NAPIM
Avoiding Hazcom GHS Paralysis – A Roadmap to a Successful Program
Part 1
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Overview

- Overview of SDS and Label Preparation under Hazcom 2012
  - How the GHS works
  - Common Physical Hazards
  - Health Hazards
  - Using the criteria
  - How to classify mixtures
  - Using Appendix C – developing the label
  - SDS Content (Appendix D)
- Roadmap on where to begin – example formulations
- Sources of classification data

OSHA HCS 2012 Effective Dates

- The final rule was effective 60 days following publication in the Federal Register (May 25, 2012)
- Employers must train employees of the new labels and SDS format by December 1, 2013
- Manufacturers/Importers/Distributor and Employers must comply by June 1, 2015
- Distributors cannot ship containers without compliant labels after December 1, 2015
- Employers must update hazcom program and provide additional training for new hazards by June 1, 2016

GHS Basics

- Gather data about your product
  - Physical Characteristics
    - pH
    - Flash Point, Boiling Point
  - Review the MSDS/SDS for Raw Materials
  - Break down formulas to Substance Level
- Classify each Substance or Raw Material
- Compare product data to criteria to classify where available
- Use mixture rules to classify where product data is not available

Hazard Classification

- Data on the chemical is compared to criteria in the Hazcom 2012
- All hazard classes must be considered
- Hazard classes have categories that reflect the degree of hazard
- Chemicals can have multiple hazard classes/categories
- Generally, categories = transport packing groups (where covered by transport)

GHS/Hazcom 2012 Physical Hazards

- Explosives
- Flammable gases
- Flammable aerosols
- Oxidizing gases
- Gases under pressure
- Flammable liquids
- Flammable solids
- Self-reactive substances and mixtures
- Pyrophoric liquids
- Pyrophoric solids
- Self-heating substances and mixtures
- Substances and mixtures which in contact with water, emit flammable gases
- Oxidizing liquids
- Oxidizing solids
- Organic peroxides
- Corrosive to metals
- Pyrophoric gases (OSHA)
- Combustible Dusts (OSHA)

GHS/Hazcom 2012 Health Hazards

- Acute toxicity
  - Poisons that cause serious, immediate effects via inhalation, ingestion or dermal contact at fairly low doses
- Skin corrosion/irritation
  - (Irreversible/reversible effects)
- Serious eye damage/eye irritation
  - (Irreversible/reversible effects)
- Respiratory or skin sensitization
- Germ cell mutagenicity
  - Cause heritable mutations in germ cells

GHS/Hazcom 2012 Health Hazards

- Carcinogenicity
- Reproductive toxicity
  - Effects on fertility, development of offspring, effects on or via lactation
- Specific target organ toxicity
  - Single and repeated exposure
- Aspiration hazard
  - Low viscosity hydrocarbons that cause lung damage when ingested
- Simple asphyxiants (OSHA)

GHS Environmental Hazards/NOT Hazcom 2012

- Aquatic toxicity
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
- Hazardous to the ozone layer

Common Hazards for Inks

Criteria for Flammable Liquids

Category	Criteria
1	Flash point < 23°C and initial boiling point ≤ 35°C
2	Flash point < 23°C and initial boiling point > 35°C
3	Flash point ≥ 23°C and ≤ 60°C
4	Flash point > 60°C and ≤ 93°C

Corrosive to Metals

- A substance or mixture which is corrosive to metals through chemical action
  - Corrosion rate on steel or aluminum >6.25 mm/year at a test temperature of 55C when tested on both materials.
  - Where positive for one metal the other test not required Labeling
  - Symbol 
  - Signal Word Warning
  - Hazard Statement May be corrosive to metals

12

Acute Toxicity

- Acute toxicity means those adverse effects occurring following oral or dermal administration of a single dose of a substance or a mixture, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.
- Includes a table of acute toxicity point estimates for acute toxicity range estimates or acute toxicity hazard categories.

Criteria for Acute Toxicity

Acute Toxicity	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5 (not Hazcom 2012)
Oral (mg/kg)	≤5	>5 - ≤50	>50 - ≤300	>300 - ≤2000	Criteria: ≤5000 • ≤5000 • Anticipated significant effects in human • Any mortality at class 4 • Significant clinical signs at class 4 • Indications from other studies
Dermal (mg/kg)	≤50	>50 - ≤200	>200- ≤1000	>1000- ≤2000	
Gases (ppm)	≤100	>100 - ≤500	>500- ≤2500	>2500- ≤20000	
Vapours (mg/l)	≤0.5	>0.5- ≤2.0	>2 - ≤10	>10 - ≤20	
Dust and mists (mg/l)	≤0.05	>0.05- ≤0.5	>0.5- ≤1.0	>1.0 - ≤5	

Acute Toxicity Notes

- Inhalation toxicity based on 4 hour testing exposures. Can convert 1-hour data by dividing by 2 for gases and vapours and 4 for dusts and mists.
- Inhalation test form vapors can be more liquid or gaseous. When the test atmosphere is near gaseous, use gas criteria
- The terms “dust”, “mist” and “vapour” are defined as follows:
  - Dust: solid particles of a substance or mixture suspended in a gas (usually air);
  - Mist: liquid droplets of a substance or mixture suspended in a gas (usually air);
  - Vapour: the gaseous form of a substance or mixture released from its liquid or solid state.
- Dust is generally formed by mechanical processes. Mist is generally formed by condensation of supersatured vapours or by physical shearing of liquids. Dusts and mists generally have sizes ranging from less than 1 to about 100 μm.
- The preferred test species oral and inhalation is the rat, dermal the rat or rabbit.

15

Toxicity Estimate Table

Table A.1.2: Conversion from experimentally obtained acute toxicity range values (or acute toxicity hazard categories) to acute toxicity point estimates for use in the formulas for the classification of mixtures

Exposure routes	Classification category or experimentally obtained acute toxicity range estimate	Converted Acute Toxicity point estimate
Oral (mg/kg bodyweight)	0 < Category 1 ≤ 5	0.5
	5 < Category 2 ≤ 50	5
	50 < Category 3 ≤ 300	100
	300 < Category 4 ≤ 2000	500
Dermal (mg/kg bodyweight)	0 < Category 1 ≤ 50	5
	50 < Category 2 ≤ 200	50
	200 < Category 3 ≤ 1000	300
	1000 < Category 4 ≤ 2000	1100
Gases (ppmV)	0 < Category 1 ≤ 100	10
	100 < Category 2 ≤ 500	100
	500 < Category 3 ≤ 2500	700
	2500 < Category 4 ≤ 20000	4500
Vapors (mg/l)	0 < Category 1 ≤ 0.5	0.05
	0.5 < Category 2 ≤ 2.0	0.5
	2.0 < Category 3 ≤ 10.0	3
	10.0 < Category 4 ≤ 20.0	11
Dust/mist (mg/l)	0 < Category 1 ≤ 0.05	0.005
	0.05 < Category 2 ≤ 0.5	0.05
	0.5 < Category 3 ≤ 1.0	0.5
	1.0 < Category 4 ≤ 5.0	1.5

Note: Gas concentrations are expressed in parts per million per volume (ppmV).

