This material was produced under grant number SH-27673-SH-5 from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Task 1

In your groups, read the factsheets on pages 16-23. Then based on the factsheets and your own experience write a response to the statement below. For each paragraph, list the factsheets that helped you write your response.

Statement:

"My current job involves light duty maintenance and janitorial work. Most of the time I clean floors and rugs so I don't have to worry about being exposed to hazardous chemicals.

For many years I worked at a place that produced hazardous chemicals and I always knew when we were making the highly toxic stuff because you could smell it.

But even when I worked with highly toxic chemicals I wasn't that concerned. The truth is as long as you don't drink the stuff or pour it directly into your eyes, it can't get into your system.

I should know, I was exposed a few times but nothing ever happened to me. As long as you can avoid getting a heavy dose in your system, small amounts of the stuff won't hurt you.

I think the whole chemical hazards thing is overblown and I'm not going to worry about the cleaning chemicals I use on my job."

How would you respond? (Please make a list.)

1.

2.

3.

4.

5.

1. Cleaning Products Can Make You Sick

Many traditional cleaning products, floor strippers and disinfectants are a source for human health and environmental problems. Cleaning products may contain chemicals that cause cancer, reproductive disorders, respiratory ailments (including occupational asthma), eye and skin irritation, central nervous system impairment and other human health effects. The wide use of cleaning products may also contribute to poor indoor air quality.

Disinfectants
Disinfectants such as bleach are registered with the Environmental Protection Agency (EPA) as pesticides. These toxic chemicals are used for routine cleaning. Health effects from long-term exposure to bleach include occupational asthma and hypersensitivity syndrome.

Floor Strippers
Floor strippers contain chemicals that can seriously harm you. Workers exposed to floor stripping and floor polishing chemicals experience headaches, eye irritation, dizziness, nausea, difficulty concentrating, fatigue, wheezing, coughing, asthma attacks, respiratory infections, hypersensitivity pneumonitis (an inflammation of the lung) and nose, throat and skin irritation. If exposure continues, irreversible lung damage and the formation of fibrous tissue (fibrosis) may occur making breathing more difficult.

Scented Cleaning Chemicals
Workers exposed to fragrance products may experience some combination of eye, nose and/or throat irritation; respiratory difficulty or asthma-like reactions; and central nervous system reactions (e.g., dizziness, incoordination, confusion, fatigue).

Ventilation and Equipment

Exposures can also occur as a result of inadequate ventilation, the incorrect mixing of chemicals and/or the utilization of spray bottles, aerosol cans, and mechanized equipment. For example, floor burnishers, buffers, and carpet washers increase the airborne concentrations of cleaning chemicals as particulate matter and become aerosolized and suspended in the air.

Cleaning Products and Occupational Asthma

Cleaning products have also been linked to high rates of occupational asthma. In fact, the rate of occupational asthma among janitorial workers is double the rate of other workers. In California, Massachusetts, Michigan, and New Jersey 12 percent of work-related asthma cases have been associated with exposure to cleaning products. Additional research has found that even short-term exposure to cleaning agents caused asthmatic attacks (Reactive Airway Dysfunction Syndrome—RADS).

Report Cases of Work-Related Asthma

Work-related asthma cases are reportable diseases in the state of NJ. In fact, New Jersey law requires that physicians and advanced practice nurses report individuals diagnosed with work-related asthma. If you think you might have work-related asthma, or would like more information, you should contact the New Jersey Department of Health and Senior Services (NJDHSS) at 609-984-1863, or go to the NJ Department of Health Work-Related Asthma website at: http://www.state.nj.us/health/eoh/survweb/wra/index.shtml.

Sources: *Going Green: A Resource Kit for Pollution Prevention in Health Care*, Cleaning Chemical Use in Hospitals Fact Sheet, Health Care Without Harm, www.noharm.org. *Cleaning for Health, Products and Practices for a Safer Environment*, INFORM, August 2002, www.informinc.org/cleanforhealth.php. *Pesticides, Fragrances & Cleaners*, Health Care Without Harm, www.noharm.org/us/pesticidesCleaner/CleanersDIs.

2. Chemical Hazard Awareness

There are four basic ways that chemicals can enter your body:

- **Direct contact**—on the skin or eyes
- **Absorption**—through the skin
- **Accidental Ingestion**—through the mouth
- **Inhalation**—through the lungs

