

2008 NYC Fire Code



New Hazardous Materials Regulations

History

- The new Fire Code legislation was signed by Mayor Bloomberg on June 3, 2008.
- The new Code took effect on July 1, 2008 with maintenance & operational requirements immediately enforceable.
- On July 1, 2009, the FDNY began enforcing new certificate of fitness, new permit and new design requirements of the new code.

HazMat Permits and C of F

- The following hazardous materials are now regulated by the FDNY and, in certain quantities, require possession of a C91 Certificate of Fitness and a Permit:
 - Corrosives
 - Flammable Solids
 - Toxics and Highly Toxics
 - Ozone Generators
 - Oxidizers
 - Organic Peroxides
 - Pyrophoric Materials
 - Pyroxylics
 - Unstable (Reactive) Materials
 - Water-Reactive Solids and Liquids

Note: Other hazardous materials such as flammable liquids, combustible liquids, and compressed gases are covered by other types of permits and/or Certificates of Fitness

Applicability

- Facilities that were lawfully existing under the old code (prior to July 1, 2008) will have most of the new design criteria waived (grandfathered).
- New installations, facilities, and new construction (including substantial alterations) and those that were not lawfully existing under the old Code (prior to July 1, 2008) will be required to fully comply with the new Code.

“Lawfully Existing”

FC 102.3 Lawfully existing facilities and conditions.

“Facilities, or parts thereof, lawfully existing on the effective date of this code (July 1, 2008) , as to which the design or installation of a facility would not be allowed or approved under this code may be continued in compliance with the old Fire Code and other laws, rules and regulations or permit conditions applicable at the time such facility was lawfully allowed or approved, and as such provisions may be amended from time to time.”

“Lawfully Existing”

- **R 102-01 Pre-Existing Facilities and Conditions (excerpts)**
- (a) Scope. This section consolidates requirements for *facilities*, or parts thereof, and *conditions* that were lawfully existing on July 1, 2008, the effective date of the Fire Code, and that, pursuant to FC102.3, may be continued in compliance with laws, rules, regulations and *permit* conditions pre-dating the Fire Code.
- (c)(2) Unless one of the exceptions set forth in FC102.3 is applicable, and except as otherwise provided in R102-01(c)(3) and (c)(4), *pre-existing conditions* or *facilities*, or any part thereof, that would not be allowed and could not be approved under the applicable provisions of the Fire Code and the *rules* shall comply with the provisions of the New York City Fire Prevention Code and the *rules* in effect on June 30, 2008, including applicable provisions consolidated in Chapter 48 of the *rules*, and any other applicable laws, rules and regulations. For example, an existing below-grade storage facility for flammable liquids lawfully designed and installed in a mercantile establishment prior to July 1, 2008, and that on June 30, 2008 was in compliance with the design and installation requirements for such facilities set forth in Administrative Code §27-4066 of Subchapter 9 of the New York City Fire Prevention Code, is a *pre-existing facility* which may be continued in compliance with the provisions of the New York City Fire Prevention Code and the *rules* in effect on June 30, 2008, notwithstanding the fact that such below-grade *facility* would not be allowed or approved in a *control area* under the Fire Code.

“Lawfully Existing”

- (3) Unless one of the exceptions set forth in FC102.3 is applicable, a *pre-existing condition* or *facility*, or part thereof, that was lawfully allowed or approved under the provisions of the Fire Prevention Code or *rules* or other laws, rules or regulation no longer in effect on June 30, 2008, and that had been lawfully continued under such earlier provisions through June 30, 2008, shall comply with such earlier design and installation provisions, to the extent applicable, and any other applicable laws, rules and regulations. Two examples are:
 - (A) an existing *refrigerating system* that was lawfully designed and installed on a *premises* pursuant to Subchapter 18 of the New York City Fire Prevention Code prior to the enactment of the 1968 *Building Code*, and that had not been required by reason of *alteration* or otherwise to be replaced to comply with the superseding 1968 Building Code or 2008 *Construction Codes* requirements for such systems, may be continued in compliance with the earlier provisions of the New York City Fire Prevention Code, notwithstanding the fact that such *refrigerating system* would not be allowed or approved under the Fire Code.
 - (B) an existing *LPG* storage facility that was lawfully designed and installed on a *premises* pursuant to Fire Prevention Directive 2-88, and that had not been required by reason of *alteration* or otherwise to be replaced or discontinued, may be continued in compliance with said directive, notwithstanding the fact that the quantity of LPG storage authorized by said directive exceeds the quantity that would be allowed or approved under the Fire Code.

