



This month, we dedicate the newsletter to the Safety Data Sheet. What exactly can it tell us? Who writes those things? How the heck does anyone understand what they mean?

-Steve and Hilary



All about Safety Data Sheets

The Hazard Communication Standard (HCS) of the U.S. Occupational Safety and Health Administration (OSHA) requires companies which manufacture or distribute hazardous chemicals to provide Safety Data Sheets (SDS) to their customers.

The SDS (formerly known as an MSDS) provides useful information about a specific chemical, such as various names used for the chemical, procedures for safe handling and storage, exposure risks, appropriate personal protective equipment (PPE), exposure limits, and emergency response measures.

Employers should provide SDSs for every chemical to which employees might come into contact. SDSs are also useful to persons not covered by OSHA rule, because they provide important safety information of chemicals.

In December 2015, OSHA implemented elements of the Global Harmonization Standard into the [Hazard Communication Standard](#), mandating that all chemical manufacturers in the U.S. utilize the GHS SDS format.

Who creates the SDS? The chemical manufacturer is responsible for creating an accurate SDS for each chemical they produce. Some chemical manufacturers may write the SDS themselves, while others may hire a specialist to write the SDS for the chemical they are manufacturing.

The Global Harmonization Standard (GHS) was developed by the United Nations, as a way to bring into agreement the chemical regulations and standards of different countries.

In short, it is an international attempt to get everyone on the same page.

SDSs present lots of information, and may seem overwhelming at first glance. However, once you know how the sheets are organized, you can find information quickly, thanks to the standardized format. . .