Acute Toxicity Mixtures

- Apply criteria for tested mixtures
- Use bridging principles
- Consider all routes (if relevant) and all relevant ingredients
- The "relevant ingredients" of a mixture are those which are present >= 1% (w/w for solids, liquids, dusts, mists and vapours and v/v for gases), unless a lower concentration may be needed. (Category 1 or 2)
  - Include ingredients with a known acute toxicity, which fall into any of the acute toxicity categories shown in Table 3.1.1;
  - Ignore ingredients that are presumed not acutely toxic (e.g., water, sugar);
  - Ignore ingredients if the data from limit dose test does not show acute toxicity at the upper limit of category 4.
- Guidance is included addressing mixtures with ingredients for which appropriate toxicity data is not available
- Ingredients with unknown toxicity are labeled

17

Acute Toxicity - Mixture Calculation

$$\frac{100}{ATE_{mix}} = \sum_{n=i} \frac{C_i}{ATE_i}$$

- Where:
  - Ci = concentration of ingredient i
  - ATEi = Acute Toxicity Estimate of ingredient i
  - ATEmix = Acute Toxicity Estimate of mixture
  - n ingredients in the mixture and i runs from 1 to n
- Formula adjusted if >10% unknown toxicity

Acute Toxicity Mixture Example

- Mixture:
  - Component A 30% LD50 oral rat 50 mg/kg
  - Component B 40% LD50 oral rat 500 mg/kg
  - Component C 30% LD50 oral rat 100 mg/kg
- ATE_{mix} calculation

$$\frac{100}{ATE_{mix}} = \frac{30}{50} + \frac{40}{500} + \frac{30}{100}$$

$$ATE_{mix} = 102 \text{ mg/kg}$$

Classification – Acute Oral Category 3

19

Unknown Acute Toxicity

- If ≥1% ingredients of unknown toxicity
  - Classify based on known ingredients
  - Add "x% of the mixture consists of ingredients of unknown toxicity"
- If >10% ingredients of unknown toxicity

$$\frac{100 - \left(\sum C_{\text{unknown}} \text{ if } > 10\%\right)}{ATE_{mix}} = \sum_{n} \frac{C_i}{ATE_i}$$

20

Skin Corrosion/Irritation

- Consider human experience, animal data, pH extremes including assessment of acid or alkali reserve
- Validated in-vitro tests for skin corrosion
- Mixtures – relevant ingredients 1% unless presumption (for eg. Corrosives) that ingredient may be relevant <1%.

21

Classification Criteria for Skin Corrosion/Irritation

Category 1			Category 2	Category 3
Destruction of dermal tissue: visible necrosis in at least one of three animals			Reversible adverse effects in dermal tissue Mean Draize score in 2 of 3 animals: ≥2.3 ≤4.0 erythema/ eschar/edema or persistent inflammation	Reversible adverse effects in dermal tissue Mean Draize score in 2 of 3 animals: ≥1.5 < 2.3 erythema/ eschar/edema
Subcat. 1 A Exposure ≤ 3 min Observation < 1 hour	Subcat. 1 B Exposure >3 min ≤1 hour Observation < 14 days	Subcat. 1 C Exposure >1 hr ≤4 hours Observation < 14 days		

22

Skin Corrosion/Irritation – Mixtures Additivity

Table A.2.3: Concentration of ingredients of a mixture classified as skin Category 1 or 2 that would trigger classification of the mixture as hazardous to skin (Category 1 or 2)

Sum of ingredients classified as:	Concentration triggering classification of a mixture as:	
	Skin corrosive	Skin irritant
	Category 1	Category 2
Skin Category 1	≥ 5%	≥ 1% but < 5%
Skin Category 2		≥ 10%
(10 × Skin Category 1) + Skin Category 2		≥ 10%

Additivity May Not Apply

- Eye and Skin Damage/Irritation
  - Acids, Bases, Inorganic Salts, Aldehydes, Phenols, Surfactants
- pH ≤2 or ≥11.5 - Category 1
- ≥ 1% Other corrosives – Category 1
- ≥ 3% Other irritants – Category 2

24

Serious Eye Damage/Irritation

- Serious eye damage means the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application.
- *Eye irritation* means the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application.
- Consider human experience, animal data, SARs, pH extremes including assessment of acid or alkali reserve
- No validated in-vitro tests for eye irritation
- Mixtures – relevant ingredients 1% unless presumption (for eg. Corrosives) that ingredient may be relevant <1%.
- **OSHA adopted eye category 2B, EU did not**

25

Classification Criteria for Serious Eye Damage/Irritation

Category 1	Category 2A	Category 2B
Irreversible effects on the eye – a material that produces: a) at least in one tested animal, effects on the cornea, iris, or conjunctiva that are not expected to reverse, or have not fully reversed within an observation period of normally 21 days; and/or b) at least in 2 of 3 tested animals, a positive response of: i. corneal opacity >= 3; and/or ii. iritis > 1.5; calculated as the mean scores, following grading at 24, 48, and 72 hours after instillation of the test substance	**Irritating to eyes** – a material that produces: a) at least in 2 of 3 tested animals, a positive response of: i. corneal opacity >= 1; and/or ii. iritis >= 1; and/or iii. conjunctival redness >= 2, and/or iv. conjunctival oedema (chemosis) >=2 calculated as the mean scores, following grading at 24, 48, and 72 hours after instillation of the test substance and which fully reverses within an observation period of normally 21 days.	**Mildly irritating to eyes** Within the category of 2A, above, when the effects listed are fully reversible within 7 days of observation.

26

Eye Damage/Irritation – Mixtures Additivity

Sum of ingredients classified as:	Concentration triggering classification of a mixture as:	
	Serious eye damage	Eye Irritation
	Category 1	Category 2/2A
Skin Category 1 + Eye Category 1	≥ 3%	≥ 1% but < 3%
Eye Category 2		≥ 10%
10 x (Skin Category 1 + Eye Category 1) + Eye Category 2		≥ 10%

Note: A mixture can be classified as 2B if all relevant ingredients are classified as 2B (NEW)

27

Additivity May Not Apply

- Eye and Skin Damage/Irritation
  - Acids, Bases, Inorganic Salts, Aldehydes, Phenols, Surfactants
- pH ≤2 or ≥11.5 - Category 1
- ≥ 1% Other corrosives – Category 1
- ≥ 3% Other irritants – Category 2

28

Respiratory or Skin Sensitization

- Evidence of sensitization in humans or positive results in an appropriate animal test.

29

Respiratory or Skin Sensitization

- 2 Subcategories
  - Subcategory 1A – high frequency of occurrence in humans or probability of high occurrence based on animal studies. Severity of reaction can be considered
  - Subcategory 1B – low to moderate frequency. Severity of reaction can be considered
  - Contains guidance on interpretation of animal test data for sub-categories
- Mixture cutoffs
  - 0.1% Category 1 / 1A (0.1 for gaseous respiratory sensitizer).
  - 1% Category 1B (0.2% for gaseous respiratory sensitizer).