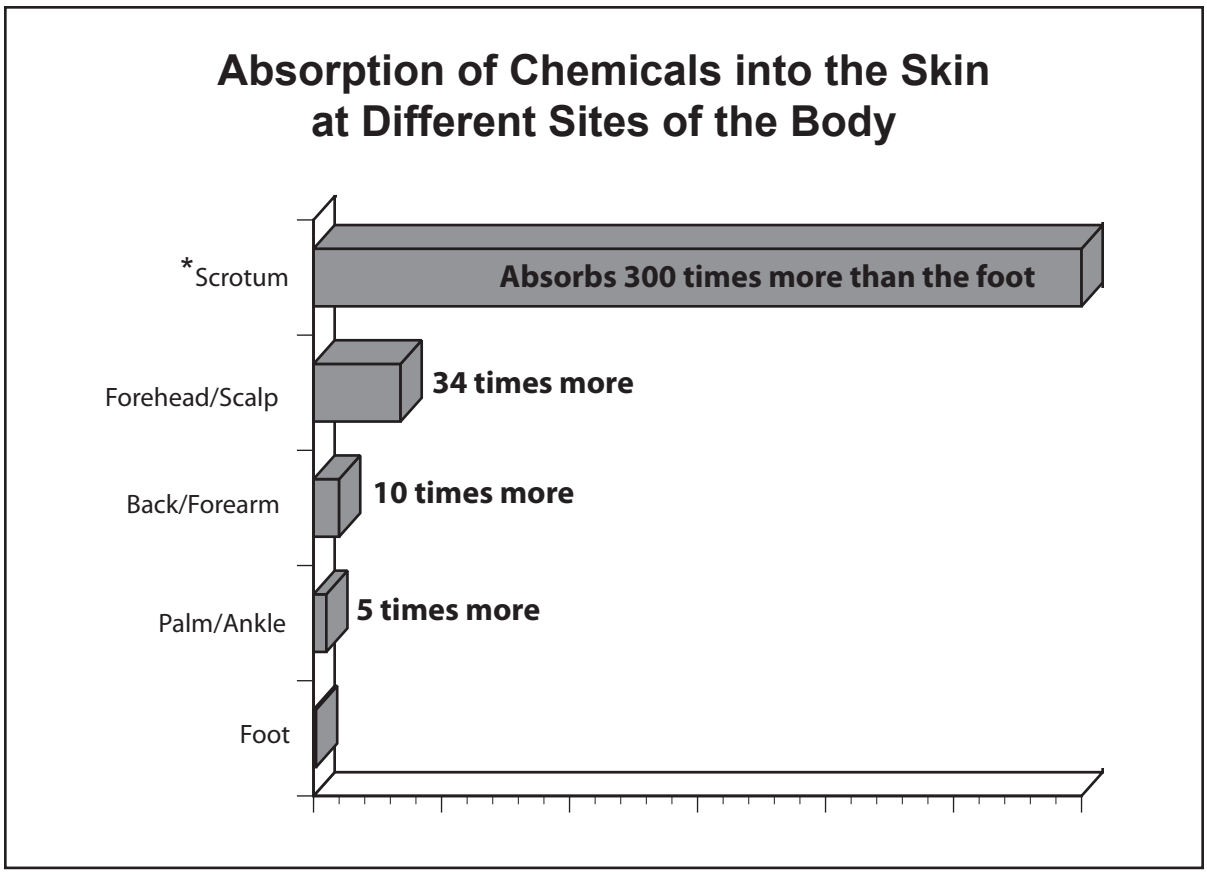
Direct Contact = Surface
The cleaners and disinfectants we work with can burn or irritate the skin and eyes on contact, causing damage on the surface. Dermatitis (inflammation of the skin) and conjunctivitis (inflammation of the eye membrane) are two examples.

Absorption = Penetration
Some chemicals can pass right through the skin undetected and enter the bloodstream. They are carried throughout the body, causing harm. Broken skin or puncture wounds greatly increase the rate at which chemicals are absorbed.

Source: Occupational Safety and Health Administration, *Personal Protective Equipment*, Washington DC, 1998.

Absorption of Chemicals by Your Body

Chemicals can enter your system by being absorbed through the skin. In fact, as the chart below shows, when it comes to absorption through the skin, different parts of your body absorb chemicals at very different rates. (If you are working with chemicals you should wash your hands **BEFORE** and after using the bathroom!)



*For men (studies of female workers yet to be done).
Source: E. Hodgson and P.E. Levi, *A Textbook of Modern Toxicology*, Second Edition. Stamford: Appleton & Lange, 1997, pg. 36-40.

3. Don't Trust Your Nose

You can't rely on your sense of smell to protect you from exposure to toxic chemicals. Let's face it, your nose has some important limitations. Here are the basic ones:

- Some dangerous chemicals, such as carbon monoxide, are odorless. No nose can smell them.

- For some chemicals, you can only detect the smell when the toxin is around you in such large quantities that your health is being harmed by it. For example, by the time you can smell ethylene oxide (used in gas sterilizers), you're already in trouble.

- Our noses can become accustomed to chemicals. That means that after a while we can't smell even very powerful odors. For instance, our noses can learn to turn off strong odors like ammonia and bleach.

4. Dose and the Body's Response

After ingestion, inhalation or skin contact, toxic chemicals as well as their by-products react in the body. For most toxic substances to cause harm there needs to be a sufficient "dose" given.

"Dose" refers to how much a substance reacts with the body. Dose is measured by the concentration of the substance and the time period of the exposure.

The higher the concentration, the larger the dose.

The longer the exposure, the larger the dose.

There are basically two ways the body reacts to a dose of a toxic substance:

- **Linear/Non-Threshold** For any dose, no matter how small, the body may have a reaction. This type of response may be found with cancer-causing chemicals and cancer-causing physical agents, such as radiation. **Any** dose carries a risk.

- **Threshold** There needs to be a certain level of dose before there is a bodily response. This type of response is found with most toxic chemicals (not for cancer-causing agents and chemicals)**.** For example, low-level exposure to acetone (found in nail polish remover) throughout the plant is not very harmful, but at higher concentrations it will cause irritation to the eyes, mucous membranes, and upper respiratory tract. Nausea, dizziness and headaches may result.

