

lechyd a Diogelwch – Health and Safety

CHEMICAL SAFETY – IDENTIFYING CHEMICAL HAZARDS

This Information Sheet provides guidance to enable the correct identification and assessment of the hazards associated with the use of a single chemical and / or chemicals used in combination.





General Information






Chemicals play an important role in our lives. Everywhere we look chemicals will have been used, for example in our clothes, food, healthcare and before this in the research needed to create such products and / or ensure their safe inclusion in such products.

Many chemicals are relatively harmless and may be used without significant risk. However, some are inherently dangerous and whilst some of these nastier chemicals may produce odours which generally warn of danger, the majority don't.

To help us work out '*what is hot and what is not*', Legislation requires producers of chemicals to label their products, and provide information on the hazards associated with the chemical. So, before using any chemical, always start by looking at the product labels for the following warning symbols:

Warning Symbols

<p>TOXIC</p> 	<p>Substances that can cause death or serious illness if even a small amount enters the body (by ingestion, inhalation, skin contact)</p>
<p>HARMFUL</p> 	<p>Substances that can cause illness by ingestion, inhalation or skin contact</p>
<p>IRRITANT</p> 	<p>Substances which can cause inflammation of the skin, mucous membrane or irritation of the respiratory tract</p>
<p>CORROSIVE</p> 	<p>Substances that can destroy living tissue. Cause damage quickly and can react violently with water or certain metals eg concentrated acids</p>

<p>EXPLOSIVE</p> 	<p>Substances that can explode when exposed to heat, flame or other sources of ignition. Very sensitive to shock or friction. Usually more dangerous when dry</p>
<p>OXIDISING</p> 	<p>Substances that produce a lot of oxygen and possibly heat in contact with other substances, particularly flammable substances</p>
<p>HIGHLY FLAMMABLE / FLAMMABLE</p> 	<p>Substances that can ignite spontaneously in air or react with water or damp air to produce dangerous quantities of flammable gas. They can also ignite in the presence of sources of ignition including static or heat</p>
<p>CRYOGENS</p> 	<p>Substances that boil at extremely low temperatures which are used to keep things cold. Commonly used cryogens include liquid nitrogen. Contact with cryogens can cause severe damage to the tissues and there is also the risk of asphyxiation</p>
<p>HARMFUL TO THE ENVIRONMENT</p> 	<p>Chemicals that may present an immediate or delayed danger to one or more components of the environment</p>

Product labels are only the starting point.

You must also look beyond the label for the following reasons:



1. Old Chemicals – the University has lots which may have no warning symbols at all on their containers.
2. Although labels will give you a good idea of the chemical's hazards they won't tell you:
 - a. Whether the chemical has particularly hazardous properties that require special precautions to be taken eg carcinogens, teratogens, mutagens.
 - b. How the chemical may react when mixed with another chemical or exposed to air, moisture or heat.



An old chemical bottle with no hazard symbol

Chemical Reactions

What is a chemical reaction?

Chemical Reaction: *A process in which a substance decomposes, combines with other substances or interchanges with other substances.*

Before undertaking any work using chemicals, you must identify if a reaction could occur when you mix the chemicals together. Common types of reaction that pose a health and safety risk include:

- **Exothermic** – reactions that give out heat energy.
- **Synergistic** – the combined effect is greater than if each chemical was administered alone. For example, $2 + 2 = 20$.
- **Potential** – the first harmless chemical enhances the effect of the second, eg $0 + 2 = 10$.

Of these reactions, exothermic often causes the most concern as it can lead to **Runaway Reactions**:

Runaway Reaction: *When the heat produced exceeds the heat removed. The surplus heat raises the temperature of the reaction mass, causing the reaction rate to speed up to a point where the chemical reaction can no longer be controlled.*

As an approximate rule of thumb heat generation doubles with every 10°C rise in temperature.

In general most chemicals can be used quite safely. However some chemicals, which appear to be perfectly safe, if not handled correctly (eg heated above its flash point) or mixed with another chemical, will react, creating harmful by-products such as fire, explosion, toxic gases, affecting both people and the environment.

Such uncontrolled reactions can cause:

- Boiling over of the reaction mass.
- Explosions.
- Fire.
- Toxic gases / vapours / fumes.



Fire caused by a runaway reaction



Winchester jar exploding due to severe over pressure caused by rapid gas generation

So before you handle any chemicals:



- **RESEARCH** so you understand the task and the hazards associated with the chemical(s). Especially if using a combination of chemicals.
- **NEVER** rush.
- **CHECK** equipment is clean. Contaminants can act as catalysts, causing unexpected reactions.
- **IF IN DOUBT** ask your Supervisor or Lab Technician.

Finding out more information about Chemical Hazards

Always assess the hazards associated with a chemical(s) by researching them and the proposed experiment first.

The following are useful sources of information:

- Product labels.
- Manufacturer's Safety Data Sheets (MSDS) which are usually provided by the supplier of the chemical.
- Oxford MSDS system <http://msds.chem.ox.ac.uk>, an on-line resource that provides information on chemical hazards, including MSDSs.