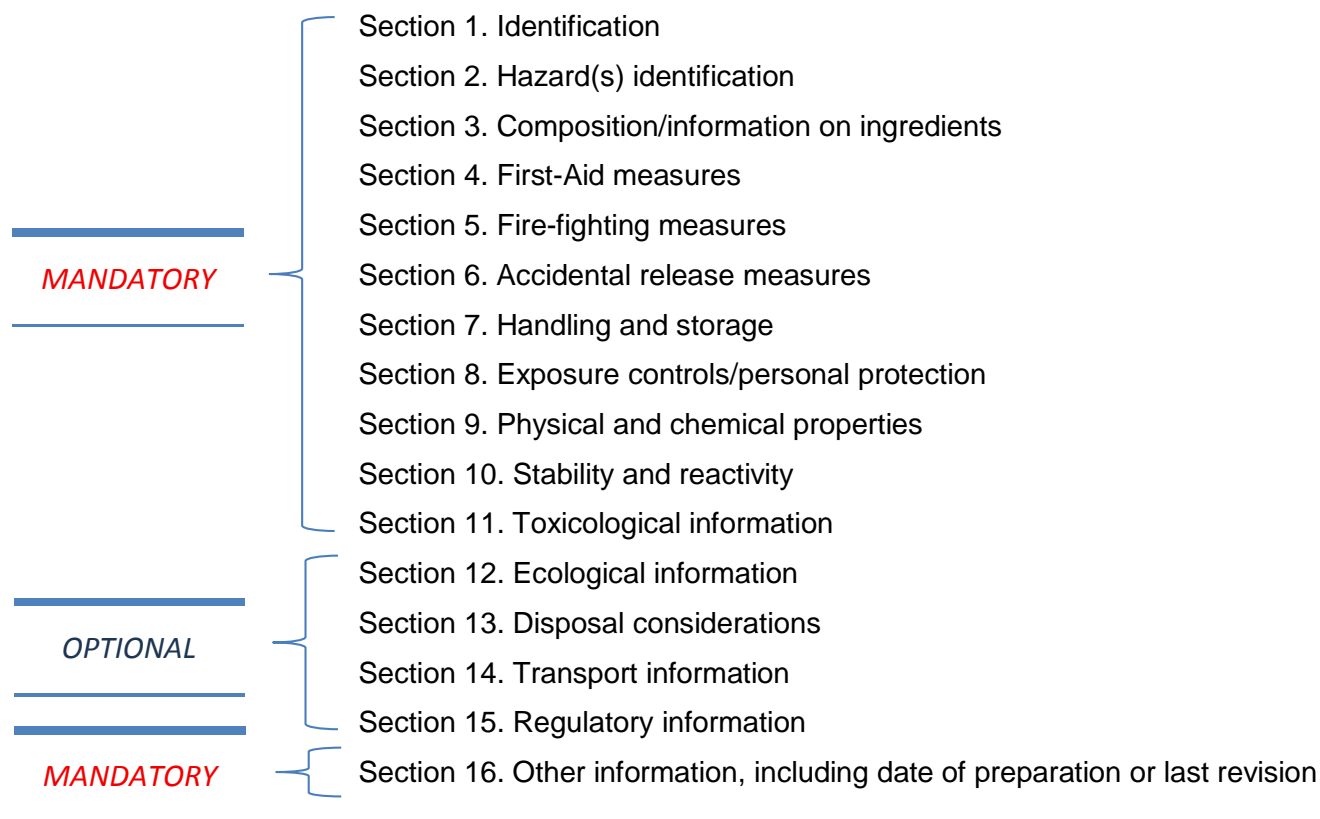
All About Safety Data Sheets

SDS

Breakdown:

- SDS have 16 sections
- All over the world, SDSs have 16 sections, which always present chemical information in the same order.
- In the U.S., Sections 1-11 and 16 are mandatory, while sections 12-15 are optional.

The format of the 16-section SDS includes the following sections:



Here's a simple way to think about the information in an SDS:

Section 1- 3: **What is the material? Can harm us?**

Sections 4- 6: **What do you do if a hazardous situation occurs?**

Sections 7- 11: **How to do you prevent a hazardous situation from occurring?**

Sections 12- 15: **How do you dispose and transport the chemical? How is it regulated? (optional)**

Section 16: **Any other useful information? When was the SDS written or last revised?**

Side note: Sections 12-15 are optional in the U.S. because disposal, transportation, and regulation fall outside of OSHA's jurisdiction.

All about Safety Data Sheets



GHS HAZARD CLASSIFICATION












SDS contain images called **"Pictograms."** These pictograms each represent one of the 9 Hazard Classes within the Global Harmonization System. This worldwide standardization helps communicate hazards of chemicals being shipped internationally. This enables the reader of the SDS to have awareness of chemical hazards even if the SDS is written in a foreign language.

Pictograms on an SDS are found in Section 2: (Hazard Identification).

There are 9 pictograms under the GHS to convey the health, physical, and environmental hazards. In the U.S., OSHA's final Hazard Communication Standard (HCS) requires 8 of these pictograms. The 9th hazard class / pictogram is the Environmental Hazard symbol, which is optional because environmental hazards are not within OSHA's jurisdiction.

The hazard pictograms and their corresponding hazards are shown below:

<p>GHS01: Explosive</p>  <p>Explosives⁴ Self-reactives, types A, B Organic peroxides, types A, B</p>	<p>GHS02: Flammable</p>  <p>Flammables Self-Reactives, types B-F Pyrophorics Organic Peroxides types B-F Self-Heating Emits Flammable Gas</p>	<p>GHS03: Oxidizing</p>  <p>Oxidizers</p>
<p>GHS04: Compressed Gas</p>  <p>Gases under Pressure</p>	<p>GHS05: Corrosive</p>  <p>Skin Corrosion/ burns Eye Damage Corrosive to Metals</p>	<p>GHS06: Toxic</p>  <p>Acute Toxicity (fatal or toxic) <small>*GHS Acute Toxic symbol is used for less severe toxicity</small></p>
<p>GHS07: Harmful</p>  <p>Irritant (skin and eye) Narcotic Effects Skin Sensitizer Respiratory Tract Acute Toxicity Irritant Hazardous to Ozone Layer (Non Mandatory)</p>	<p>GHS08: Health Hazard</p>  <p>Carcinogen Respiratory Sensitizer Mutagenicity Target Organ Reproductive Aspiration Toxicity</p>	<p>GHS09: Environmental Hazard</p>  <p>Aquatic Toxicity</p>

Now let's break down an SDS, comparing 2 separate examples. . .