Sources: *Centers for Disease Control, 1998.* OSHA, May 1995; *Fit the Glove* by Gerard Arotti. Michael Roder, *A Guide For Evaluating the Performance of Chemical Protective Clothing (CPC)*, US Dept. of Health and Human Services; June 1990.

5. The Long and Short of It

There are two different types of effects that result from toxic exposure. They are acute and chronic.

Acute Effects
"Acute" means that health effects are felt at the time of exposure or shortly after, or result from a short-term, highly concentrated exposure. Examples of acute effects:

- Hydrogen chloride (HCl), when inhaled, causes fluid to collect in the lungs (pulmonary edema) and bleeding in the respiratory tract. When it comes into contact with the skin, it causes severe burns unless promptly washed off.

- Caustic soda, also known as sodium hydroxide (NaOH), corrodes the skin. It burns, and actually dissolves the skin while in contact with it.

- Carbon monoxide (CO) bonds to the protein in blood that is responsible for carrying oxygen to the cells. If enough of the blood bonds with CO instead of oxygen, the cells "starve" and you may die.

Although acute toxicity is often seen within minutes or hours after a sudden, high exposure there are some instances where a one-time high-level exposure causes delayed effects. For example, symptoms of high exposures to certain pesticides may not appear for several days.

Chronic Effects
"Chronic" is a word that means the ill effects will not be seen for some time after exposure. It is associated with low concentration exposures over a longer period of time.

- Cancer is a chronic effect, as is asbestosis.

- Lung diseases, like bronchitis and emphysema, are examples of noncancerous, chronic diseases.

- Solvents can cause chronic damage to the liver, kidneys and brain.

Many chemicals can cause either chronic or acute effects. The difference is in the amount of the dose. High doses generally cause acute effects. Low doses over time cause chronic effects.

- Exposure to PCBs in large doses can cause a skin disease called chloracne.

- Exposure to benzene over a long period of time can cause leukemia, a chronic effect.

- Exposure to arsenic over a long period of time can cause lung cancer, a chronic effect.

Task 2 (Hazard Commmunication Standard and SDSs)

Your trainers will lead you through the updates to OSHAs Hazard Communication Standard and then on to your group tasks.

OSHA has estimated that more than 32 million workers are exposed to 650,000 hazardous chemical products in more than 3 million American workplaces. This poses a serious problem for exposed employers and their employees.

The basic goal of an effective hazard communication program is to ensure employers and employees know the identities and hazards of chemicals in their workplaces. When employers and employees have such information, it can be used to design and implement appropriate protective measures to reduce the incidence of adverse effects.

The Hazard Communication Standard (HCS) is now aligned with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). This update to the Hazard Communication Standard (HCS) will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets.

Once implemented, the revised standard will improve the quality and consistency of hazard information in the workplace, making it safer for workers by providing easily understandable information on appropriate handling and safe use of hazardous chemicals.

This update will also help reduce trade barriers and result in productivity improvements for American businesses that regularly handle, store, and use hazardous chemicals while providing cost savings for American businesses that periodically update safety data sheets and labels for chemicals covered under the hazard communication standard.

Hazard Communication Standard
In order to ensure chemical safety in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers. OSHA's Hazard Communication Standard (HCS) requires the development and dissemination of the following information:

- Chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers;

- All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.

Hazard Communication Standard Updates
Updates of the HSC include:

- **Hazard classification:** Provides specific criteria for classification of health and physical hazards, as well as classification of mixtures.

- **Information and training:** Employers are required to train workers by December 1, 2013 on the new labels elements and safety data sheets format to facilitate recognition and understanding.

- **Labels:** Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each hazard class and category. Precautionary statements must also be provided.

(continued)

Task 2 (Hazard Commmunication Standard and SDSs)

In your groups review the factsheets (including the SDS for sodium hypochlorite solution) on pages 28-54. Then based on your own experience and the factsheets answer the questions below.

1. If you worked with sodium hypochlorite solution would you be concerned about a fire or explosion hazard?

   ☐ Yes
   ☐ No

2. What personal protective equipment (PPE) does the SDS call for in handling sodium hypochlorite solution?

3. What first aid is recommended for sodium hypochlorite solution?

4. What is recommended for the proper storage of sodium hypochlorite solution?

5. Is sodium hypochlorite solution incompatible with other chemicals?

6. What are the health hazards that could result from exposure to sodium hypochlorite solution?
   Acute (Short-Term) Hazards **Chronic (Long-Term) Hazards**

7. Did you find working with the SDS difficult or confusing?

8. Are SDSs a useful health and safety resource tool at work?

SAFETY DATA SHEET
Sodium Hypochlorite

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME	Sodium Hypochlorite
SYNONYMS, TRADE NAMES	Bleach, , Hypo, , Everchlor, , Chloros, , Hispec, , Bridos, , Bleacol, , Vo-redox 9110,
SUPPLIER	UNIVAR LTD 46 Peckover Street BRADFORD West Yorkshire United Kingdom BD1 5BD Tel: +44 1274 377000 Fax: +44 1274 377001 sds@univareurope.com
SDS No.	S024
Emergency Contact Number (Office Hours)	+441274 377070
Emergency Contact Number (Outside Office Hours)	+441865 407333

2 HAZARDS IDENTIFICATION

Causes burns. Contact with acids liberates toxic gas.