“Lawfully Existing”

- (4) *Conditions or facilities*, or any part thereof, existing on July 1, 2008 that had not been approved, prohibited or otherwise regulated under the New York City Fire Prevention Code or New York City Building Code prior to such date, and that would not be allowed and could not be approved under the applicable provisions of the Fire Code and the *rules*, shall constitute a *pre-existing condition or facility* within the meaning of this section, if:
 - (A) on June 30, 2008, the condition or *facility* was in compliance with the requirements of any applicable Federal, New York State or other laws, rules or regulations; and
 - (B) at the time the *condition or facility* was established, it was substantially in compliance with national or industry standards or practices; and
 - (C) the *condition or facility* is not determined by the *Department* to be subject to any of the exceptions set forth in FC102.3.

Certificate of Fitness

- Certificate issued to individuals who pass a test administered by the FDNY and are authorized to perform certain regulatory functions mandated by the Fire Code.

Certificate of Fitness

- C91 study material is available at 9 Metrotech Center or online at the FDNY website
- http://www.nyc.gov/html/fdny/pdf/cof_study_material/c_91_st_mat.pdf
- www.nyc.gov/fdny and look for “Certificate of Fitness” link

Certificate of Fitness Process

All applicants must bring:

- A completed application (A20)
- A letter of recommendation from the employer
- 2 forms of government-issued identification
- \$25 in check, cash, money order, or credit card (no debit cards accepted)

Certificate of Fitness

- Tests available at 9 Metrotech Center M-F 8:30am-2:30pm (no appointments necessary unless more than 5 employees from the same organization or institution are taking the test at once)
- Must achieve a score of at least 70% on multiple choice exam covering Study Material
- Upon completion of test, individuals receive C of F card or failure report on the spot

Permits

- Permits are issued upon satisfactory completion of an on-site inspection by Fire Prevention Inspectors
- Requests for inspections may be submitted to the FDNY by email (camachs@fdny.nyc.gov), phone at 718-999-2502, fax (718-999-1015) or mail at:
9 MetroTech Center
Brooklyn, NY 11201
Attn: Laboratory Unit

Permits


The following documents should be submitted prior to our onsite inspection:

- NYC Department of Buildings approved plans and/or CofO
- Certificates of Fitness
- Hazardous Chemical Inventory List (NYC DEP Tier II acceptable)
- NYSDEC Chemical Bulk Storage (CBS) Registration
- MSDS (only for uncommon chemicals and/or mixtures)
- Contact Info (names & phone numbers)
- Hours and Days of Operation
- Type of Business (storage for use, sale, dispensing, manufacturing, etc.)

Permits

- Issuance of permits contingent upon compliance with the following:
 - Applicant must meet all applicable requirements of the Fire Code for the specific hazardous material at the inspection site (signage, extinguishers, etc)
 - Possession of at least one valid Certificate of Fitness (C91 for hazardous materials)
 - Payment of permit fee(s) (dependent on type of hazardous material and quantity)
 - Satisfactory examination of DOB-approved plans (or acceptance of CofO in lieu of plans)

Permit

FIRE DEPARTMENT, CITY OF NEW YORK				PERMIT		BUREAU OF FIRE PREVENTION	
ACCOUNT NUMBER	TYPE	A.P.	D.O.	ADM. CO.	ISSUANCE DATE	PERMIT EXPIRES	
88888888	10	R	27	E777	2/29/09	2/10	
PREMISES ADDRESS				ACCOUNT NAME			
LAUREN BLDG 111 ELM AVE QUEENS 11105-4950				BATTY'S BATCH OF CHEMICALS			
ITEM CODE	SUB CODE	QTY	DESCRIPTION			FLOOR NO.	FEE
715	00	1	INFL MIX/LQ 1-10 UNITS			1	210.00
110	00	1	ACIDS STR > 5 CARB EX PICRIC			1	50.00
PERMIT TYPE							
1							
1=REGULAR 2=SUPPLEMENTAL 3=DUPLICATE			BATTY'S BATCH OF CHEMICALS 111 ELM AVE QUEENS 11105-4950			260.00	
 8 8 8 8 8 8 8 8 6 2 4 5			BLEND METHANOL FROM 500-G TK W/ACETIC ACID FOR CLNG SOLN G-97 COF REQD				
9002004592			BY ORDER OF THE COMMISSIONER				