These documents, especially the MSDS will provide guidance on the hazardous properties of the chemical and important data on how to use the chemical safely.

MSDSs are a requirement of the Chemical Hazard Information and Packing Supply Regulations (CHIPs) that require suppliers to classify substances and provide information to users based on a specified classification scheme.

Material Safety Data Sheet

MSDS No. 0002

Sani-Cloth Plus[®] Germicidal Disposable Cloth

1.0 Product and Company Identification

Product Name: SANI-CLOTH PLUS GERMICIDAL DISPOSABLE CLOTH

Manufacturer or Supplier:
Nice-Pak Products, Inc. or
PDI, The Healthcare Div. of Nice-Pak Products, Inc.
Two Nice-Pak Park
Orangeburg, NY 10962-1376
Toronto, Ontario M9L 1V8 Canada (800) 263-7067
Flint, United Kingdom +44 (0) 1352-736700

Emergency and General Information:
1-845-365-1700 (USA) (M-F 8am-5pm Eastern time) or call your local Poison Control Center

2.0 Composition/Information on Ingredients

Component	CAS Number	Percent (%)
Isopropyl Alcohol	67-63-0	14.85
2-Butoxyethanol	111-76-2	1-4
Quaternary Ammonium Compounds	68391-01-5 68956-79-6	0.250

3.0 Hazards Identification

Emergency Overview: Combustible. Causes moderate eye irritation.

NEPA 704 Hazard Ratings:

Flammability: 1
Health: 1
Instability (Reactivity): 0
Special: None

Potential Health Effects: Causes moderate eye irritation.

Eye Contact: Causes moderate eye irritation.

Skin Contact: None expected for treated applicator.

Inhalation: Vapor concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract; may cause headaches and dizziness, and other central nervous system effects.

Ingestion: Unlikely route of exposure.

4.0 First Aid Measures

Eye Contact: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Skin Contact: If skin irritation occurs, discontinue use and wash with copious amounts of soap and water.

Inhalation: Unlikely route of exposure. Remove the affected person to fresh air. Administer artificial respiration if breathing has stopped. Call for prompt medical attention.

Ingestion: Unlikely route of exposure. If swallowed, DO NOT induce vomiting. Get prompt medical attention. Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

Stringent product labelling and the MSDS is part of this 'information', with a MSDS having to provide information on 16 headings outlined in Schedule 5 of the CHIPs Regulations.

Headings include:

- **Hazard Identification** - routes of entry into the body.
- **Handling and Storage** - incompatible materials, special storage needs.
- **First Aid Measures** – what to do and what not to do if someone is exposed to the chemical.
- **Fire Fighting** – extinguishers to use in the event of a fire, requirements for breathing apparatus etc.

COSHH Assessment

Taking time to research the chemical will help you prepare your COSHH Assessment. But also remember to consider:

- **Any activity that may affect the chemicals behaviour eg heating or stirring**
- **Compatibility when mixing chemicals eg will an exothermic reaction or one that produces large amounts of gas occur**
- **The concentration and amount of chemical used**
- **It's form eg liquid, powder**
- **Routes of entry into the body eg inhalation**

Temperature

When working with chemicals you must always consider the temperature at which you will be handling them. At certain temperatures some chemicals will ignite leading to fire and / or explosion. Such information should be included on the MSDS so always look out for the following terms:

- *Flash Point*: The lowest temperature at which sufficient vapour is produced from a liquid for flash ignition to occur.
- *Fire Point*: The lowest temperature at which, the heat produced will enable combustion to continue after a substance is ignited.
- *Auto Ignition*: The lowest temperature at which a substance will ignite spontaneously and will burn without a flame or other ignition source.

Ignition points can vary greatly and do not just include high temperatures. The term 'Flammable' also causes confusion as it is not always used. The four categories are:

1. *Flammable*: Flash point between 22°C and 55°C. The liquid usually needs to be heated to give off an ignitable vapour eg. diesel, paraffin, methyl alcohol, isopropanol, xylene.
2. *Highly & Extremely Flammable*: Flash point of less than 21°C and readily ignite within normal temperature ranges, giving off an ignitable vapour in normal circumstances eg. acetone, methanol, methyl ethyl ether.
3. *Combustible Liquids*: All liquids with a flash point above 55°C eg. phenol, pine oil, linseed oil.
4. *Inflammable*: Has the same meaning as *Flammable*.

Chemical Compatibility

The improper storage or mixing of chemicals can also cause serious accidents due to violent reactions between incompatible chemicals.

The Information Sheet '*Chemical Compatibility*' provides further information on common laboratory chemicals found at the University and the mixing and storing of the chemicals together.

But **REMEMBER** this list only includes common chemicals found at the University. You must also **ALWAYS** refer to the COSHH Assessment and supporting MSDS information before storing or mixing chemicals.