CLASSIFICATION C;R34. R31.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Name	EC No.	CAS-No.	Content	Classification
SODIUM HYPOCHLORITE SOLUTION, ... % Cl ACTIVE	231-668-3	7681-52-9	10-25%	C;R34 R31 N;R50

The Full Text for all R-Phrases are Displayed in Section 16

4 FIRST-AID MEASURES

INHALATION

Remove victim immediately from source of exposure. Keep the affected person warm and at rest. Get prompt medical attention.

INGESTION

NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Rinse mouth thoroughly. Get medical attention immediately!

SKIN CONTACT

Remove affected person from source of contamination. Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT

Remove victim immediately from source of exposure. Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention immediately. Continue to rinse.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

This product is not flammable. Use fire-extinguishing media appropriate for surrounding materials.

Sodium Hypochlorite

SPECIFIC HAZARDS

Chlorine. Oxygen.

PROTECTIVE MEASURES IN FIRE

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS

Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS

Do not allow ANY environmental contamination. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.

SPILL CLEAN UP METHODS

DO NOT TOUCH SPILLED MATERIAL! Stop leak if possible without risk. Absorb in vermiculite, dry sand or earth and place into containers. Flush with plenty of water to clean spillage area.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS

Avoid spilling, skin and eye contact.

STORAGE PRECAUTIONS

Store in tightly closed original container in a dry, cool and well-ventilated place. Keep in original container.

STORAGE CLASS

Corrosive storage.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS

WEL = Workplace Exposure Limits

PROTECTIVE EQUIPMENT

PROCESS CONDITIONS

Provide eyewash, quick drench.

ENGINEERING MEASURES

Provide adequate ventilation. Observe Workplace Exposure Limits and minimise the risk of inhalation of vapours.

RESPIRATORY EQUIPMENT

No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists.

HAND PROTECTION

Use suitable protective gloves if risk of skin contact.

EYE PROTECTION

If risk of splashing, wear safety goggles or face shield.

OTHER PROTECTION

Wear appropriate clothing to prevent any possibility of skin contact.

HYGIENE MEASURES

DO NOT SMOKE IN WORK AREA! Wash at the end of each work shift and before eating, smoking and using the toilet. Wash promptly if skin becomes wet or contaminated. Promptly remove any clothing that becomes contaminated. When using do not eat, drink or smoke.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	Liquid

Sodium Hypochlorite

COLOUR	Green yellow		
SOLUBILITY	Completely soluble in water		
BOILING POINT (°C)	>100	MELTING POINT (°C)	-17
RELATIVE DENSITY	1.20 - 1.27	pH-VALUE, CONC. SOLUTION	>12

10 STABILITY AND REACTIVITY

STABILITY

Stable under normal temperature conditions.

CONDITIONS TO AVOID

Avoid excessive heat for prolonged periods of time. Avoid contact with acids.

MATERIALS TO AVOID

Strong acids. Ammonia or amines. Hydrocarbons.

HAZARDOUS DECOMPOSITION PRODUCTS

Fire creates: Chlorine.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50: 8910 mg/kg (oral rat)

INHALATION

May cause damage to mucous membranes in nose, throat, lungs and bronchial system.

INGESTION

May cause burns in mucous membranes, throat, oesophagus and stomach.

SKIN CONTACT

May cause serious chemical burns of the skin.

EYE CONTACT

Causes burns.

12 ECOLOGICAL INFORMATION

MOBILITY

The product is soluble in water.

13 DISPOSAL CONSIDERATIONS

GENERAL INFORMATION

Do not puncture or incinerate even when empty.

DISPOSAL METHODS

Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

UK ROAD CLASS	8		
PROPER SHIPPING NAME	SODIUM HYPOCHLORITE SOLUTION, ... % CI ACTIVE		
UN NO. ROAD	1791	UK ROAD PACK GR.	III
ADR CLASS NO.	8	ADR CLASS	Class 8: Corrosive substances.
ADR PACK GROUP	III	ADR LABEL NO.	8
HAZCHEM CODE	2X	RID CLASS NO.	8

Sodium Hypochlorite

RID PACK GROUP	III	UN NO. SEA	1791
IMDG CLASS	8	IMDG PACK GR.	III
MARINE POLLUTANT	No.	UN NO. AIR	1791
AIR CLASS	8	AIR PACK GR.	III

15 REGULATORY INFORMATION

LABELLING

Corrosive

CONTAINS SODIUM HYPOCHLORITE SOLUTION, ... % Cl ACTIVE

RISK PHRASES

R31	Contact with acids liberates toxic gas.
R34	Causes burns.

SAFETY PHRASES

P6	Warning! Do not use with other products. May release dangerous gases (chlorine).
S1/2	Keep locked up and out of the reach of children.
S28	After contact with skin, wash immediately with plenty of water.
S45	In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S50	Do not mix with acid.

STATUTORY INSTRUMENTS

Chemicals (Hazard Information and Packaging) Regulations.

APPROVED CODE OF PRACTICE

Safety Data Sheets for Substances and Preparations. Classification and Labelling of Substances and Preparations Dangerous for Supply.

GUIDANCE NOTES

Workplace Exposure Limits EH40. CHIP for everyone HSG(108).