30

Germ Cell Mutagenicity

- Primarily concerned with chemicals that may cause mutations in the germ cells of humans that can be transmitted to the progeny
- A mutation means a permanent change in the amount or structure of the genetic material in a cell.
- The more general terms "genotoxic" and "genotoxicity" apply to agents or processes which alter the structure, information content, or segregation of DNA, including those which cause DNA damage by interfering with normal replication processes, or which in a non-physiological manner (temporarily) alter its replication. Genotoxicity test results are usually taken as indicators for mutagenic effects.
- Classification for heritable effects in human germ cells is made on the basis of well conducted, sufficiently validated tests using expert judgement and weight of evidence.
- When a single well-conducted test is used for classification, it shall provide clear and unambiguously positive results.

31

Germ Cell Mutagenicity

- Category 1A – known to induce heritable mutations in germ cells of humans> Positive evidence from human epidemiological studies
- Category 1B –
  - Positive *in vivo* germ cell tests in mammals
  - Positive *in vivo* somatic cell tests in mammals plus evidence of potential germ cell effects
  - Positive mutagenic data from humans without demonstration of transmission to progeny
- Category 2 –
  - Positive *in vivo* somatic cell tests in mammals
  - Other *in vivo* somatic cell tests supported by positive *in vitro* assays
  - **Note:** Substances which are positive in *in vitro* mammalian mutagenicity assays, and which also show chemical structure activity relationship to known germ cell mutagens, shall be considered for classification as Category 2 mutagens.

32

Germ Cell Mutagenicity Mixtures

Ingredient Classified as:	Category 1A and 1B concentration limit	Category 2 concentration limit
Category 1 mutagen	≥ 0.1%	
Category 2 mutagen		≥ 1.0%

33

Criteria for Carcinogens

- Category 1: Known or presumed human carcinogen
  - Category 1A: Known to have carcinogenic potential for humans, largely based on human evidence
  - Category 1B: Presumed to have carcinogenic potential for humans, largely based on animal evidence
- Category 2: Suspected human carcinogens (based on human or animal evidence but less convincing)
- Hazcom 2012 allows manufacturers/importers to use classification by International Agency for Research on Cancer (IARC), National Toxicology Program (NTP) or OSHA instead of applying criteria
  - Regardless, the positive classifications must be noted on the SDS

Carcinogenicity Mixtures – concentration limits

Ingredient Classified as:	Category 1 concentration limit	Category 2 concentration limit
Category 1 carcinogen	≥ 0.1%	
Category 2 carcinogen		≥ 0.1%

If category 2 present at 0.1-1%, information required on SDS, however a label warning is optional.

35

Reproductive Toxicity

- Reproductive toxicity includes adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring.
- For classification purposes, the known induction of genetically based heritable effects in the offspring is addressed in Germ Cell Mutagenicity.
- Reproductive toxicity is subdivided under two main headings:
  - Adverse effects on sexual function and fertility;
  - Adverse effects on development of the offspring.
- *Adverse effects on sexual function and fertility* include any effect of chemicals that would interfere with reproductive ability or capacity.
- *Adverse effects on development of the offspring* or developmental toxicity include, in its widest sense, any effect which interferes with normal development of the conceptus, either before or after birth.
- Adverse effects on or via lactation included to provide hazard warning for lactating mothers.

36

Classification Criteria – Reproductive Toxicity

- Category 1: Known or Presumed Human Reproductive Toxicant
  - Category 1A: Known human reproductive toxicant, largely based on human evidence
  - Category 1B: Presumed human reproductive toxicant, largely based on animal evidence
- Category 2: Suspected human reproductive toxicant (based on human or animal evidence but less convincing)
- Effects on lactation – interferes with lactation or present in breast milk in amounts sufficient to be hazardous for baby

37

Reproductive Toxicity Mixtures

Ingredient Classified as:	Category 1 concentration limit	Category 2 concentration limit
Category 1 A or B reproductive toxicant / effects on lactation	≥ 0.1%	
Category 2 reproductive toxicant		≥ 0.1%

38

Specific Target Organ Toxicity (STOT) – Single Exposure

- Specific target organ toxicity (single exposure) is defined as specific, non lethal target organ toxicity arising from a single exposure to a substance or mixture.
- All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed and not specifically addressed in other health hazard classes are included.
- Consistent and identifiable toxic effects in humans, or, in experimental animals
- Toxicologically significant changes
- Human data are the primary source of evidence for this hazard class.
- Classify for the primary target organ of toxicity
- Does not include secondary effects (a hepatotoxicant can produce secondary effects in the nervous or gastro-intestinal systems).
- Detailed guidance included

39

Specific Target Organ Toxicity (STOT) – Single Exposure

- Category 1 – Significant effects in a target organ following a single exposure, human data or animal data at low dose
  - ≤300 mg/kg oral, ≤ 1000 mg/kg dermal *
- Category 2 – based on animal data at higher dose
  - ≤2000 mg/kg oral, ≤ 2000 mg/kg dermal *
- Category 3 – transient effects (respiratory irritation, narcotic effects)

* see guidance for inhalation doses

40

STOT – Single Exposure Mixtures

Ingredient classified as:	Category 1	Category 2
Category 1 Specific Target Organ Toxicant	Concentration ≥ 1%	
Category 2 Specific Target Organ Toxicant		Concentration ≥ 1%

41

STOT SE Category 3

- Respiratory Irritation
  - Based mainly on human experience, supported by objective measurements, should be typical in exposed population – not sensitive individuals
- Narcotic Effects
  - CNS Depression, transient, animals or humans
- Mixtures
  - Same criteria as substances
  - Suggested cut-off value 20%
  - Respiratory irritation and narcotic effects classified separately
  - Ingredients additive unless evidence they are not.

42

Specific Target Organ Toxicity (STOT) – Repeated Exposure

- Target organ toxicity (repeated exposure) means specific, target organ toxicity arising from a repeated exposure to a substance or mixture. All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed are included.
- Toxic effects that are specifically addressed other heath hazard classes not included.
- These adverse health effects include consistent and identifiable toxic effects in humans, or, in experimental animals.
- Toxicologically significant changes which have affected the function or morphology of a tissue/organ, or have produced serious changes to the biochemistry or haematology of the organism and these changes are relevant for human health.
- Human data will be the primary source of evidence for this hazard class.
- Data from repeated exposure in humans, such as exposure at home, in the workplace or environmentally
- Data from studies conducted in experimental animals. The standard animal studies in rats or mice are 28 day, 90 day or lifetime studies (up to 2 years) that include haematological, clinicochemical and detailed macroscopic and microscopic examination to enable the toxic effects on target tissues/organs to be identified.
- Data from repeat dose studies performed in other species shall also be used, if available.