Corrosive Materials

- **Corrosive Material:** *A material that causes full thickness destruction of human skin at the site of contact within a specified period of time when tested by methods set forth in Department of Transportation (DOT) regulations 49 CFR Sections 173.136 and 173.137, or a liquid that has a severe corrosion rate on steel or aluminum based on the criteria set forth in DOT regulations 49 CFR Section 173.137(c) (2).*

Corrosive Materials

- A Liquid, Solid, or Gas that causes permanent injury (“full thickness destruction”) to human skin at a rate specified by the DOT regulations

-OR-

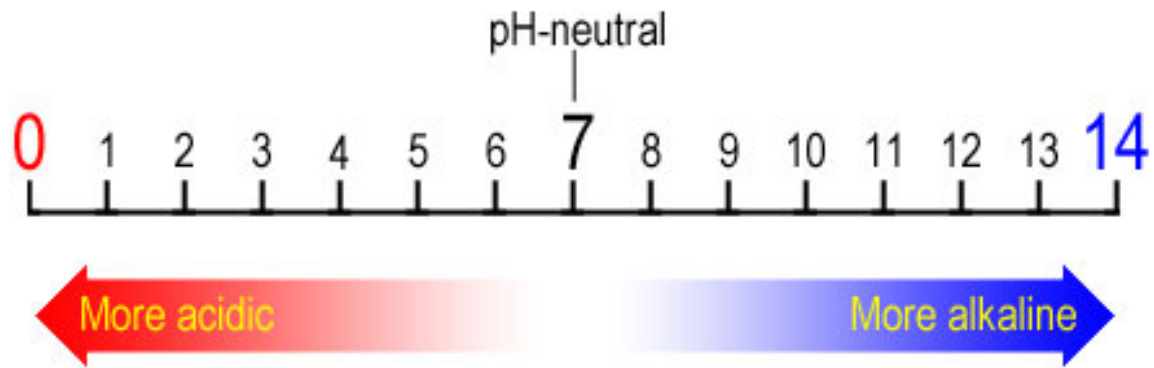
- A liquid that can corrode $\frac{1}{4}$ inch of steel or aluminum within the course of a year.

Corrosive Materials

- Corrosives can be either Acids or Bases
- **pH:** The negative logarithm of the hydrogen ion (H^+) concentration of a solution (in moles per liter or molarity).
- **Acid:** A solution that has a pH less than 7.0.
- **Base:** A solution that has a pH greater than 7.0. Basic materials or solutions are sometimes called caustic or alkaline

Corrosive Materials

- pH Scale



Corrosive Materials

- Some common corrosive materials:
 - Acids: Sulfuric Acid, Nitric Acid, Hydrochloric (Muriatic) Acid, Hydrofluoric Acid, Acetic Acid, Chromic Acid
 - Bases: Ammonium Hydroxide, Sodium Hydroxide (Lye), Sodium Hypochlorite (Bleach), Soda Lime, Calcium Hypochlorite
 - Gases: Chlorine, Ammonia,

Corrosive Materials

- Corrosives may have **serious** health risks (including death) upon exposure or inhalation.
- Corrosives can corrode metals and cause damage to property.
- Corrosives, if exposed to incompatible materials, can lead to dangerous reactions such as **explosions, release of toxic gas, and/or extreme fire conditions.**

Corrosive Materials



Corrosive Threshold Quantities

- Permit Thresholds:
 - 55 gallons of liquids
 - 1,000 pounds of solids
 - 400 SCF of compressed gases
- Certificate of Fitness Thresholds:
 - 550 gallons of liquids
 - 1,000 pounds of solids
 - 400 SCF of compressed gases

Flammable Solid Materials

- **FLAMMABLE SOLID:** *A solid, other than a blasting agent or other explosive, whether in elemental or alloy form, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change, or heat retained from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard.*

Flammable Solid Materials

- Many flammable solids may react violently or explosively on contact with water.
- Flammable Solids may be ignited by friction, heat, sparks, or flame and burn vigorously.
- Flammable Solids may cause explosions when heated under confinement or when dusts are released in the air.