All about Safety Data Sheets

We will look at examples of two different SDSs for a similar chemical – Sodium hydroxide solution (40%). Notice that although they both follow the same standardized format under GHS, they will still have differences in content and style, because they were written by two different authors. Compare the differences between the two sample SDSs as you move through each section.

Sections 1-3:

What is the material? Can it harm us?

Section 1: Identification

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”, “degreaser”, or “cleaning solution”) and any restrictions on use (including recommendations given by the supplier).



Page 1/11

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 02/09/2017

Reviewed on 02/09/2017

1 Identification

· **Product Identifier**

· **Trade name:** 10N Sodium Hydroxide (NaOH 40%)

· **Product Number:** NGT-10N NaOH

· **Relevant identified uses of the substance or mixture and uses advised against:**
No further relevant information available.

· **Product Description** PC21 Laboratory chemicals

· **Application of the substance / the mixture:** Laboratory chemicals

· **Details of the Supplier of the Safety Data Sheet:**

· **Manufacturer/Supplier:**

NuGeneration Technologies, LLC (dba NuGenTec)

1155 Park Avenue, Emeryville, CA 94608

salesteam@nugentec.com

1-888-996-8436 or 1-707-820-4080 for product information

www.nugentec.com

· **Emergency telephone number:**

PERS Emergency Response: Domestic and Canada - 1-800-633-8253, International 1-801-629-0667

All about Safety Data Sheets

Sections 1-3:

What is the material? Can it harm us?

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS, and the appropriate warning information associated with those hazards. This section describes any ways the material can harm us, and precautions to take to prevent injury. The required information of Section 2 consists of seven items:

Hazard Class **Pictograms**
Hazard Statement **Precautionary statement**
Signal Word **Mixtures of Unknown Toxicity**
Description of any hazards not otherwise classified

REQUIRED in Section 2:

- **The GHS “Hazard Class”** of the chemical (e.g.GHS01: Explosive, GHS05: Corrosive). A chemical may pose multiple hazards to a user, so the SDS may show multiple Hazard Classes.
- **GHS “Signal Word”**
There are only two signal words in GHS: **"Danger" or "Warning."**
They are used to emphasize chemical hazards and indicate the relative level of severity of the hazard.
"Danger" = More Severe; "Warning" = Less Severe
- **Pictograms**
The GHS pictogram for each Hazard Class associated with the chemical may be presented as graphical reproductions of the symbols in black and white.
NOTE: OSHA rule allows SDS authors to include a written description of the name of the pictogram (e.g., skull and crossbones, flame), *in place* of the actual pictogram graphic. This is not a best practice, but it is allowable under OSHA rule.
- **GHS “Hazard Statement(s)”**
Section 2 of an SDS will always have something called the “Hazard Statement.”
The Hazard Statement is a short sentence that clearly describes the hazard(s) that the chemical poses. Some examples of this are “Causes severe skin burns” or “Toxic if swallowed.”
The specific Hazard Statement is a *required component* of Section 2, so the SDS reader should always be able to find a simple statement describing the hazards in this section.
The SDS reader doesn’t need to worry about looking up any numbers or codes, because the hazard statement will *always* be written out on the SDS. This ensures that anyone reading the SDS knows exactly what to expect immediately, without having to refer to a long list of codes.

All about Safety Data Sheets

Sections 1-3:

What is the material? Can it harm us?

Section 2: Hazard(s) Identification (cont.)

Section 2 identifies the hazards of the chemical presented on the SDS, and the appropriate warning information associated with those hazards. This section describes any ways the material can harm us, and precautions to take to prevent injury. The required information of Section 2 consists of seven items:

Hazard Class	Pictograms
Hazard Statement	Precautionary statement
Signal Word	Mixtures of Unknown Toxicity
Description of any hazards not otherwise classified	

REQUIRED in Section 2 (cont.):

- **Precautionary statement(s)**

An SDS will also have short statements describing precautions that users should take when working with the chemical.

Each Precautionary Statement has an associated precautionary code (Pxxx); however;

The SDS reader doesn't need to worry about the code, because the statement will *always* be written out on the SDS. This ensures that anyone reading the SDS knows exactly what to expect immediately, without having to refer to a long list of codes.