43

Specific Target Organ Toxicity (STOT) – Repeated Exposure

- Category 1 – Significant effects in target organ following repeated exposure, human data or animal data at low dose
  - ≤10 mg/kg oral, ≤20 mg/kg dermal *
- Category 2 – based on animal data at higher dose
  - ≤100 mg/kg oral, ≤ 200 mg/kg dermal *
- Animal studies: 28 days, 90 days, lifetime
- Not adaptive responses, small changes in clinical parameters, species-specific

* see guidance for inhalation doses

44

STOT – Repeated Exposure Mixtures

Ingredient classified as:	Category 1	Category 2
Category 1 Specific Target Organ Toxicant	Concentration ≥ 1%	
Category 2 Specific Target Organ Toxicant		Concentration ≥ 1%

45

Aspiration Toxicity

- Category 1
  - Reliable human evidence
  - hydrocarbons with kinematic viscosity of 20.5 mm2/s or less at 40C
- Mixture cut-off 10% and meets viscosity above
- Mixtures that separate – evaluate each layer

46

Using Appendix C: Labeling

- Under the GHS the label elements are specified in Appendix C
- For each classification determined
  - Go to that entry
  - Record the label elements
  - Use Danger if both Danger and Warning
  - Check Pictogram Precedence
  - Eliminate duplication of P phrases

Label Content Shipped Containers

- Product Identifier
  - Ingredients not required but are part of GHS label
- Signal word (danger or warning)
- Hazard statements
- Pictograms
- Precautionary statements
- Name, address and telephone number of the chemical manufacturer, importer or other responsible party
- Unknown acute toxicity statement if applicable
- HNOC information is not required on the label

Product Identifier

- The name or number used for a hazardous chemical on a label or in the SDS – provides a unique means by which user can identify the chemical – permits cross-referencing between the list of hazardous chemicals, label and SDS.

Signal Word

- A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label
  - The signal words used in this section are
    - "Danger" and "Warning"

"Danger" – used for the more severe hazards

"Warning" – used for the less severe

Pictogram

- A composition that may include a symbol plus other graphic elements such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical
- Nine pictograms are designated under the GHS
- Eight pictograms are adopted in Hazcom 2012
  - Red border, black symbol, white background
  - Blank red diamonds are not permitted on shipped container labels

Exploding Bomb Pictogram

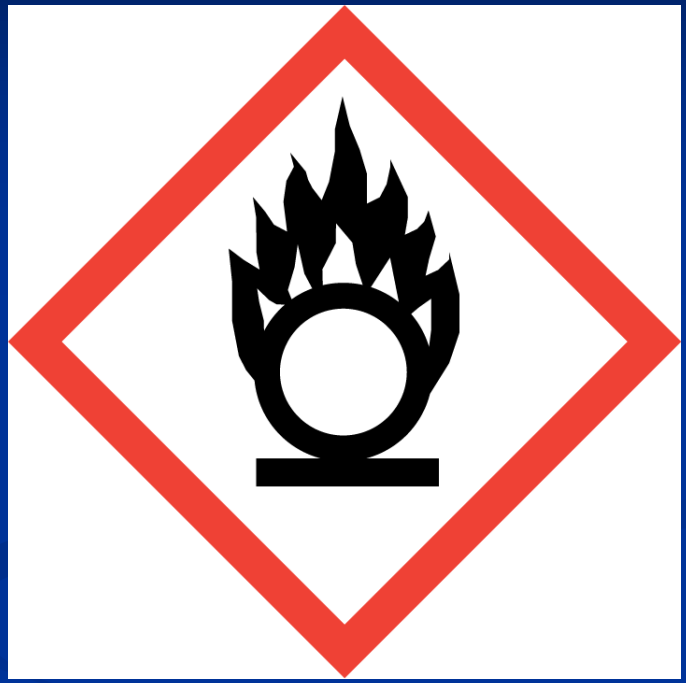
- Unstable explosives
- Explosives (Divisions 1.1-1.4)
- Self-reactives (Type A and Type B with flame)
- Organic peroxides (Type A and Type B with flame)

Flame Pictogram

- Flammable gases
- Flammable aerosols
- Flammable liquids (Categories 1-3)
- Flammable solids
- Self-reactives (Type B with bomb, Types C-F)
- Pyrophoric liquids and solids (gases Hazcom 2102)
- Self-heating substances
- Substances which in contact with water emit flammable gases
- Organic peroxides (Type B with bomb, Types C-F)

Flame over Circle Pictogram

- Oxidizing gases
- Oxidizing liquids
- Oxidizing solids



Gas Cylinder Pictogram

- Compressed gas
- Liquefied gas
- Refrigerated liquefied gas
- Dissolved gas

Corrosion Pictogram

- Corrosive to metals (steel or aluminum >6.25 mm/year at 55C)
- Skin corrosion/irritation – Category 1 (A, B and C)
- Serious eye damage/irritation – Category 1

Skull and Crossbones Pictogram

- Acute toxicity – Categories 1-3 (oral, inhalation or dermal routes)

Exclamation Mark Pictogram

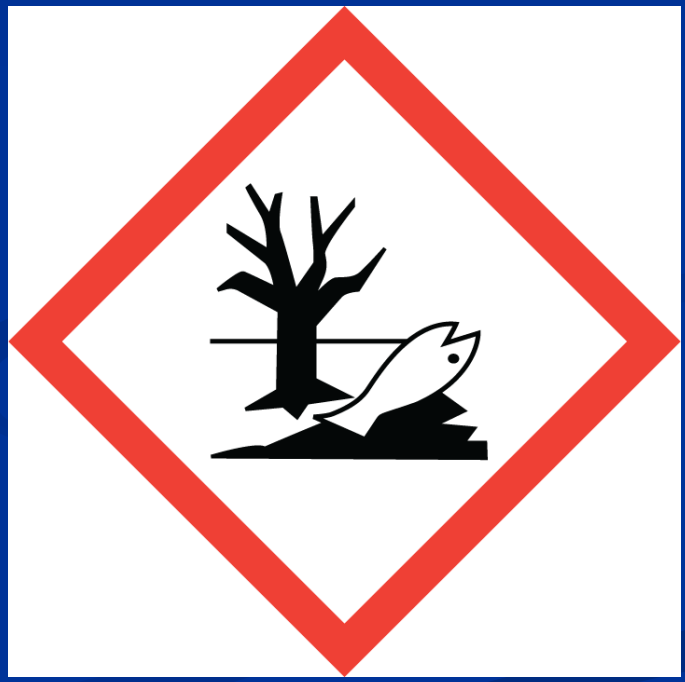
- Acute toxicity – Category 4 (oral, inhalation or dermal routes)
- Skin irritation/corrosion – Category 2
- Serious eye damage/ irritation – Category 2A
- Skin sensitizer
- STOST (single exposure) – Category 3 (respiratory tract irritation, narcotic effects)
- Ozone Depleting (not Hazcom 2012)