Flammable Solid Materials

- Some common examples of flammable solids
 - Aluminum powder
 - Camphor
 - Magnesium
 - Matches
 - Naphthalene
 - Nitrocellulose
 - Phosphorus
 - Sulfur
 - Picric Acid (wetted with not less than 10% water).

Flammable Solid Materials



Flammable Solid Materials

- Permit and Certificate of Fitness Threshold

FORMS OF FLAMMABLE SOLID	INDOORS	OUTDOORS
	(pounds)	(pounds)
Pigs, ingots, billets, heavy castings	1,000	100
Light castings, light metallic products	125	100
Scraps, shavings, powders, dusts	1	100

Toxic and Highly Toxic Materials

- Toxicity is often measured by Median Lethal Dose (LD50) or Median Lethal Concentration (LC50).
- LD50: LD50 value is the amount of a solid or liquid material that it takes to kill 50% of test animals (for example, mice or rats) in one dose.
- LC50: A LC50 value is the amount of a gas, dust or mists that it takes to kill 50% of test animals (for example, mice or rats) in one dose.



Highly Toxic and Toxic Materials

Toxic Material: A chemical that is lethal at the following doses or concentration:

- 1. A chemical that has a median lethal dose (LD50) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered **orally** to albino rats weighing between 200 and 300 grams each; or
- 2. A chemical that has a median lethal dose (LD50) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous **contact** for 24 hours (or less if death occurs within 24 hours) with the **bare skin** of albino rabbits weighing between 2 and 3 kilograms each; or
- 3. A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of **gas or vapor**, or more than 2 milligrams per liter but not more than 20 milligrams per liter of **mist, fume or dust**, when administered by continuous **inhalation** for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Toxic and Highly Toxic Materials

Highly Toxic Material: a chemical that is lethal at the following doses or concentration, including the following:

- A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered **orally** to albino rats weighing between 200 and 300 grams each; or
- A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous **contact** for 24 hours (or less if death occurs within 24 hours) with the **bare skin** of albino rabbits weighing between 2 and 3 kilograms each; or
- A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of **gas or vapor**, or 2 milligrams per liter or less of **mist, fume or dust**, when administered by continuous **inhalation** for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Highly Toxic and Toxic Materials

	Toxic	Highly Toxic
Oral LD50 (albino rats)	50-500 mg/kg	<50 mg/kg
Skin Contact LD50 (albino rabbits)	200-1000 mg/kg	<200 mg/kg
Inhalation LC50 (albino rats) gas	200-2000 ppmv/air	<200 ppmv/air
Inhalation LC50 (albino rats) mists/dust	2-20 mg/L	<2 mg/L

Toxic and Highly Toxic Materials

- Toxic chemicals are chemicals that can produce injury or death when inhaled, ingested, or absorbed through the skin.
- Exposure may enter the body through three routes: inhalation, ingestion, or contact with the skin and eyes.

Toxic and Highly Toxic Materials

- Some common examples of toxic materials include:
 - Phenol
 - Acrylonitrile
 - Aniline
- Some common examples of highly toxic materials include:
 - Inorganic Cyanides (Sodium, potassium)
 - Chlorine gas

Toxic and Highly Toxic Materials



Toxic and Highly Toxic Materials

Highly Toxic Permit and Certificate of Fitness Thresholds:

- Gases: Any amount
- Solids: Any amount
- Liquids: Any amount

Toxic and Highly Toxic Materials

Toxic Permit and Certificate of Fitness Thresholds:

- Gases: Any amount
- Solids: 100 lbs.
- Liquids: 10 gallons

Ozone Gas Generators

- Ozone (trioxygen O_3) is a highly unstable gas that can readily decompose into O_2 (oxygen).
- Ozone gas is extremely toxic and can cause a decrease in lung function, chest pain, shortness of breath, throat irritation, higher susceptibility to respiratory infection, and inflammation of the lungs.
- Ozone is a strong oxidizer and is especially dangerous because it supplies a large oxygen source that can fuel a fire.
- Ozone gas can explode on contact with organic substances.

