviewed by regulatory inspectors. A copy of the sign up sheet we suggest using can be found at [www.flinnsci.com/Sections/Safety/SNotes/signup.pdf](http://www.flinnsci.com/Sections/Safety/SNotes/signup.pdf).

(continued on next page)

### **Additional Questions for Discussion**

1. What outstanding tasks remain to be done to get into compliance with the Hazard Communication Standard and Laboratory Standard?
2. Who should be responsible for getting the tasks completed?
3. What time frame is needed to accomplish these tasks?
4. Who is or who should become the Chemical Hygiene Officer?
5. What role should the district office play in this process since the school district is ultimately responsible to be in compliance with the laws?

### **We Welcome Your Comments**

Are the Science Department Safety Training Notes useful to you? Are they working for you and your department? Do you have any suggestions for topics you would like covered or how to improve them? We really want to hear from you. Please e-mail us with your comments and suggestions. Our e-mail address is [flinn@flinnsci.com](mailto:flinn@flinnsci.com).

# How to Read an MSDS

Material Safety Data Sheets (MSDS) are an important component of OSHA Hazard Communication Standard. MSDS have become an important document to inform employees, students, and the general public how materials can be safely handled, used, and stored. Since Flinn only provides chemicals to schools, we have written Flinn MSDS specifically for teachers and their students. Using clear and straight-forward language, each Flinn MSDS provides all the relevant safety and hazard information in a consistent, useful, and easy-to-read two-page format. Flinn MSDS follow the American National Standards Institute (ANSI) and Chemical Manufacturer Association (CMA) 16-section MSDS format which exceeds OSHA requirements. The 16 sections are divided into four major areas, each designed to answer a specific question.

## What is the material and what do I need to know immediately in an emergency?

### Sections 1-3.

**1** Important that the chemical name on the label matches the name on the MSDS. Many chemicals have similar names, but very different properties.

**2** The CAS# is the single identifying number for each specific substance. CAS# should match the CAS# on the bottle label.

**3** The most important section! The first part describes the material's appearance. If it doesn't look like this, STOP. Do not use it. It may be more or less hazardous.

The second part provides an overview of the most significant and immediate concern when using this material. It will include reactivity, adverse health effects, and flammability information.

**4** Flinn At-A-Glance™ provides a numerical guide in five categories. If 2's and 3's are present, read the MSDS for further information.

## What should I do if a hazardous situation occurs?

### Sections 4-6.

**5** Seek medical attention. These first-aid measures are only meant for immediate first aid and should be followed up with professional medical care.

**6** This section is written for the firefighter. Flash point (the lowest temperature at which enough vapor is present for an ignitable mixture); upper and lower flammable limits; and the auto ignition temperature (AIT) are common values included.

**7** The NFPA code is a numerical code established by the National Fire Protection Associate. It rates the substance *under fire conditions* in four categories. Health, Flammability, Reactivity, and unusual reactivity: 4 is a severe hazard, 0 is no hazard.

**8** How to clean up a spill. Always remove unprotected personnel from area and make sure all students are safe. Contain the spill with sand or absorbent materials.

**FLINN SCIENTIFIC, Inc.**  
**Material Safety Data Sheet (MSDS)**

MSDS #: 5.00  
Revision Date: September 24, 2002

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**SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Acetic Acid; Glacial **1****

Flinn Scientific, Inc. P.O. Box 219 Batavia, IL 60510 (800) 452-1261  
CHEMTREC Emergency Phone Number: (800) 424-9300

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**SECTION 2 — COMPOSITION, INFORMATION ON INGREDIENTS**

Acetic Acid; Glacial  
Synonyms: vinegar acid, ethanoic acid  
CAS#: 64-19-7 **2**

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**SECTION 3 — HAZARDS IDENTIFICATION**

Clear colorless liquid, strong vinegar odor.  
Corrosive, causes severe burns to eyes and skin. Moderately toxic by ingestion, inhalation and skin absorption. Fumes can be suffocating.  
Class II Combustible Liquid. **3**