Health Hazard Pictogram

- Respiratory sensitizer
- Germ cell mutagenicity
- Carcinogenicity
- Toxic to reproduction
- STOT (single exposure) – Categories 1-2
- STOT (repeated exposure) – Categories 1-2
- Aspiration hazard

Environment Pictogram (NOT Hazcom 2012)

- Acute hazards to the aquatic environment – Category 1 (Categories 2 and 3 no pictogram or signal word)
- Chronic hazards to the aquatic environment – Categories 1 and 2 (Categories 3 and 4 no pictogram or signal word)



Hazard and Precautionary Statements

- Hazard statement for each level of hazard (category) within each hazard class (See Appendix C)
  - Example: Flammable liquids
    - Category 1: Extremely flammable liquid and vapour
    - Category 2: Highly flammable liquid and vapour
    - Category 3: Flammable liquid and vapour
    - Category 4: Combustible liquid
- Precautionary statements are selected from tables in Appendix C, based on the classification

Example 1

- Liquid
  - LD50 oral rat 200 mg/kg
  - LD50 dermal rabbit 50 mg/kg
  - LC50 (vapor) rat 3 mg/L

Classification

Acute Toxicity Oral Category 3

Acute Toxicity Dermal Category 1

Acute Toxicity Inhalation Category 3

Criteria for Acute Toxicity

Acute Toxicity	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5 (not Hazcom 2012)
Oral (mg/kg)	≤5	>5 - ≤50	>50 - ≤300	>300 - ≤2000	Criteria: ≤5000 • ≤5000 • Anticipated significant effects in human • Any mortality at class 4 • Significant clinical signs at class 4 • Indications from other studies
Dermal (mg/kg)	≤50	>50 - ≤200	>200- ≤1000	>1000- ≤2000	
Gases (ppm)	≤100	>100 - ≤500	>500- ≤2500	>2500- ≤20000	
Vapours (mg/l)	≤0.5	>0.5- ≤2.0	>2 - ≤10	>10 - ≤20	
Dust and mists (mg/l)	≤0.05	>0.05- ≤0.5	>0.5- ≤1.0	>1.0 - ≤5	

C.4.1 ACUTE TOXICITY – ORAL (CONTINUED)
(Classified in Accordance with Appendix A.1)

Hazard category	Signal word	Hazard statement	Pictogram
3	Danger	Toxic if swallowed	Skull and crossbones

Precautionary statements			
Prevention	**Response**	**Storage**	**Disposal**
Wash … thoroughly after handling. … Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. **Do not eat, drink or smoke when using this product.**	**If swallowed: Immediately call a poison center/doctor/...** … Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. **Specific treatment (see ... on this label)** ... Reference to supplemental first aid instruction. - *if immediate administration of antidote is required.* **Rinse mouth.**	**Store locked up.**	**Dispose of contents/container to...** ... in accordance with local/regional/national/international regulations (to be specified).

C.4.2 ACUTE TOXICITY - DERMAL
(Classified in Accordance with Appendix A.1)

Pictogram
Skull and crossbones

Hazard category	Signal word	Hazard statement
1	Danger	Fatal in contact with skin
2	Danger	Fatal in contact with skin

Precautionary statements			
Prevention	**Response**	**Storage**	**Disposal**
Do not get in eyes, on skin, or on clothing. **Wash … thoroughly after handling.** … Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. **Do not eat, drink or smoke when using this product.** **Wear protective gloves/protective clothing.** Chemical manufacturer, importer, or distributor to specify type of equipment.	**If on skin: Wash with plenty of water/...** … Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. **Immediately call a poison center/doctor/…** … Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. **Specific treatment (see ... on this label)** ... Reference to supplemental first aid instruction. - *if immediate measures such as specific cleansing agent is advised.* **Take off immediately all contaminated clothing and wash it before reuse.**	**Store locked up.**	**Dispose of contents/container to...** ... in accordance with local/regional/national/international regulations (to be specified).

C.4.3 ACUTE TOXICITY – INHALATION (CONTINUED)
(Classified in Accordance with Appendix A.1)

Hazard category	Signal word	Hazard statement	Pictogram
3	Danger	Toxic if inhaled	Skull and crossbones

Precautionary statements			
Prevention	**Response**	**Storage**	**Disposal**
Avoid breathing dust/fume/gas/mist/ vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. **Use only outdoors or in a well-ventilated area.**	**If inhaled: Remove person to fresh air and keep comfortable for breathing.** **Call a poison center/doctor/...** ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. **Specific treatment (see ... on this label)** ... Reference to supplemental first aid instruction. - *if immediate specific measures are required.*	**Store in a well-ventilated place. Keep container tightly closed.** - *if product is volatile so as to generate hazardous atmosphere.* **Store locked up.**	**Dispose of content/container to...** ... in accordance with local/regional/national/international regulations (to be specified).

Example 1 Label

TOXIC LIQUID

DANGER

Fatal in contact with skin. Toxic if swallowed or inhaled.

Prevention

Do not get in eyes, on skin, or on clothing. Avoid breathing vapors. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area.

Response

IF SWALLOWED: Immediately call a POISON CENTER or doctor. Rinse mouth.

IF ON SKIN: Wash with plenty of soap and water. Immediately call a POISON CENTER or doctor. Take off immediately all contaminated clothing and wash it before reuse.

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Call a POISON CENTER or doctor.

Storage

Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal

Dispose of contents in accordance with local and federal regulations.

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Example 2

- Mixture with 2 components
  - 90% Component A
    - Flammable Liquid Category 2
  - 10% Component B
    - IARC Carcinogen Group 1
    - Carcinogen Category 1B
  - Product Flashpoint 20C and BP 100C
- Mixture Classification
  - Flammable Liquid Category 2
  - Carcinogen Category 1B

Criteria for Flammable Liquids

Category	Criteria
1	Flash point < 23°C and initial boiling point ≤ 35°C
2	Flash point < 23°C and initial boiling point > 35°C
3	Flash point ≥ 23°C and ≤ 60°C
4	Flash point > 60°C and ≤ 93°C

Carcinogen / Cut-off values

Mixture classified as a carcinogen when at least one carcinogen has been classified as a Category 1 or 2 carcinogen and is present at or above the cut-off value/concentration limit below

Ingredient Classified as	Category 1 carcinogen	Category 2 carcinogen
Category 1 carcinogen	≥0.1%	
Category 2 carcinogen		≥0.1%

Label Elements Flammable Liquids

Hazard Category	Signal Word	Hazard Statement
1	Danger	Extremely flammable liquid and vapor
2	Danger	Highly flammable liquid and vapor
3	Warning	Flammable liquid and vapor

Pictogram

Prevention	Response	Storage	Disposal
Keep away from heat/ sparks/open flames/ hot surfaces. – No smoking Keep containers tightly closed. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ ventilating / lighting/…./equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/ eye protection/ face protection	If on skin (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower. In case of fire: Use … for extinction.	Store in a well-ventilated place. Keep cool	Dispose of contents/container to… *… in accordance with local/ regional/ national/ international regulations (to be specified)*

