CHEMICAL SAFETY LEVELS AND HAZARD CODES

The chemical inventories in MyChem are automatically assigned to a Chemical Safety Level (CSL) based on the quantity and type of hazards present. CSLs include both physical and health hazards, and assist the Environmental Health & Safety Department (EH&S) with identifying locations that may pose a greater risk to workers. EH&S developed the CSL criteria based on similar risk assessment programs at other universities and organizations. EH&S has incorporated it into the MyChem software. It is only for internal use and EH&S does not share CSL levels with regulatory agencies. As shown below, CSLs range from 1 to 4, where 4 represents the highest risk.

Chemical Safety Level	CSL 1	CSL 2	CSL 3	**CSL 4**
Health or physical hazard	Minimal	Low	Moderate	**High**

Chemicals are hazard coded with a CSL in MyChem using criteria from the International Fire Code (IFC) and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). The hazard definitions are shown in the tables below, along with example chemicals, and the quantity limits that trigger each of the four CSLs. The inventory for a room in MyChem is assigned a CSL rating based on the specific chemicals and the quantities present. Individual chemical and area CSLs are listed when viewing an area inventory in MyChem.

In the tables below, the IFC hazard codes are noted and listed first (pages 2 - 13) and followed by the GHS hazard codes (pages 14 - 17). The following definitions relate to table entries.

< = less than
> = greater than
≤ = less than or equal to
≥ = greater than or equal to
N/A = not applicable
“not allowed” = no amount of chemical is allowed in the specified CSL area
“any amount” = any amount of chemical triggers the CSL classification level for the area

Hazards codes below are based on IFC criteria.

Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
COMBUSTIBLE LIQUID, CLASS II	Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).	Acetic Acid Dimethyl-formamide	< 5 gal.	between 5 - 60 gal.	> 60 gal.	**N/A**
COMBUSTIBLE LIQUID, CLASS IIIA	Liquids having a closed cup flash point at or above 140° F (60°C) and below 200°F (93°C).	2-mercaptoethanol Aniline Dimethylsulfoxide	< 10 gal.	between 10 - 120 gal.	> 120 gal.	**N/A**
CORROSIVE (LIQUIDS AND SOLIDS)	A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. See also corrosive gases.	Hydrochloric acid Sodium Hydroxide	< 50 lbs.	between 50 - 100 lbs.	> 100 lbs.	**N/A**
CORROSIVE GAS	A compressed gas that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact.	Ammonia Chlorine Sulfur dioxide	not allowed	not allowed	< 80 cu. ft.	**≥ 80 cu. ft.**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
CRYOGENIC, FLAMMABLE	A fluid having a boiling point lower that -130°F (-89.9°C) at 14.7 psia of pressure that is flammable in its vapor state.	Liquid hydrogen	not allowed	not allowed	any amount	**N/A**
CRYOGENIC, INERT LIQUID	A fluid having a boiling point lower that -130°F (-89.9°C) at 14.7 psia of pressure that is chemically non-reactive, non-flammable and non-toxic under normal conditions.	Liquid nitrogen	< 30 gal.	between 30 - 100 gal.	> 100 gal.	**N/A**
CRYOGENIC, OXIDIZING	A fluid having a boiling point lower that -130°F (-89.9°C) at 14.7 psia of pressure that is an oxidizer.	Liquid oxygen	< 5 gal.	between 5 - 50 gal.	> 50 gal.	**N/A**
EXPLOSIVES, ALL DIVISIONS	There are several different divisions of explosives, but the CSL does not change.	2, 4, 6-trinitrotoluene Consumer fireworks Ammunition	not allowed	not allowed	not allowed	**any amount**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
FLAMMABLE GAS (GASEOUS)	A material which is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure [a material that has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa)] which: 1. Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13% or less by volume with air; or 2. Has a flammable range at 14.7 psia (101 kPa) with air of at least 12%, regardless of the lower limit.	Methane Hydrogen Carbon monoxide	not allowed	< 500 cu. ft.	between 500 - 1000 cu. ft.	**> 1000 cu. ft.**
FLAMMABLE GAS (LIQUEFIED)	A liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of 68°F (20°C) and which is flammable.	Propane Vinyl bromide	not allowed	≤ 75 lbs.	between 75 - 150 lbs.	**> 150 lbs.**
FLAMMABLE LIQUID, CLASS IA	Liquids having a flash point below 73°F (23°C) and having a boiling point below 100°F (38°C). Excludes compressed gases and cryogenic fluids.	Bromoethane Ethyl ether	≤1 gal.	between 1 - 5 gal.	between 5 - 30 gal.	**> 30 gal.**
FLAMMABLE LIQUID, CLASS IB	Liquids having a flash point below 73°F (23°C) and having a boiling point at or above 100°F (38°C). Excludes compressed gases and cryogenic fluids.	Ethanol Isopropanol Acetone	≤ 1 gal.	between 1 - 10 gal.	between 10 - 120 gal.	**> 120 gal.**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
FLAMMABLE LIQUID, CLASS IC	Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C). Excludes compressed gases and cryogenic fluids.	Xylenes Ethylenediamine	≤ 1 gal.	between 1 - 10 gal.	between 10 - 120 gal.	**> 120 gal.**
FLAMMABLE SOLID	A solid capable of causing fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which has an ignition temperature below 100°C or which burns so vigorously and persistently when ignited as to create a serious hazard.	Phosphorus red Cellulose nitrate Magnesium Sulfur	≤ 5 lbs.	between 5 - 60 lbs.	> 60 lbs.	**N/A**
HIGHLY TOXIC (LIQUIDS AND SOLIDS)	A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats. Or a chemical that has a median lethal dose (LD_{50}) 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 rats. See also highly toxic gas.	Cyanide compounds Organic mercury compounds Sodium azide	not allowed	not allowed	≤ 20 lbs.	**> 20 lbs.**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
HIGHLY TOXIC GAS	A compressed gas that has a median lethal concentration (LC_{50}) 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, administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats.	Nitrogen dioxide Phosgene	not allowed	not allowed	not allowed	**any amount**
INERT COMPRESSED GAS	A compressed gas that is chemically non-reactive under normal conditions, non-flammable and non-toxic.	Nitrogen Argon	≤ 1000 cu. ft.	between 1000 - 6000 cu. ft.	> 6000 cu. ft.	**N/A**
ORGANIC PEROXIDE, CLASS I	Organic compound that contains the bivalent -O-O- structure considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. This subclass covers those formulations that are capable of *deflagration* but not *detonation*.	Benzoyl peroxide (>98%)	not allowed	not allowed	any amount	**N/A**
ORGANIC PEROXIDE, CLASS II	Organic compound that contains the bivalent -O-O- structure and which may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. This subclass covers formulations that burn very rapidly and that pose a moderate reactivity hazard.	Peroxyacetic acid (43%)	not allowed	not allowed	any amount	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
ORGANIC PEROXIDE, CLASS III	An organic compound that contains the bivalent -O-O- structure and which may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. This subclass describes those formulations that burn rapidly and that pose a moderate reactivity hazard.	Di-t-Butyl peroxide (99%)	not allowed	≤ 10 lbs.	> 10 lbs.	**N/A**
ORGANIC PEROXIDE, CLASS IV	An organic compound that contains the bivalent -O-O- structure and which may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. This subclass describes those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.	Benzoyl peroxide (70%)	≤ 10 lbs.	between 10 - 50 lbs.	> 50 lbs.	**N/A**
ORGANIC PEROXIDE, CLASS V	An organic compound that contains the bivalent -O-O- structure and which may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. This subclass covers those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.	Benzoyl peroxide (35%)	≤10 lbs.	between 10 - 50 lbs.	> 50 lbs.	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	**CSL 4**
ORGANIC PEROXIDE, CLASS UD	An organic compound that contains the bivalent -O-O- structure and which may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides capable of *detonation*. These peroxides pose an extremely high-explosion hazard through rapid explosive decomposition.	Acrolein	not allowed	not allowed	any amount	**any amount**
OXIDIZER GAS (GASEOUS)	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Oxidizer gases can support and accelerate combustion of other materials, but it themselves are not flammable.	Oxygen-23.5% or greater Chlorine Fluorine Nitrous oxide	not allowed	≤ 504 cu. ft.	> 504 cu. ft.	**N/A**
OXIDIZER GAS (LIQUEFIED)	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Liquefied oxidizer gases can support and accelerate combustion of other materials, and is partially liquid under charged pressure at 68°F (20°C).	Liquid oxygen Liquid chlorine	not allowed	≤ 100 gal.	> 100 gal.	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
OXIDIZER, CLASS 1	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Class 1 oxidizers will *slightly increase* the burning rate of combustible materials, but not cause spontaneous ignition upon contact.	Hydrogen peroxide (8-27.5%) Most inorganic nitrates	≤ 50 lbs.	between 50 - 1000 lbs.	> 1000 lbs.	N/A
OXIDIZER, CLASS 2	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Class 2 oxidizers cause a *moderate increase* in the burning rate or that causes spontaneous ignition of combustible materials with which it come in contact.	Bromine Potassium permanganate	≤ 25 lbs.	between 25 - 100 lbs.	> 100 lbs.	N/A
OXIDIZER, CLASS 3	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Class 3 oxidizers 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.	Ammonium dichromate Perchloric acid (60-72%)	not allowed	≤ 10 lbs.	> 10 lbs.	N/A