16 OTHER INFORMATION

REVISION DATE	9th August 2007
REV. NO./REPL. SDS GENERATED	07
SDS NO.	S024

SAFETY DATA SHEET STATUS

Approved.

DATE	9th August 2007
SIGNATURE	Jitendra Panchal

RISK PHRASES IN FULL

R31	Contact with acids liberates toxic gas.
R34	Causes burns.
R50	Very toxic to aquatic organisms.

6. Safety Data Sheets (SDSs)

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or SDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in 16-section uniform format that includes section numbers, headings, and associated information under the headings below:

Employers must ensure that SDSs are readily accessible to employees Appendix D of 1910.1200 offers a detailed description of SDS contents;

Section 1
Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).

Section 2
Hazard(s) identification includes all hazards regarding the chemical; required label elements.

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g., flammable liquid, category1).
- Signal word.
- Hazard statement(s).
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
- Precautionary statement(s).
- Description of any hazards not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3
Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service (CAS) number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

(continued)

6. Safety Data Sheets (SDSs) (continued)

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
  - Present above their cut-off/concentration limits or
  - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
  - A trade secret claim is made,
  - There is batch-to-batch variation, or
  - The SDS is used for a group of substantially similar mixture
  - Chemicals where a trade secret is claimed
- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

Section 4
First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5
Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6
Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up).

(continued)

6. Safety Data Sheets (SDSs) (continued)

Section 7
Handling and storage lists precautions for safe handling and storage, including incompatibilities.

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements).

Section 8
Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.

- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face,

skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9
Physical and chemical properties lists the chemical's characteristics.

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.);
- Upper/lower flammability or explosive limits;
- Odor;
- Vapor pressure;
- Odor threshold;
- Vapor density;
- pH;
- Relative density;
- Melting point/freezing point;
- Solubility(ies);
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition.

(continued)

6. Safety Data Sheets (SDSs) (continued)

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.

Section 10
Stability and reactivity lists chemical stability and possibility of hazardous reactions.

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize,

which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11
Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.

(continued)

6. Safety Data Sheets (SDSs) (continued)

- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA

***Note:** Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)) mentioned below:

Section 12
Ecological information*

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment.

Section 13
Disposal considerations*

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS.

Section 14
Transport information*

This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea.

Section 15
Regulatory information*

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS.

The information may include:

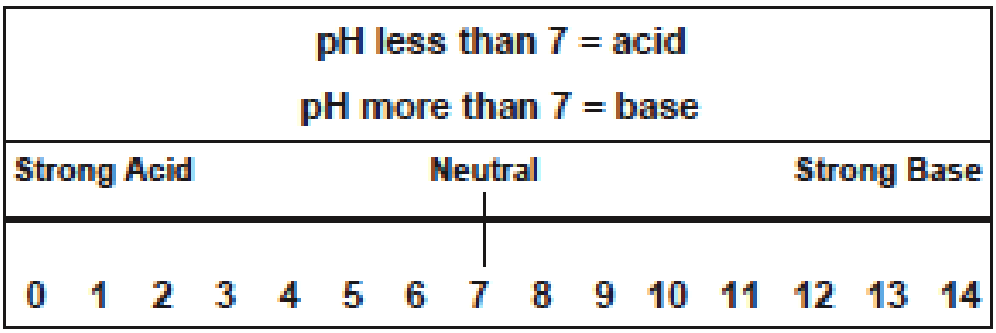
- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).

Section 16
Other information, includes the date of preparation or last revision.

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

7. pH: A Basic Chemical Term

The pH of a chemical tells you if the chemical is an acid, a base (also called alkali or caustic), or neutral. The pH scale goes from 0 to 14, with 7 being neutral (water is neutral with a pH of 7).



The lower the pH (below 7), the stronger the acid. The higher the pH (above 7), the stronger the base. Many organic hydrocarbons (e.g., gasoline, benzene, kerosene, etc.) have almost neutral pHs (close to 7).

Here are some things to remember about pH:

- Chemicals with a pH much lower or much higher than 7 will cause irritation and burns to the part of the body coming into contact with the material.

- Basic chemicals (those with a pH above 7) are much more dangerous to the eyes than are acids. Acids "sit" on the surface of the eyes, if splashed, and can therefore be washed off (if done quickly), often without resulting in permanent damage.

- Base substances rapidly penetrate the eye tissue, often causing quick and lasting damage.

- Store like with like. Chemicals with lower or higher pH should only be stored with chemicals of like pH and never with their opposite or a neutral chemical.