Label Elements Carcinogenicity

Hazard Category	Signal Word	Hazard Statement	Pictogram
1A and 1B	Danger	May cause cancer	
2	Warning	Suspected of causing cancer	

Prevention	Response	Storage	Disposal
Obtain special instructions before use Do not handle until all safety precautions have been read and understood Use personal protective equipment as required.	If exposed or concerned: Get medical advice/attention	Store locked up	Dispose of contents/container to… *… in accordance with local/ regional/ national/ international regulations (to be specified)*

Example Label 2

2-Methyl Flammaline

Danger
Highly Flammable Liquid and Vapor
May cause cancer

Keep away from heat/, sparks, open flames and hot surfaces. – No smoking
Keep containers tightly closed.
Ground container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wear protective gloves and eye protection.
Use other personal protective equipment as required.
If on skin (or hair): Remove immediately all contaminated clothing. Rinse skin with water/shower.
If exposed or concerned: Get medical advice.
In case of fire: Use water fog, foam or dry chemical for extinction.
Store in a well-ventilated place. Keep cool. Store locked up.
Dispose of contents to hazardous waste in accordance with all local, state and national regulations

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SDS Sections

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure control/ personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

1. Identification

(a) Product identifier used on the label;
(b) Other means of identification;
(c) Recommended use of the chemical and restrictions on use;
(d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party;
(e) Emergency phone number.

2. Hazard(s) Identification

(a) Classification of the chemical
(b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s). (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones);
(c) Describe any hazards not otherwise classified that have been identified during the classification process;
(d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration = 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.

3. Composition / Information on Ingredients

For Substances

(a) Chemical name;
(b) Common name and synonyms;
(c) CAS number and other unique identifiers;
(d) Impurities and stabilizing additives which are classified and contribute to the classification of the substance.

For Mixtures

In addition to the information required for substances:

(a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards and
    (1) are present above their cut-off/concentration limits; or
    (2) present a health risk below the cut-off/concentration limits.

(b) The concentration (exact percentage) shall be specified unless a trade secret claim is made, when there is batch variability or SDS covers similar mixture (these can show ranges).

If 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.

Note: OSHA also wants relevant ingredients with OELs to be listed in Section 3 and 8

77

4. First-Aid Measures

(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion;
(b) Most important symptoms/effects, acute and delayed.
(c) Indication of immediate medical attention and special treatment needed, if necessary.

78

5. Fire-Fighting Measures

(a) Suitable (and unsuitable) extinguishing media.
(b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).
(c) Special protective equipment and precautions for fire-fighters.

79

6. Accidental Release Measures

(a) Personal precautions, protective equipment, and emergency procedures.

(b) Methods and materials for containment and cleaning up.

7. Handling and Storage

(a) Precautions for safe handling.

(b) Conditions for safe storage, including any incompatibilities.

8. Exposure Controls/Personal Protection

(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
(b) Appropriate engineering controls.
(c) Individual protection measures, such as personal protective equipment.

9. Physical and Chemical Properties

(a) Appearance (physical state, color, etc.);
(b) Odor;
(c) Odor threshold;
(d) pH;
(e) Melting point/freezing point;
(f) Initial boiling point and boiling range;
(g) Flash point;
(h) Evaporation rate;
(i) Flammability (solid, gas);
(j) Upper/lower flammability or explosive limits;
(k) Vapor pressure;
(l) Vapor density;
(m) Relative density;
(n) Solubility(ies);
(o) Partition coefficient: n-octanol/water;
(p) Auto-ignition temperature;
(q) Decomposition temperature;
(r) Viscosity.

10. Stability and Reactivity

(a) Reactivity;
(b) Chemical stability;
(c) Possibility of hazardous reactions;
(d) Conditions to avoid (e.g., static discharge, shock, or vibration);
(e) Incompatible materials;
(f) Hazardous decomposition products.

11. Toxicological Information

Description of the various toxicological (health) effects and the available data used to identify those effects, including:

(a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
(b) Symptoms related to the physical, chemical and toxicological characteristics;
(c) Delayed and immediate effects and also chronic effects from short- and long-term exposure;
(d) Numerical measures of toxicity (such as acute toxicity estimates).
(e) Whether the hazardous 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 edition), or by OSHA.

12. Ecological Information

- Non-Mandatory

(a) Ecotoxicity (aquatic and terrestrial, where available);
(b) Persistence and degradability;
(c) Bioaccumulative potential;
(d) Mobility in soil;
(e) Other adverse effects (such as hazardous to the ozone layer).

13. Disposal Considerations

- Non-Mandatory

Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

14. Transport Information

- Non-Mandatory

(a) UN number;
(b) UN proper shipping name;
(c) Transport hazard class(es);
(d) Packing group, if applicable;
(e) Environmental hazards (e.g., Marine pollutant (Yes/No));
(f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);
(g) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.

15. Regulatory Information

- Non-Mandatory

Safety, health and environmental regulations specific for the product in question.

16. Other Information

- The date of preparation of the SDS or the last change to it.

SUBSTANCE: LITHIUM

TRADE NAMES/SYNONYMS: Lithium Metal
CHEMICAL FAMILY: Element
FORMULAS: Li

SECTION 2 HAZARDS IDENTIFICATION

GHS Classification:

Health	Environmental	Physical
Eye Corrosion/Irritation- Category 1 Skin Corrosion/Irritation – Category 1	None	Substances and Mixtures Which, in Contact with Water, Emit Flammable Gases – Category 1

GHS Label

Lithium
DANGER!
H260 In contact with water releases flammable gases, which may ignite spontaneously
H314 Causes severe skin burns and eye damage.

Prevention
P223 Do not allow contact with water
P231+ P232 Handle under inert gas. Protect from Moisture
P260 Do not breathe dusts.
P264 Wash thoroughly after handling
P280 Wear protective gloves/protective clothing/ eye protection/ face protection.

Response
P301+P330+P331 IF SWALLOWED Rinse Mouth Do NOT Induce Vomiting
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Response
P302 IF ON SKIN:
P335+P334 Brush off loose articles from skin. Immerse in cool water/wrap in wet bandage
P302 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P310 Immediately call a POISON CENTER or doctor/physician

P370+P378 In case of fire, use extinguishing media on basis of NaCl, pulverized limestone, Class D graphite powder. Never use water.

Storage
P402+P404 Store in a dry place. Store in closed container.
P405 Store locked up

Disposal
P501 Dispose of contents/containers in accordance with local/ regional/ national/ international regulation.

