

## Discussion and Notes

*Keep a copy of these safety training notes and a signed attendance sheet to verify regular safety training. Regulatory inspectors will usually request proof of safety training.*

## Chemical Labels and the GHS Requirements

The chemical label is an important and often-overlooked safety aid. To prevent possible accidents, always take the time to read the name of the chemical on the bottle and briefly review the safety warnings before using any chemical.

### GHS Label Requirements

In March 2012 OSHA updated the Hazard Communication Standard (and, by extension, the Laboratory Standard) to incorporate the Globally Harmonized System of Classification and Labeling of Chemicals, better known as GHS. GHS provides a set of objective criteria for classifying the physical and health hazards of chemicals. To remove ambiguity about the degree of risk inherent in using a chemical, GHS further specifies the use of standard symbols and language elements to convey the hazard information on chemical labels. Hazardous chemical labels will be required to include pictograms, a signal word, as well as specific hazard and precautionary statements. The pictograms, signal words, and hazard statements will help you quickly identify and describe the nature of the hazard(s). Precautionary statements provide guidance to prevent accidents and avoid exposure to chemicals.

### Pictograms and the Signal Word

According to the GHS scheme, eight pictograms, shown below, are associated with 16 different physical hazards and 10 health hazard categories. Examples of physical hazards include: explosive, flammable, oxidizing, and self-reactive. Health hazard categories include acute toxicity, corrosive to skin and eyes, respiratory irritants, allergens and skin sensitizers, and carcinogens, mutagens or reproductive toxins. Listed below each pictogram is an example of a chemical that would fit into the hazard category. In addition to the pictograms, GHS requires the use of signal words, either Danger or Warning, to heighten awareness of the relative risk when using certain chemicals. (Danger is the more severe warning!) Depending on their hazard rankings, not all chemicals will have a pictogram or signal word.



**Acutely toxic**  
Copper(II) Chloride



**Oxidizer**  
Ammonium Nitrate



**Gas under pressure**  
Oxygen



**Corrosive to skin or eyes**  
Hydrochloric Acid



**Explosive or self-reactive substance**  
*Not in school science labs!*



**Irritant to skin, eyes or respiratory tract**  
Iodine



**Flammable or self-reactive**  
Methyl Alcohol



**Carcinogen, mutagen or reproductive toxin**  
Formaldehyde

## Hazard and Precautionary Statements

Pictograms and signal words convey the general physical and health hazards of chemicals. To understand the relative hazards, GHS assigns specific hazard statements to chemicals. For example, the hazard statement “Toxic if swallowed” is assigned to chemicals with acute toxicity (LD50 values) between 50 and 300 mg/kg, while “Harmful if swallowed” is used for chemicals with acute toxicity between 300 and 2000 mg/kg. GHS has codified 82 specific, unique hazard statements.

Understanding physical and health hazards is one aspect of chemical safety. Taking precautions to prevent accidents and minimize exposure is the rationale behind more than 300 different precautionary statements in the GHS labeling requirements. To illustrate how the hazard and precautionary statements work together to protect you when using a chemical, consider the following label elements for a flammable liquid such as ethyl alcohol. With a flash point of 14 °C, ethyl alcohol is classified as a Category 2 flammable liquid in the GHS scheme, and the assigned hazard statement is “Highly flammable liquid and vapor.” Five precautionary statements associated with this hazard describe the safe use of this chemical and appropriate response measures in the event of exposure or fire:

- ◆ Keep away from heat, sparks, and open flames.
- ◆ Keep container tightly closed.
- ◆ Wash protective gloves and clothing after handling.
- ◆ IF ON SKIN (or hair): Immediately remove all contaminated clothing. Rinse skin with water.
- ◆ In case of fire: Use a triclass dry chemical fire extinguisher.

## New Flinn Scientific GHS Sample Label

A well-written and designed chemical label will reduce accidents and may even save lives. For more than 40 years you have counted on Flinn Scientific labels to help you safely store, handle and use laboratory chemicals. We are excited with the opportunity to further improve chemical safety by adding the “right-to-understand” GHS label elements\* while preserving the indispensable Flinn storage, disposal, shelf-life, and hazard alert advice. See the next page for a GHS-compliant Flinn Scientific label, and a convenient guide to using this information.

*\* In announcing the GHS revision, OSHA stated that its goal was to transform the “right-to-know” laws into the right to understand.*

## Thank You for Your Support!

Please continue to support our efforts to improve safety in school science labs by ordering your science supplies and laboratory chemicals from Flinn Scientific.