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	**CSL 4**
OXIDIZER, CLASS 4	Materials that readily yield oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Class 4 oxidizers can undergo an *explosive reaction* due to contamination or exposure to thermal or physical shock. In addition, the oxidizer will enhance the burning rate and can cause spontaneous ignition of combustibles.	Ammonium perchlorate Hydrogen peroxide (>91%)	not allowed	not allowed	not allowed	any amount
PYROPHORIC	A chemical with an auto-ignition temperature in air, at or below a temperature of 130°F (54°C).	Aluminum powder Silane Lithium	not allowed	not allowed	not allowed	any amount
TOXIC (LIQUIDS AND SOLIDS)	A chemical with a median lethal dose (LD_{50}) of more than 50 mg/kg, but not more than 500 mg/kg of body weight when administered orally to albino rats. A chemical that has a median lethal dose (LD_{50}) of more than 200 mg/kg but not more than 1000 mg/kg body weight when administered by continuous contact for 24 hours or less to the bare skin of albino rabbits.	Cadmium chloride Sodium borohydride Tellurium	not allowed	≤ 10 lbs.	between 10 - 100 lbs.	> 100 lbs.

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	**CSL 4**
TOXIC GAS	A compressed gas that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2000 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 one hour (or less if death occurs within 1 hour) to albino rats.	Carbon monoxide Hydrogen chloride Methylamine	not allowed	not allowed	< 80 cu. ft.	greater than 80 cu. ft.
UNSTABLE (REACTIVE), CLASS 1	Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.	Paraldehyde Tetrahydrofuran Hydrogen Peroxide (35%-52%)	≤ 50 lbs.	between 50 - 100 lbs.	> 100 lbs.	**N/A**
UNSTABLE (REACTIVE), CLASS 2	Materials normally unstable that can 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 pressures, and that can undergo violent chemical change at elevated temperatures and pressures.	Methacrylic acid Styrene Sodium Perchlorate	≤ 25 lbs.	between 25 - 50 lbs.	> 50 lbs.	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety			
			CSL 1	CSL 2	CSL 3	CSL 4
UNSTABLE (REACTIVE), CLASS 3	Materials capable of detonation or of explosive decomposition or explosive reaction but that require a strong initiating source or must be heated under confinement before initiation. This class includes materials that are sensitive to mechanical or localized thermal shock at elevated temperatures and pressures.	Hydrogen Peroxide (>52%) Nitromethane Hydroxylamine	not allowed	not allowed	any amount	**N/A**
UNSTABLE (REACTIVE), CLASS 4	Materials readily capable of detonation or explosive decomposition or 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.	Ethyl nitrate Peroxyacetic acid	not allowed	not allowed	not allowed	any amount
WATER-REACTIVE, CLASS 1	Materials that may react with water with some release of energy, but not violently.	Acetic anhydride Sodium hydroxide	≤ 50 lbs.	between 50 - 500 lbs.	> 500 lbs.	**N/A**
WATER-REACTIVE, CLASS 2	Materials that react violently with water, have the ability to boil water, produce flammable, toxic or other hazardous gases, or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.	Potassium borohydride Sulfuric acid Sodium metal	≤ 25 lbs.	between 25 - 50 lbs.	> 50 lbs.	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
WATER-REACTIVE, CLASS 3	Materials that react explosively with water without requiring heat or confinement.	Aluminum alkyls Bromine trifluoride	not allowed	not allowed	any amount	N/A

HAZARD CODES BELOW ARE BASED ON GHS CRITERIA.