**FLINN AT-A-GLANCE**

Health-2  
Flammability-2  
Reactivity-2  
Exposure-3 **4**  
Storage-3

0 is low hazard, 3 is high hazard

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**SECTION 4 — FIRST AID MEASURES**

Call a physician, seek medical attention for further treatment, observation and support after first aid.  
Inhalation: Remove to fresh air at once. If breathing has stopped give artificial respiration immediately. **5**  
Eye: Immediately flush with fresh water for 15 minutes.  
External: Wash continuously with fresh water and mild liquid soap for 15 minutes.  
Internal: Give 1 to 2 cups of water or milk, followed by a gastric antacid, such as milk of magnesia. Do not induce vomiting. Call a physician or poison control at once.

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**SECTION 5 — FIRE FIGHTING MEASURES**

Class II Combustible liquid. When heating to decomposition, emits irritating fumes. **6**  
Flash Point: 103 F (OC) Upper: 19.9% Lower: 4.0% AIT: 867 F  
**Fire Fighting Instructions:** Use triclass, dry chemical fire extinguisher. Firefighters should wear PPE and SCBA with full facepiece operated in positive pressure mode. **7**

**NFPA CODE**

H-3  
F-2 **7**  
R-0

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**SECTION 6 — ACCIDENTAL RELEASE MEASURES**

Restrict unprotected personnel from area. Remove all ignition sources and ventilate area. Contain spill with sand and absorbent material, neutralize with sodium bicarbonate or calcium hydroxide and deposit in sealed bag or container. See Sections 8 and 13 for further information. **8**

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**SECTION 7 — HANDLING AND STORAGE**

Flinn suggested chemical storage pattern: Organic #1. Store with acids, anhydrides and peracids. Store away from Nitric Acid. Store in a dedicated acid cabinet and away from any source of water; if an acid cabinet is not available, store in a Flinn Saf-Cube. Use and dispense in a hood. **9**

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**SECTION 8 — EXPOSURE CONTROLS, PERSONAL PROTECTION**

Avoid contact with eyes, skin and clothing. Wear chemical splash goggles, chemical-resistant gloves and chemical-resistant apron. Use ventilation to keep airborne concentrations below exposure limits. Always wear a NIOSH-approved respirator with proper cartridges or a positive pressure, air-supplied respirator when handling this material in emergency situations (spill or fire). **10**  
Exposure guidelines: TWA 10 ppm, STEL 15 ppm (OSHA, NIOSH)

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## How can I prevent hazardous situations from occurring?

### Sections 7-11.

**9** Use the Flinn Suggested Chemical Storage Pattern to prevent accidents and improve safety. Special storage and usage tips are also included.

**10** Wear personal protection equipment such as goggles, gloves, and an apron. See page 980 for an explanation on TWA and STEL.

## How to Read an MSDS, continued

Each Flinn MSDS follows the same format and the data is always found in the same location making it a valuable resource in the event of an emergency. Flinn sends an MSDS with every chemical you order. Flinn MSDS are continually updated, guaranteeing the most up-to-date safety information possible. Flinn sells a complete MSDS library in two versions, a hard copy version in two binders or an electronic version on a CD-ROM. For a more detailed description of our MSDS Library, please refer to pages 961–962. For our customers' convenience, Flinn has placed a complete set of MSDS on our website. Simply go to [www.flinnsci.com](http://www.flinnsci.com) and click on the safety icon—individual MSDS are easy to find and very easy to print out on your printer.