(continued)

The Fearsome Incompatibles

Keep these...	away from these...	or you may get these
Acids	Bases	**Heat** **Violent Reaction**
Acids or Bases	Reactive Metals (Aluminum, Beryllium, Calcium, Lithium, Potassium, Magnesium, Sodium, Zinc Powder), Metal Hydrides	**Fire** **Explosion** **Hydrogen Gas**
Water or Alcohols	Concentrated Acids or Bases Calcium, Lithium, Potassium, Metal Hydrides, Other Water Reactive Wastes	**Heat** **Fire** **Explosions** **Flammable and Toxic Gases**
Reactive Organic Compounds or Solvents (Alcohols, Aldehydes, Nitrated Hydrocarbons)	Concentrated Acids or Bases, Reactive Metals and Metal Hydrides	**Fire** **Explosion**
Cyanide or Sulfide Solutions	Acids	**(Toxic) Hydrogen Cyanide Sulfide Gas**
Strong Oxidizers (Chlorates, Chlorine, Chrome Acid, Hypochlorites, Nitrates, Perchlorates, Permanganates, Peroxides)	Organic Acids, Concentrated Mineral Acids, Reactive Metals, Metal Hydrides, Reactive Organic Compounds or Solvents, Flammable or Combustible Waste	**Fire** **Explosion**

8. An Alternative Source of Information

Through New Jersey's Right to Know program you can obtain factsheets (at no charge) for 1,717 commonly used hazardous substances and chemicals (630 are available in Spanish). The factsheets are easy to read. (www.state.nj.us/health/eoh/rtkweb/).

The phone number for the Right to Know program is 609-555-5555. The e-mail address is

9. Your Rights Under the Law

OSHA requires your company to:

- Have an SDS for every hazardous chemical used in the workplace (including all maintenance and cleaning chemicals)
- Provide you with a copy of the SDS no later than 15 days after the request, at no charge
- Ensure that SDSs are readily accessible to all employees during each shift
- Provide training to you and your co-workers prior to handling hazardous chemicals so that you understand the health effects of these chemicals and how to work with them safely

What Is OSHA?

The Occupational Safety and Health Administration (OSHA), is an agency of the U.S. Department of Labor. Congress created OSHA under the Occupational Safety and Health Act of 1970. Prior to 1970, no uniform, comprehensive provisions existed to protect workers against unsafe or hazardous work situations.

OSHA's sole responsibility is to develop mandatory job safety and health standards and enforce them through workplace inspections, employer assistance, and by imposing citations and financial penalties.

OSHA covers all private sector employers and employees in manufacturing, construction, long shoring, shipping, agriculture, law, medicine, charity, disaster relief, organized labor, private education, and religious groups who employ workers.

(continued)

9. Your Rights Under the Law (continued)

You Can File an OSHA Complaint

If you are concerned about a health and safety problem on your job and your employer refuses to solve the problem you can file an OSHA complaint. If you file an OSHA complaint you will have to complete an OSHA-7 Complaint Form and it must be faxed, mailed or emailed to the local OSHA Regional Office. You can obtain a complaint form by contacting the OSHA area office or going online (www.osha.gov/as/opa/worker/complain.html#happens).

Your complaint may result in an OSHA investigation. If an OSHA investigation doesn't solve the problem you can still request an OSHA on-site inspection. If OSHA decides not to inspect, they must notify you in writing and give reasons. You may question this decision with the OSHA area director and regional administrator.

The OSHA General Duty Clause

Section 5(a)(1) of the Occupational Safety and Health Act requires that an employer:

> *"shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."*

This is know as the OSHA "general duty clause."

Task 3 (Labeling and Pictograms)

OSHA has updated the requirements for labeling of hazardous chemicals under its Hazard Communication Standard (HCS). As of June 1, 2015, all labels will be required to have pictograms, a signal word, hazard and precautionary statements, the product identifier, and supplier identification.

In your groups, review the factsheets on pages 50-54. Then assume that you have been asked to move cotainers with lables that look like the one on the next page. Based on the factsheets and the label, what hazards would be of most concern to you and your co-workers? Also, explain what you can conclude from looking at the pictograms.

1. List your concerns based on the label.

2. What can you learn from the pictograms?

Sulfuric Acid / ácido sulfúrico / 硫酸

Danger

Causes severe skin burns and eye damage. Fatal if inhaled. Causes damage to organs if inhaled. May be corrosive to metals. May be harmful if swallowed.Do not breathe dust/fume/gas/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection. Use only outdoors or in a well-ventilated area.IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER/doctor/... IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.Store in a well-ventilated place. Keep container tightly closed. Store in corrosive resistant/... container with a resistant inner liner.Dispose of contents/ container to an approved waste disposal plant.

Peligro

Provoca quemaduras graves en la piel y lesiones oculares graves. Mortal en caso de inhalación. Provoca daños en los órganos por inhalación. Puede ser corrosivo para los metales. Puede ser nocivo en caso de ingestión.No respirar el polvo/el humo/el gas/la niebla/los vapores/el aerosol. Llevar guantes/prendas/gafas/máscara de protección. Llevar equipo de protección respiratoria. Utilizar únicamente en exteriores o en un lugar bien ventilado.EN CASO DE INHALACIÓN: Transportar a la víctima al exterior y mantenerla en reposo en una posición confortable para respirar. Llamar inmediatamente a un CENTRO DE TOXICOLOGÍA/médico/... EN CASO DE CONTACTO CON LOS OJOS: Aclarar cuidadosamente con agua durante varios minutos. Quitar las lentes de contacto, si lleva y resulta fácil. Seguir aclarando. EN CASO DE INGESTIÓN: Enjuagarse la boca. NO provocar el vómito. EN CASO DE CONTACTO CON LA PIEL (o el pelo): Quitarse inmediatamente las prendas contaminadas. Aclararse la piel con agua o ducharse. Lavar las prendas contaminadas antes de volver a usarlas.Almacenar en un lugar bien ventilado. Mantener el recipiente cerrado herméticamente. Almacenar en un recipiente resistente a la corrosión/en un recipiente...con forro interior resistente a la corrosión.Eliminar el contenido/ el recipeinte en una planta de eliminación de residuos aprobada.