Each code begins with the Letter "P" for Precautionary Statement

The first number designates the type of precaution:

1= general, 2 = prevention, 3 = response, 4 = storage, 5 = disposal

The second and third numbers refer to specific prevention measures

For example: the prevention code P234 designates "Keep only in original container" and P260 designates "Do not breathe dusts or mists."

- **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).

- **Mixtures of Unknown Toxicity**

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).

All about Safety Data Sheets

Sections 1-3:

What is the material? Can it harm us?

Section 2: Hazard(s) Identification (cont.)

Some authors choose to include extra information in the SDS. This extra information can actually make the SDS appear more confusing. It is important to remember that the only required components of Section 2 are the 7 items listed in the previous pages. Any other information is optional. Some of the most common “extras” include:

Hazard Code NFPA Fire Diamond
Hazard Category HMIS Rating

Extra Info Sometimes Included in Section 2:

▪ Hazard Code

Some SDS authors may also include a 4 digit “Hazard Code.” Each code begins with the Letter “H” (for Hazard Statement), then a number designating the type of hazard (2 = physical hazard, 3 = health hazard, 4 = environmental hazard), followed by two additional numbers which designate the intrinsic properties of the substance.

For example: the hazard code H200 refers to an unstable explosive. It’s clear from the first letter of the code, “2”, that the explosive property of the material is a physical hazard.

Section A3.1.2.1 of the [UNECE document](#) explains the codification of the hazard statements.

▪ Hazard Category

The Hazard Category is a number that indicates the degree of hazard within a Hazard Class.

Section 2 of the new GHS Labels and SDSs require **hazard statements** which are determined by:

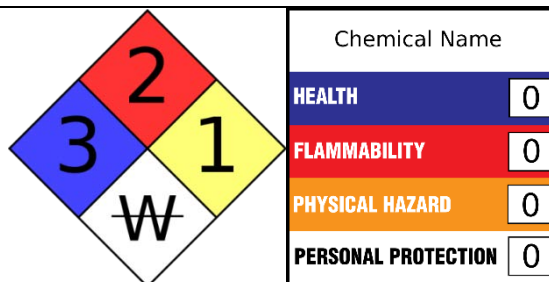
Hazard Class + Hazard Category = Hazard Statement

There are numerous Hazard Categories under the GHS system, which SDS authors utilize to determine the correct Hazard Statement.

Some SDS authors might choose to include the Hazard Category used to determine the Hazard Statement. Because the Hazard statement has already been given as a required element of Section 2, the reader does not need this extra information.

▪ NFPA Fire Diamond and HMIS Rating

The NFPA Fire Diamond and HMIS Rating are safety tools developed and used in the United States. They are not required elements of an SDS, although some manufacturers choose to include them.



All about Safety Data Sheets

Sections 1-3:

What is the material? Can it harm us?

Section 3: Composition Information on Ingredients

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

▪ Mixtures

- Same information required for substances, plus:
- 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 mixtures

▪ Trade Secret Claimed Chemicals

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required

All about Safety Data Sheets

Sections 4-6:

What do you do if a hazardous situation occurs?

Section 4: First Aid Measures

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 section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. This section describes any ways the material can harm us, and precautions to take to prevent injury. 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: Firefighting Measures

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

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.

All about Safety Data Sheets

Sections 7-11:

How do you prevent a hazardous situation from occurring?

Section 7: Handling and Storage

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

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 SDS, 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

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

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

Notes on the Composition on Ingredients Section: 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.

All about Safety Data Sheets

Sections 7-11 (cont.):

How do you prevent a hazardous situation from occurring?

Section 10: Stability and Reactivity

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 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. 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 SDS, 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).

All about Safety Data Sheets

Sections 12-15 (optional in the U.S.): How do you dispose and transport the chemical? How is it regulated?

Section 12: Ecological Information (optional)

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

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (K_{ow}) and the bioconcentration factor (BCF), where available
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential)

Section 13: Disposal Considerations (optional)

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. The information may include:

- Description of appropriate disposal containers to use
- Recommendations of appropriate disposal methods to employ
- Description of the physical and chemical properties that may affect disposal activities
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities

All about Safety Data Sheets

Sections 12-15 (optional):

How do you dispose and transport the chemical?