ACUTE TOXICITY, CATEGORY 1 (SEE ALSO HIGHLY TOXIC MATERIALS ABOVE)	Oral LD50 at or below 5 mg/kg Dermal LD50 at or below 50 mg/kg Inhalation LD50 at or below 100 mg/kg	Sodium azide Hydrogen cyanide Arsine Acrolein Acrylic acid	not allowed	not allowed	≤ 20 lbs.	> 20 lbs.
ACUTE TOXICITY, CATEGORY 2 (SEE ALSO TOXIC MATERIALS ABOVE)	Oral LD50 between 5 mg/kg and 50 mg/kg Dermal LD50 between 50 mg/kg and 200 mg/kg Inhalation LD50 between 100 mg/kg and 500 mg/kg	Sodium arsenate heptahydrate Chlorine Cadmium chloride Acrylamide	not allowed	≤ 10 lbs.	between 10 - 100 lbs.	> 100 lbs.
ASPHYXIANT	A material that can displace oxygen resulting in an unsafe atmosphere	Argon Nitrogen Dry ice	≤ 10 lbs.	between 10 - 100 lbs.	> 100 lbs.	**N/A**

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
CARCINOGENICITY, CATEGORY 1A	Chemicals known to have carcinogenic potential to humans – largely based on human evidence	Asbestos Benzene	not allowed	not allowed	any amount	N/A
CARCINOGENICITY, CATEGORY 1B	Chemicals known to have carcinogenic potential to humans – largely based on animal evidence	Methylene chloride Sodium nitrate	not allowed	not allowed	any amount	N/A
CARCINOGENICITY, CATEGORY 2	Suspected human carcinogen – evidence from human and/or animal studies is limited	Chloroform Diethyl sulfate Hydrazine	< 1 lb.	between 1 and 5 lbs.	> 5 lbs.	N/A
GERM CELL MUTAGENICITY, CATEGORY 1A	Chemicals known to induce heritable mutations in human germ cells – positive evidence from human epidemiological studies	Allyl bromide	not allowed	not allowed	any amount	N/A
GERM CELL MUTAGENICITY, CATEGORY 1B	Chemicals regarded to induce heritable mutations in human germ cells – positive evidence from in vivo heritable germ cell or somatic cell mammalian mutagenicity tests, or positive results showing mutagenic effects in the germ cells of humans without demonstration of transmission to progeny.	Acrylamide Benzene	not allowed	not allowed	any amount	N/A

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Hazard Code	Definition	Examples	Chemical Safety			
			CSL 1	CSL 2	CSL 3	CSL 4
GERM CELL MUTAGENICITY, CATEGORY 2	Chemicals that may induce heritable mutations in human germ cells showing positive evidence obtained from *in vivo* somatic cell mutagenicity or somatic cell genotoxicity tests in mammals and in some cases with support from *in vitro* experiments	Phenol Furan	< 1 lb.	between 1 - 5 lbs.	> 5 lbs.	N/A
IRRITANT	A chemical that causes a reversible inflammatory effect on living tissue by chemical action at the site of contact.	Surfactants Ethyl acetate	≤ 25 lbs.	between 25 - 150 lbs.	> 150 lbs.	N/A
REPRODUCTIVE TOXICITY, CATEGORY 1A	Known human reproductive toxins	Lead nitrate 2,2,2-Trifluoroethanol	not allowed	not allowed	any amount	N/A
REPRODUCTIVE TOXICITY, CATEGORY 1B	Presumed human reproductive toxins - largely based on animal studies	Dimethyl-formamide Boric acid	not allowed	not allowed	any amount	N/A
REPRODUCTIVE TOXICITY, CATEGORY 2	Suspected human reproductive toxicant - Evidence from animal and/or human studies is limited	Chloroform Hexane	< 1 lb.	between 1 - 5 lbs.	> 5 lbs.	N/A

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Hazard Code	Definition	Examples	Chemical Safety Level			
			CSL 1	CSL 2	CSL 3	CSL 4
SENSITIZER	Substance can induce sensitization by respiration or skin contact in a substantial number of persons, or where there are positive results from an appropriate animal test.	Nickel compounds Aluminum chloride	≤ 10 lbs.	between 10 - 100 lbs.	> 100 lbs.	**N/A**

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