危险

造成严重皮肤灼伤和眼损伤。吸入致命。吸入引起对器官的伤害。可能对金属有腐蚀性。如服入是有害的。不要吸入粉尘/烟/气体/烟雾/蒸汽/喷雾。戴防护手套/穿防护服/戴防护眼罩/戴防护面具。带呼吸防护装置。只能在室外或通风良好的环境操作。如误吸入：将受害人转移到空气新鲜处，保持呼吸舒适的体位休息。立即呼叫解毒中心/医生/..... 如进入眼睛：用水小心清洗几分钟。如带隐形眼镜并可方便地取出，取出隐形眼镜。如误吞咽：漱口。但不要诱导呕吐。如皮肤(或头发)沾染：立即脱掉所有沾染的衣服。用水冲洗/淋浴皮肤。衣服须经洗涤后方可重新使用。存放于通风良好处。保持容器密闭。贮存于抗腐蚀/.....带抗腐蚀衬里的容器中。将内容物/ 容器处理到得到批准的废物处理厂。

SULFURIC ACID

UN1830

24 HOUR EMERGENCY
CALL CHEMTREC
1-800-424-9300 (USA)
+1-703-527-3889 (outside USA)

icc ComplianceCenter
HAZMAT REGULATIONS SPECIALISTS

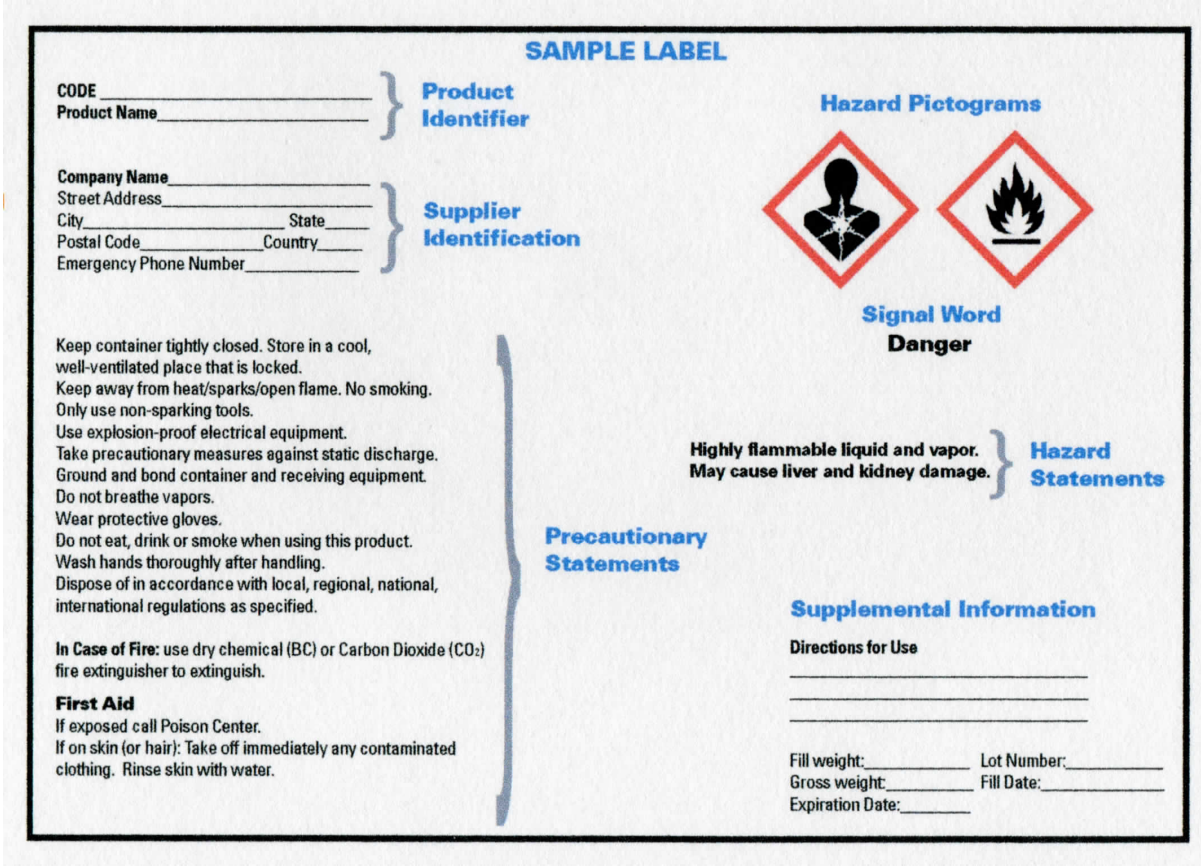
ICC - The Compliance Center
205 Matheson Blvd East
Unit 7, Mississauga, Ontario, L4Z 1X8, Canada
Phone: 905-890-7228, www.thecompliancecenter.com

LOT NUMBER:	NET WEIGHT	PRODUCT CODE
34234	20 KGS	HAZ-SUL

10. Changes to the HCS Labels

OSHA has updated the requirements for labeling of hazardous chemicals. As of June 1, 2015, all labels will be required to have pictograms, a single word, hazard and precautionary statements, the product identifier, and supplier identification.