Ozone Gas Generators

- Permits and Certificates of Fitness are only required when ozone gas is stored as a compressed gas within a cylinder or tank.



Oxidizers

- ***Oxidizer:*** *A material that readily yields oxygen or other oxidizing gas, such as bromine, chlorine and fluorine, or that readily reacts to promote or initiate combustion of combustible materials, classified as follows:*

Oxidizers

- **Class 1.** An oxidizer whose primary hazard is that it slightly increases the burning rate but which does not cause spontaneous ignition when it comes in contact with combustible materials. Examples include:
 - Inorganic Nitrates
 - Nitric Acid ($\leq 40\%$)
 - Ammonium Persulfate
- **Class 2.** An oxidizer that will cause a moderate increase in the burning rate or that causes spontaneous ignition of combustible materials with which it comes in contact. Examples include:
 - Barium Bromate
 - Barium Chlorate
 - Solid Calcium Hypochlorite ($\leq 50\%$)

Oxidizers

- **Class 3.** An oxidizer that will cause a severe increase in the burning rate of combustible materials with which it comes in contact or that will undergo vigorous self-sustained decomposition caused by contamination or exposure to heat. Examples include:
 - Solid Calcium Hypochlorite ($\geq 50\%$)
 - Ammonium Dichlorimate
 - Perchloric Acid
- **Class 4.** An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and can cause spontaneous ignition of combustibles.
 - Ammonium Perchlorate
 - Ammonium Permanganate
 - Perchloric Acid ($\geq 72.5\%$)

Oxidizers

Oxidizer Permit and Certificate of Fitness Thresholds:

- Solids
 - Any amount of Class 4
 - 10 pounds Class 3
 - 100 pounds Class 2
 - 500 pounds Class 1

- Liquids:
 - Any amount of Class 4
 - 1 gallon Class 3
 - 10 gallons Class 2
 - 55 gallons Class 1

Organic Peroxides

- **Organic Peroxide:** *An organic compound having a double oxygen or peroxy (-O-O-) in its chemical structure. Organic peroxides can present an explosion hazard (detonation or deflagration), can be shock sensitive, can be susceptible to decomposition into various unstable compounds over an extended period of time and are classified as follows based upon their hazardous properties*
- Although organic peroxides are considered strong oxidizers, they are covered by a separate chapter in the new code due to their unique characteristics. Organic peroxides pose the dual hazards of being both oxidizers and flammable/combustible or explosive compounds.

Organic Peroxides

- Class I. Organic peroxides that are capable of deflagration but not detonation. Examples include:
 - t-butyl hydroperoxide (90%)
 - Fulfonyl Peroxide
 - Benzoyl Peroxide ($\geq 98\%$)
- Class II. Organic peroxides that burn very rapidly and that pose a moderate reactivity hazard.
 - Peroxyacetic acid (43%)
 - Di-sec-butyl peroxydicarbonate 75%
 - 3,5,5-trimethylecyclohexane

Organic Peroxide

- **Class III. Organic peroxides that burn rapidly and that pose a moderate reactivity hazard.**
 - Acetyl Cyclohexane sulfonal peroxide
 - Benzoyl peroxide (78%)
 - Cumene hydroperoxide (86%)
- **Class IV. Organic peroxides that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.**
 - Benzoyl peroxide (70%)
 - Methyl ethyl ketone peroxide (9% in water and glycols)
 - T-butyl hydroperoxide (70%)
- **Class V. Organic peroxides that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.**
 - Benzoyl peroxide (35%)

Organic Peroxide

Organic Peroxide Permit and Certificate of Fitness Thresholds:

- **Solids**

- Any amount of Class I
- Any amount of Class II
- 10 pounds of Class III
- 20 pounds of Class IV
- No permit needed for Class V