<b>FLINN SCIENTIFIC, INC.</b>		<b>MSDS #:</b> 5.00
<b>Material Safety Data Sheet</b>	<b>Acetic Acid; Glacial</b>	<b>Revision Date:</b> September 24, 2002
<b>SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES</b>		
Clear colorless liquid with strong 'vinegar' odor		Melting Point: 16.2 C
Solubility: Soluble in water.	<b>11</b>	Boiling Point: 244 F
Freezes at slightly below room temperature (17 C).		Vapor Density: 3.52
Formula: CH <sub>3</sub> CO <sub>2</sub> H		Vapor Pressure: 11 mm and 20 C
Formula Weight: 60.5		Concentration: 17.4 molar; 36-37%
<b>SECTION 10 — STABILITY AND REACTIVITY</b>		
Avoid contact with strong oxidizers, especially chromic and nitric acids.		
Shelf Life: Indefinite, if stored properly.	<b>12</b>	
<b>SECTION 11 — TOXICOLOGICAL INFORMATION</b>		
Acute effects: Harmful liquid, corrosive		ORL-RAT LD50: 3310 mg/kg
Chronic effects: N.A.	<b>13</b>	IHL-RAT LC50: 5620 ppm/IH
Target organs: N.A.		SKN-RBT LD50: 1060 mg/kg <b>14</b>
N.A. = Not available, not all health aspects of this substance have been fully investigated.		
<b>SECTION 12 — ECOLOGICAL INFORMATION</b>		
Data not yet available. <b>15</b>		
<b>SECTION 13 — DISPOSAL CONSIDERATIONS</b>		
Please consult with state and local regulations.		
Flinn Suggested Disposal Method #24a is one option.	<b>16</b>	
<b>SECTION 14 — TRANSPORT INFORMATION</b>		
Shipping Name: Acetic Acid, Glacial		
Hazard Class: 8, Corrosive, Flammable liquid	<b>17</b>	
UN Number: UN2789		
N/A = Not applicable		
<b>SECTION 15 — REGULATORY INFORMATION</b>		
TSCA-listed, EINECS-listed (200-580-7). RCRA code D001, D002 <b>18</b>		
<b>SECTION 16 — OTHER INFORMATION</b>		
This Material Safety Data Sheet (MSDS) is for guidance and is based upon information and tests believed to be reliable. Flinn Scientific, Inc. makes no guarantee of the accuracy or completeness of the data and shall not be liable for any damages relating thereto. The data is offered solely for your consideration, investigation, and verification. The data should not be confused with local, state, federal or insurance mandates, regulations, or requirements and CONSTITUTE NO WARRANTY. Any use of this data and information must be determined by the science instructor to be in accordance with applicable local, state or federal laws and regulations. The conditions or methods of handling, storage, use and disposal of the product(s) described are beyond the control of Flinn Scientific, Inc. and may be beyond our knowledge. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THIS PRODUCT(S). <b>19</b>		
Consult your copy of the <i>Flinn Scientific Catalog/Reference Manual</i> for additional information about laboratory chemicals.		
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### How can I prevent hazardous situations from occurring? (continued)

- 11** Clear, concise, and useful physical and chemical properties help you learn more about the chemicals you use. Formula and formula weight are also useful for making solutions.
- 12** Describes the conditions or reactions to be avoided. Also provides some indication about anticipated shelf life.
- 13** More detail on how the material may injure you. Acute (short exposure) and chronic (long-term) effects are listed along with their target organs.
- 14** Oral (ORL), inhalation (IHL), and skin absorption (SKN) toxicity data on test animals is included. For more information on LD<sub>50</sub> and LC<sub>50</sub>, see page 982.

### Other useful information.

#### Section 12–16.

- 15** Ecological impact if large amounts (e.g., tank car) of the chemical spill near a river or lake.
- 16** Suggested disposal methods for disposing laboratory quantities of chemicals. See pages 1025–1049 for Flinn Suggested Disposal Methods.
- 17** Department of Transportation shipping information is included for your school district, emergency responders, and transport/shipping departments.
- 18** Regulatory information used by regulatory compliance personnel.
- 19** Flinn Scientific has an ongoing program to update its MSDS. As professional chemists, we try our best to provide science teachers with the most accurate and useful safety information.
- 20** Call Flinn if you have any questions. We can help!