Supplemental Hazard Information: Lithium may explode when in contact with water. Exposure to moist air may result in fire. Lithium can react with water to produce flammable hydrogen gas, which may create a fire and explosion hazard. Spontaneous ignition can occur if Lithium is heated to its melting point. Lithium dusts may ignite spontaneously in moist air. Lithium can react with moisture to produce corrosive compounds. NEVER purge open

91

GHS Classification Sources of Information

- Japan has classified 1500 substances – available in English for download at http://www.safe.nite.go.jp/english/ghs_index.html (not mandatory)
- Korea has classified 2500 substances – only Korean
- REACH/EU CLP – REACH established a mandatory classification and labeling inventory for substances on the market in the EU available at ECHA website.

http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database

- REACH registrations contain GHS classifications (not always consistent with OSHA)

http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

92

EU Classification and Labeling

- CLP includes C&L Inventory requirement
- Includes both industry notified classifications and EU Harmonized classifications
- EU Harmonized classification for Carcinogens, Mutagens, Reproductive Toxins (CMR) – Categories 1 and 2, Respiratory Sensitizers – Category 1 and Active substances in pesticides/ biocides
- Use of EU Harmonized classification is Mandatory – found in Annex VI (Equivalent to previous Annex 1).
- Theoretically other agreed classifications should be used unless the ECHA is notified, must be substantiated.
- Inventory is now available to the public on the ECHA website

93

Summary Of Classification and Labelling

Harmonised classification - Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)

General Information

EC Number	CAS Number	Index Number	International Chemical Identification
200-836-8	75-07-0	605-003-00-6	ethanal acetaldehyde

ATP Inserted / Updated: CLP00

CLP Classification (Table 3.1)

Classification		Labelling			Specific Concentration limits, M-Factors	Notes
Hazard Class and Category Code(s)	Hazard Statement Code(s)	Hazard Statement Code(s)	Supplementary Hazard Statement Code(s)	Pictograms, Signal Word Code(s)		
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr		
Eye Irrit. 2	H319	H319				
STOT SE 3	H335	H335				
Carc. 2	H351	H351				

Signal Words	Pictograms		
Danger			
	Exclamation mark	Flame	Health hazard

Hazard Class and Category Code(s)	Hazard Statement Code(s)	Hazard Statement Code(s)	Supplementary Hazard Statement Code(s)	Pictograms, Signal Word Code(s)			Notifiers
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr			813
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351						
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr			178
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351	H351					
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr			142
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351	H351					
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr			93
Acute Tox. 4	H302	H302					
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351	H351					
Flam. Liq. 1	H224	H224		GHS07 GHS02 GHS08 Dgr			53
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351	H351					
Flam. Liq. 1	H224	H224		GHS01 Dgr			48
Eye Irrit. 2	H319	H319					
STOT SE 3	H335	H335					
Carc. 2	H351	H351					

Summary Of Classification and Labelling

Notified classification and labelling

General Information

EC Number	CAS Number	IUPAC Name
215-691-6	1344-28-1	13547_1344-28-1

Discus

Notified classification and labelling according to CLP criteria

Classification		Labelling			Specific Concentration limits, M-Factors	Notes	Number of Notifiers	Joint Entries
Hazard Class and Category Code(s)	Hazard Statement Code(s)	Hazard Statement Code(s)	Supplementary Hazard Statement Code(s)	Pictograms, Signal Word Code(s)				
Not Classified							1132	
							292	✔
							204	
STOT SE 3	H370	H370		GHS08 Dgr			44	
STOT SE 3	H335	H335		GHS07 Wng			35	
Acute Tox. 4	H332	H332		GHS07 Wng			34	
STOT SE 3	H335	H335						
							30	
STOT RE 1	H372	H372		GHS08 Dgr			15	

formaldehyde

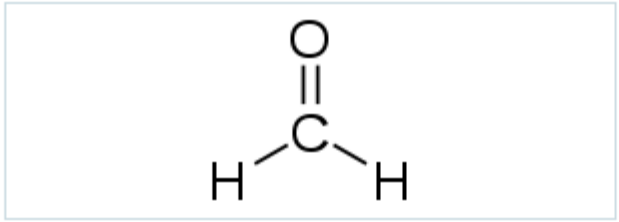
Identification | Registration data | Administrative data | Contact persons

Identification

Substance identification

formaldehyde

EC Number	200-001-8
EC Name	formaldehyde
CAS Number	50-00-0
Molecular formula	CH2O
IUPAC Name	formaldehyde



Type of substance

Composition	mono constituent substance
Origin	organic

Trade names

Classification and Labelling

GHS

Formaldehyde ...%

General Information

Not classified	✖
Implementation	EU
Remarks	EC/1272/2008 Annex VI

Classification

Physical hazards

Exposives	conclusive but not sufficient for cla
Flammable gases	conclusive but not sufficient for cla
Flammable aerosols	conclusive but not sufficient for cla
Oxidizing gases	conclusive but not sufficient for cla
Gases under pressure	conclusive but not sufficient for cla
Flammable liquids	conclusive but not sufficient for cla
Flammable solids	conclusive but not sufficient for cla
Self-reactive substances and mixtures	conclusive but not sufficient for cla
Pyrophoric liquids	conclusive but not sufficient for cla
Pyrophoric solids	conclusive but not sufficient for cla
Self-heating substances and mixtures	conclusive but not sufficient for cla
Substances and mixtures which in contact with water emits flammable gases	conclusive but not sufficient for cla
Oxidising liquids	conclusive but not sufficient for cla
Oxidising solids	conclusive but not sufficient for cla
Organic peroxides	conclusive but not sufficient for cla
Corrosive to metals	data lacking

Health hazards

Acute toxicity - oral	Acute Tox. 3 H301: Toxic if swallowed.
Acute toxicity - dermal	Acute Tox. 3 H311: Toxic in contact with skin.
Acute toxicity - inhalation	Acute Tox. 3 H331: Toxic if inhaled.
Skin corrosion / irritation	Skin Corr. 1B H314: Causes severe skin burns and eye damage.
Serious eye damage / eye irritation	Eye Damage 1 H318: Causes serious eye damage.
Respiratory sensitization	conclusive but not sufficient for classification
Skin sensitization	Skin Sens. 1 H317: May cause an allergic skin reaction.
Aspiration hazard	conclusive but not sufficient for classification

Reproductive toxicity

Reproductive toxicity	conclusive but not sufficient for classification
Effects via lactation	conclusive but not sufficient for classification

Germ cell mutagenicity

Germ cell mutagenicity	conclusive but not sufficient for classification

Carcinogenicity

Carcinogenicity	Carc. 2 H351: Suspected of causing cancer <state route of exposure if it is co proven that no other routs of exposure cause the hazard>. Route of exposure: Inhalation inhalation