- **Liquids**

- Any amount of Class I
- Any amount of Class II
- 1 gallon of Class III
- 2 gallons of Class IV
- No permit required for Class V

Oxidizers & Organic Peroxides



Pyrophoric Materials

- ***Pyrophoric Material:*** *A material that is so chemically unstable that it may ignite spontaneously at a temperature at or below 130°F.*

Pyrophoric Material

- Examples of common pyrophoric materials:
 - Lithium metal
 - White or yellow phosphorus
 - Potassium metal
 - Sodium metal
 - Diborane gas
 - Phosphine gas
 - Silane gas

Pyrophoric Material



Pyrophoric Material

Pyrophoric Material Permit and Certificate of Fitness Thresholds:

- **Gases: Any amount**
- **Solids: Any amount**
- **Liquids: Any Amount**

Pyroxylin Plastics

- ***Pyroxylin Plastic:*** Any plastic substance, material or compound, other than cellulose nitrate film, that has soluble cotton or similar cellulose nitrate as a base, by whatever name known, in the form of blocks, sheets, tubes or other fabricated shapes, including raw pyroxylin plastics and finished pyroxylin plastic products.

Pyroxylin Plastics

- When dry, pyroxylin can ignite readily and burn explosively.
- Unstabilized pyroxylin decompose at relatively low temperatures and evolve large volumes of toxic and flammable gases with rapid heat generation.
- Old items may lose plasticizing elements and become more brittle and flammable over time.
- Even residues of nitrocellulose in production machinery may ignite.

Pyroxylin Plastics

Permits and Certificates of Fitness are required when:

- 25 lbs or more raw pyroxylin plastic is stored, handled, or used.
- Any amount of raw pyroxylin plastic is used in a manufacturing or assembly process

Unstable (Reactive) Material

- ***Unstable (Reactive) Material***—A material, other than an explosive, that will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with incompatible materials.

Unstable (Reactive) Materials

- **Class 1-** Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure. Examples include:
 - Hydrogen Peroxide 35-52%
 - Acetic Acid
 - Tetrahydrofuran
- **Class 2-** Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressure, and that can undergo violent chemical change at elevated temperatures and pressures. Examples include:
 - Acrolein
 - Acrylic Acid
 - Hydrazine

Unstable (Reactive) Materials

- **Class 3-** Materials that in themselves are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. Examples include:
 - Hydrogen peroxide >52%
 - hydroxylamine
 - perchloric acid
- **Class 4-** Materials that in themselves are readily capable of detonation or of explosive decomposition or of explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures. Examples include:
 - Acetyl peroxide
 - Dibutyl peroxide
 - Ethyl nitrate

Unstable (Reactive) Materials

Unstable Reactive permit and certificate of fitness thresholds

- Gases: Any amount
- Liquids
 - Any amount of Class 4
 - Any amount of Class 3
 - 5 gallons of Class 2
 - 10 gallons of Class 1
- Solids
 - Any amount of Class 4
 - Any amount of Class 3
 - 50 lbs of Class 2
 - 100 lbs of Class 1

Water-Reactive Solids & Liquids

- ***Water-Reactive Material:*** *A material (solid, liquid, or gas) that has a dangerous chemical reaction when reacting with water. Upon coming in contact with water, a water reactive material may explode, violently react, produce flammable, toxic, or other hazardous gases, and/or generate enough heat to cause ignition of the material or nearby materials.*

Water-Reactive Solids & Liquids

- Water-Reactive materials pose an extreme hazard due to the fact that they:
 - May react with water to produce energy, oxygen, and a heat source
 - May produce extremely hazardous gases on contact with water
 - Cannot be extinguished with water

Water-Reactive Solids & Liquids

- **Class 1-** Materials that may react with water to release some energy, but not violently. Examples include:
 - Acetic anhydride
 - Sodium Hydroxide
 - Titanium Tetrachloride
- **Class 2-** Materials that may form potentially explosive mixtures with water. Examples include:
 - Calcium Carbide
 - Calcium Metal
 - Potassium Metal
- **Class 3-** Materials that react explosively with water without requiring heat or confinement. Examples include:
 - Aluminum alkyls
 - Bromine pentafluoride
 - Diethylzinc