A revised sample Hazard Communication Standard (HCS) label identifying the required label elements, with explanations for each heading is shown below. Supplemental information can also be provided on the label.



Definitions:
SAMPLE LABEL
"Label elements" means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Product Identifier
CODE _____
Product Name _____

Supplier Identification
Company Name_____
Street Address _____
City _____ State _____
Postal Code _____ Country _____
Emergency Phone Number _____

Precautionary Statements
"Precautionary statement" means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Keep container tightly closed. Store in cool, well ventilated place that is locked.
Keep away from heat/sparks/open flame. No smoking.
Only use non-sparking tools.
Use explosion-proof electrical equipment.
Take precautionary measure against static discharge.
Ground and bond container and receiving equipment.
Do not breathe vapors.
Wear Protective gloves.
Do not eat, drink or smoke when using this product.
Wash hands thoroughly after handling.
Dispose of in accordance with local, regional, national, international regulations as specified.

(continued)

10. Changes to the HCS Labels (continued)

In Case of Fire: use dry chemical (BC) or Carbon dioxide (CO2) fire extinguisher to extinguish.

First Aid
If exposed call Poison Center.
If on skin (on hair): Take off immediately any contaminated clothing. Rinse skin with water.

Definitions:
SIGNAL WORD
The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe

Danger

HAZARD STATEMENT
"Hazard statement" means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Highly flammable liquid and vapor.
May cause liver and kidney damage.

SUPPLEMENTAL INFORMATION
Directions for use

_____
_____
_____
Fill weight: _____ Lot Number _____
Gross weight: _____ Fill Date: _____
Expiration Date: _____

12. Effective Dates

The table below summarizes the phase-in dates required under the revised Hazard Communication Standard (HCS). Manufacturers and distributors are in the process of converting to the new system. Below are the deadlines for completing the transition to the new system.

Effective Completion Dates	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015 December 1, 2015	Compliance with all modified provisions of this final rule except; The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors and employers

Summary

1. Many traditional cleaning products, floor strippers and disinfectants are a source for human health and environmental problems. Cleaning products may contain chemicals that cause cancer, reproductive disorders, respiratory ailments (including occupational asthma), eye and skin irritation, central nervous system impairment and other human health effects.

2. There are four basic ways that chemicals can enter your body:

    - Direct contact—on the skin or eyes
    - Absorption—through the skin
    - Ingestion—through the mouth with food
    - Inhalation—through the lungs

3. You can't rely on your sense of smell to protect you from exposure to toxic chemicals.

4. After ingestion, inhalation or skin contact, toxic chemicals as well as their by-products affect the body. For most toxic substances to cause harm there needs to be a sufficient "dose" given. The higher the concentration, the larger the dose. The longer the exposure, the larger the dose.

5. There are two different types of effects that result from toxic exposure. They are acute and chronic. "Acute" means that health effects are felt at the time of exposure or shortly after, or result from a short-term, highly concentrated exposure. "Chronic" is a word that means the ill effects will not be seen for some time after exposure.

6. Safety Data Sheets (SDSs) give detailed information on chemical and physical dangers, safety procedures and emergency response techniques. Employers are required to have SDSs for every hazardous chemical in the workplace. The SDSs must be readily accessible to all employees on every shift and in the employee's work area.

7. The pH of a chemical tells you if the chemical is an acid, a base (also called alkali or caustic), or neutral. Chemicals with lower or higher pH should only be stored with chemicals of like pH and never with their opposite or a neutral chemical.

8. OSHA requires employers to provide training to you and your co-workers prior to handling hazardous chemicals. OSHA also requires employers to have SDSs readily accessible to all employees during each shift. If you are concerned about a health and safety problem on your job and your employer refuses to solve the problem you can file an OSHA complaint.

9. Through New Jersey's Right to Know program you can obtain factsheets (for no charge) on over 1,700 commonly used hazardous substances and chemicals. The factsheets are easier to read than most SDSs.

10. OSHA has updated the requirements for labeling of hazardous chemicals. As of June 1, 2015, all labels will be required to have pictograms, a single word, hazard and precautionary statements, the product identifier, and supplier identification.

11. As of June 1, 2015, the Hazard Communication Standard (HCS) will require pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification..

12. **As of December 1, 2013, all workers** should have been trained under the revised Hazard Communication Standard (HCS).

Evaluation Activity 2: Chemical Hazards and SDSs

1. How important is this activity for you and your co-workers?
Please circle one number.

Activity Is Not Important				Activity Is Very Important
1	**2**	**3**	**4**	**5**

2. Please **put an "X" by the one factsheet** you feel is the most important**.**

	1. Cleaning Products Can Make You Sick		**7.** pH: A Basic Chemical Term
	2. Chemical Hazard Awareness		**8.** An Alternative Source of Information
	3. Don't Trust Your Nose		**9.** Your Rights Under the Law
	4. Dose and the Body's Response		10. Changes to the HCS Labels
	5. The Long and Short of It		11. New HazCom PictoGrams
	6. Safety Data Sheets (SDSs)		12. Effective Dates

3. Which summary point do you feel is most important?
Please circle one number.

Most Important Summary Point				
1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.			

4. What would you suggest be done to improve this Activity?