**FLINN**  
**SCIENTIFIC**  
“Your Safe Source for Science”

# Flinn GHS Labels Improve Chemical Hazard Identification

**FLINN SCIENTIFIC** "Your Safer Source for Science"

T0019 500 mL

**1 TOLUENE**  
reagent, toluol,  $C_6H_5CH_3$ , FW. 92.14

**★ HAZARD ALERT:** Highly flammable liquid and vapor. Keep away from heat, sparks, and open flames. Keep container cool and tightly closed. Obtain special instructions before use. Do not use until all safety pre-cautions have been read and understood. Wear gloves, eye and face protection. Wash thoroughly after handling.

**2**

**IN CASE OF FIRE:** Use triclass dry chemical fire extinguisher.

**3** **FLAMMABLE/COMBUSTIBLE**

**8** LOT: 12534

**9** STORAGE: Organic #3 in a dedicated flammables cabinet. If a flammables cabinet is not available store in a Flinn Saf-Stor™ Can.

**10** **ORGANIC #3**

**11** DISPOSAL: #24b

**12** SHELF LIFE: Good if stored safely.

**13** SOLUBLE: Water.

**14** CAS NO: 108-88-3

**15** UN1294

**16** NFPA 3-2-0

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## 1 Product Name, Quality, Concentration, etc.

Full chemical name is shown and sometimes a common alternative name. The chemical formula and formula weight is immediately below the name. The quality of the substance (e.g., reagent, laboratory grade) is clearly indicated. See page 40 of this catalog for quality or grade explanations.

## 2 Hazard Alert

Hazard and safety precaution information is provided to alert the science teacher to the hazardous character of each chemical. This information is helpful when storing, dispensing or using the product.

## 3 Large Hazard Warning

A large, brief and specific hazard warning is shown. Many substances have multiple hazard characteristics (e.g., corrosive and inhalation irritant). This single line and dominant warning restates the most hazardous nature of the substance.

## 4 Hazard Pictograms

Graphical pictures with characteristic symbols to convey specific hazard information. There are eight pictograms. See page 1200 for more information about pictograms.

## 5 Signal Word

Indicates the relative severity of a hazard and alerts the reader to potential hazards. The GHS signal words are "Danger" or "Warning," with "Danger" being the more severe.

## 6 Warning Information

This section contains Hazard and Precautionary Statements. Hazard Statements are assigned based on a hazard class and category to describe the hazards of a product. Precautionary statements describe recommended measures that should be taken to minimize or prevent adverse effects from exposure to a hazardous product.

## 7 First Aid

We have provided basic first aid recommendations, but always seek professional medical assistance whenever injury takes place in the laboratory.

## 8 Lot Number

The fingerprint of the chemical you have purchased. A series of numbers that identifies for Flinn Scientific what the chemical is, how it was packaged, when it was packaged, who the chemical manufacturer is, etc. Lot numbers are a very important part of any chemical label!

## 9 Flinn Storage Method/Number

Number refers to the compatible chemical family in which this item should be stored. For example: Inorganic #9 refers to the family that includes all inorganic acids except for nitric acid. A detailed table of these families and even their most compatible shelf order are found on pages 1222-1226 of this Flinn Scientific Catalog/Reference Manual.

## 10 Storage Method/Number, Enlarged

The Flinn compatible family storage number is enlarged so you can easily locate it and return the chemical container to its proper storage location.

## 11 Suggested Disposal Method

Suggested disposal techniques for small, laboratory quantities of chemicals are provided in this Flinn Scientific Catalog/Reference Manual on pages 1234-1251. The number shown in the chemical listing refers you to a specific and suggested disposal method for that particular product.

## 12 Shelf Life

A general statement about anticipated shelf life. Since conditions vary widely, the statement is general and should be accepted in that context. The shelf life data are based on exhaustive literature searches.

## 13 Soluble

In what solvent(s) is this substance soluble? We have listed the common solvents. Limited space may, in a few cases, prevent us from listing all of the possible solvents.

## 14 Chemical Abstract Service (CAS) Registry Number

CAS means Chemical Abstract Service. The CAS is operated by the American Chemical Society (ACS), a society of professional chemists. The CAS maintains resource information on thousands of chemicals. The CAS number is the single identifying number for each specific substance.

## 15 UN Number

The UN (United Nations) number is a worldwide identifying number for a substance in commerce or transport. This number is meaningful to shippers and hazardous material handlers.

## 16 NFPA Code

To protect the professional firefighter, NFPA (National Fire Protection Association) has established a numerical code that rates chemicals under fire conditions in four categories: health, flammability, reactivity and unusual reactivity. Within each category, a system has been established with five numerical ratings (0-4). Number 4 is a severe hazard and number 0 is no special hazard. This rating system is on our label because a few state laws require it. Unfortunately, the NFPA numerical ratings exist for a very limited number of chemicals, and the numbers represent hazard under fire conditions as opposed to normal laboratory use. This under fire conditions rating system tends to distort hazard characteristics. We urge teachers to depend more on the hazard warnings, pictograms and signal words shown elsewhere on each label.