Water-Reactive Solids & Liquids

Water-Reactive Permit and Certificate of Fitness Thresholds:

- Solids
 - Any amount of Class 3
 - 50 pounds of Class 2
 - 500 pounds of Class 1
- Liquids
 - Any amount of Class 3
 - 5 gallons of Class 2
 - 55 gallons of Class 1

Water-Reactive Solids & Liquids



Determining Hazard Types

- Many materials belong to more than one hazard type.
- The client can determine the hazard type by the following methods
 - Consulting an MSDS
 - Contacting the chemical manufacturer
 - Testing the material

MSDS

SODIUM HYDROXIDE SOLUTIONS (MORE THAN 10% NaOH)

1. Product Identification

Synonyms: Caustic soda solution; lye solution; sodium hydroxide liquid; sodium hydrate solution, Sodium Hydroxide Concentrate Solution
[REDACTED] Sodium Hydroxide, [REDACTED] Analytical Concentrates, sodium hydroxide volumetric solutions

CAS No.: 1310-73-2

Molecular Weight: 40.00

Chemical Formula: NaOH in water

MSDS

2. Composition/Information on Ingredients

Ingredient -----	CAS No -----	Percent -----	Hazardous -----
Sodium Hydroxide	1310-73-2	10 - 60%	Yes
Water	7732-18-5	40 - 90%	No

MSDS

3. Hazards Identification

Emergency Overview

**POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED.
HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT.
REACTS WITH WATER, ACIDS AND OTHER MATERIALS.**

SAFETY DATA SHEET Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT
HOOD; PROPER GLOVES

Storage Color Code: White Stripe (Store Separately)

MSDS

Potential Health Effects

Inhalation:

Severe irritant. Effects from inhalation of mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

Ingestion:

Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Skin Contact:

Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

Eye Contact:

Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.

Chronic Exposure:

MSDS

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

MSDS

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Hot or molten material can react violently with water.

Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

Explosion:

May cause fire and explosions when in contact with incompatible materials.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

MSDS

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

MSDS

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Store above 16C (60F) to prevent freezing. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.

MSDS

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL):
2 mg/m³ Ceiling
- ACGIH Threshold Limit Value (TLV):
2 mg/m³ Ceiling

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator

MSDS

(NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Physical data is displayed for 10%, 30% and 50% aqueous sodium hydroxide solutions. (Merck Index).

Appearance:

Clear, colorless solution.

Odor:

Odorless.

Solubility:

Completely miscible with water.

Density:

10% solution = 1.11; 30% solution = 1.33; 50% solution = 1.53

pH:

14.0 (10%, 30% and 50% solutions)

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

For 10% solution = 105C (221F); for 30% solution = 115C (239F); for 50% solution = 140C (284F).

Melting Point:

For 10% solution = -10C (14 F); for 30% solution = 1C (34F); for 50%

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10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may cause violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

Conditions to Avoid:

Heat, moisture, incompatibles.

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11. Toxicological Information

Sodium hydroxide: irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe. Investigated as a mutagen.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

Sodium Hydroxide (1310-73-2)	No	No	None
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SODIUM HYDROXIDE SOLUTION

Hazard Class: 8

UN/NA: UN1824

Packing Group: II

Information reported for product/size: 360LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM HYDROXIDE, SOLUTION

Hazard Class: 8

UN/NA: UN1824

Packing Group: II

Information reported for product/size: 360LB

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15. Regulatory Information

```
-----\Federal, State & International Regulations - Part 1\-----
                                     -SARA 302-   -----SARA 313-----
Ingredient                        RQ      TPQ      List   Chemical Catg.
-----
Sodium Hydroxide (1310-73-2)     No      No      No      No
Water (7732-18-5)                No      No      No      No
```

```
-----\Federal, State & International Regulations - Part 2\-----
                                     -RCRA-      -TSCA-
Ingredient                        CERCLA      261.33      8(d)
-----
Sodium Hydroxide (1310-73-2)     1000        No          No
Water (7732-18-5)                No          No          No
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Mixture / Liquid)

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **1**

Label Hazard Warning:

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED.
HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT.
REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe mist.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.