How is it regulated?

Section 14: Transport Information (optional)

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

- UN number (i.e., four-figure identification number of the substance)
- UN proper shipping name¹
- Transport hazard class
- Packing group number, if applicable, based on the degree of hazard
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78³ and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code [IBC Code])).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available)

Section 15: Regulatory Information (optional)

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 (Required)

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.

Notes and Resources for Understanding SDSs

Notes and Best Practices

Variance in SDS Content

Although GHS has standardized the format of SDSs, they can still vary widely in their style and content. Different authors have different perspectives, and this leads to variation of the information conveyed between SDSs – even for the same chemical.

BEST PRACTICE: When addressing a chemical in emergency preparedness or response, always seek out at least 3 sources of information. An example might be:

1. the SDS supplied by the chemical manufacturer
2. an alternate SDS created by a different manufacturer of the same chemical
3. the chemical data sheet from CAMEO Chemicals

Having three separate sources of information will improve the chances that all potential hazards will be covered by at least one of the three sources. It is also wise to consider the worst case scenario offered from all chemical information sources reviewed, and to take the most conservative operational approach to protect responders.

NFPA 704 Fire Diamond and GHS HazCom 2012

- The Hazard Categories utilized under GHS to convey the degree of hazard under GHS fall on a scale of 1-4: 1 being the most severe hazard, and 4 representing the lowest hazard severity.
- This is the *opposite* of the NFPA 704 Rating System (the NFPA Fire Diamond), where degree of hazard is rated on a scale of 0-4: 0 = least hazardous degree, and 4 = the most hazardous degree.
- OSHA has created the quick card below (provided on the following page) to aid SDS readers in this potentially confusing issue.

BEST PRACTICE: Always read the Signal Word and Hazard Statement in an SDS to obtain a good understanding of the hazards present for that chemical. Then review the OSHA Quick Card below, or the separate NFPA guidance before responding.

OSHA References for Understanding Safety Data Sheets

[Safety Data Sheet Quick Card](#)

[OSHA HazCom Standard / GHS FAQs](#)

[OSHA HazCom Website](#)

[NFPA 704 / HazCom 2012 Comparison Quick Card](#)

[HazCom Pictogram Quick Card](#)

Oklahoma Attorney General Scott Pruitt Sworn In as EPA's 14th Administrator

On February 17, 2017, Scott Pruitt was sworn in as EPA's Administrator.

Mr. Pruitt says he will lead EPA in a way that our future generations inherit a better and healthier environment while advancing America's economic interests.



He also committed to working with the thousands of dedicated public servants at EPA who have devoted their careers to helping realize this shared vision, while faithfully administering environmental laws.

- [News Release](#)
 - [Video of Administrator Pruitt's First Address to EPA Staff](#)
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State EPCRA / LEPC Coordinators and SERC Contacts

Arkansas	Kenny Harmon	501-683-6700	kenny.harmon@adem.arkansas.gov
Louisiana	Gene Dunegan	225-925-6113	gene.dunegan@dps.la.gov
New Mexico	Henry Jolly	505-476-6240	henry.jolly@state.nm.us
Oklahoma	Tom Bergman	405-702-1013	tom.bergman@deq.ok.gov
	Bonnie McKelvey	405-521-2481	bonnie.mckelvey@oem.ok.gov
Texas	Bernardine Zimmerman	800-452-2791	Bernardine.zimmerman@tceq.texas.gov
	Joshua Bryant	512-424-5989	Joshua.Bryant@dps.texas.gov

Emergency Response Numbers

Arkansas Dept. of Emergency Management	800-322-4012
Louisiana State Police	877-925-6595
New Mexico State Police	505-827-9126
Oklahoma Dept. of Environmental Quality	800-522-0206
Texas Environmental Hotline	800-832-8224
National Response Center	800-424-8802
EPA Region 6	866-372-7745
CHEMTREC	800-424-9300



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