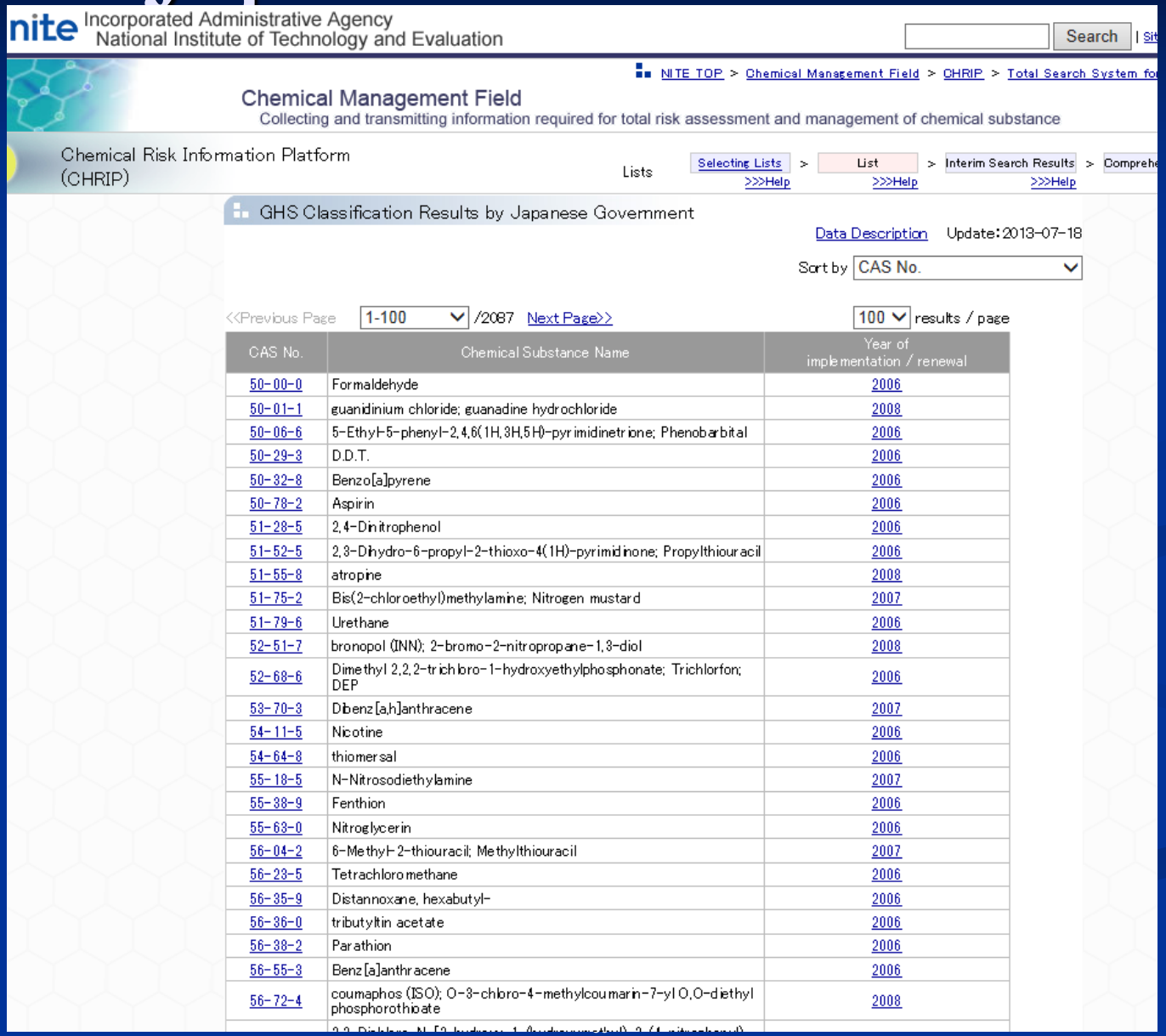
Specific target organ toxicity - single

Specific target organ toxicity - single	conclusive but not sufficient for classification

Specific target organ toxicity - repeated

Specific target organ toxicity - repeated	conclusive but not sufficient for classification

Japan Classifications



nite Incorporated Administrative Agency
National Institute of Technology and Evaluation

Search

NITE TOP > Chemical Management Field > CHRIP > Total Search System fo

Chemical Management Field

Collecting and transmitting information required for total risk assessment and management of chemical substance

Chemical Risk Information Platform (CHRIP)

Lists Selecting Lists >>>Help > List >>>Help > Interim Search Results >>>Help > Comprehe

GHS Classification Results by Japanese Government

Data Description Update:2013-07-18

Sort by CAS No.

<<Previous Page 1-100 /2087 Next Page>> 100 results / page

CAS No.	Chemical Substance Name	Year of implementation / renewal
50-00-0	Formaldehyde	2006
50-01-1	guanidinium chloride; guanadine hydrochloride	2008
50-06-6	5-Ethyl-5-phenyl-2,4,6(1H,3H,5H)-pyrimidinetrione; Phenobarbital	2006
50-29-3	D.D.T.	2006
50-32-8	Benzo[a]pyrene	2006
50-78-2	Aspirin	2006
51-28-5	2,4-Dinitrophenol	2006
51-52-5	2,3-Dihydro-6-propyl-2-thioxo-4(1H)-pyrimidinone; Propylthiouracil	2006
51-55-8	atropine	2008
51-75-2	Bis(2-chloroethyl)methylamine; Nitrogen mustard	2007
51-79-6	Urethane	2006
52-51-7	bronopol (INN); 2-bromo-2-nitropropane-1,3-diol	2008
52-68-6	Dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate; Trichlorfon; DEP	2006
53-70-3	Dibenz[a,h]anthracene	2007
54-11-5	Nicotine	2006
54-64-8	thiomersal	2006
55-18-5	N-Nitrosodiethylamine	2007
55-38-9	Fenthion	2006
55-63-0	Nitroglycerin	2006
56-04-2	6-Methyl-2-thiouracil; Methylthiouracil	2007
56-23-5	Tetrachloromethane	2006
56-35-9	Distannoxane, hexabutyl-	2006
56-36-0	tributyltin acetate	2006
56-38-2	Parathion	2006
56-55-3	Benz[a]anthracene	2006
56-72-4	coumaphos (ISO); O-3-chloro-4-methylcoumarin-7-yl O,O-diethyl phosphorothioate	2008

Health Hazards

Hazard class		Classification	symbol	signal word	hazard statement	Rational for the classification
1	Acute toxicity (oral)	Not classified				Based on the LD50 (oral route) value of 11,710mg/kg (CERI Hazard Data 2001-60 (2002).
1	Acute toxicity (dermal)	Classification not possible				No data available
1	Acute toxicity (inhalation: gas)	Not applicable				Due to the fact that the substance is "solid" according to the GHS definition and inhalation of its gas is not expected.
1	Acute toxicity (inhalation: vapour)	Classification not possible				No data available
1	Acute toxicity (inhalation: dust, mist)	Classification not possible				No data available
2	Skin corrosion / irritation	Classification not possible				IUCLID (2000) reports epidemiological evidence of human exposure: "slightly irritating." However, classification is not possible since details are not available.
3	Serious eye damage / eye irritation	Classification not possible				IUCLID (2000) reports epidemiological evidence of human exposure: "irritating." However, classification is not possible since details are not available.
4	Respiratory/skin sensitizer	Respiratory sensitizer: Classification not possible Skin sensitizer: Classification not possible				Respiratory sensitizer: No data available Skin sensitizer: CICAD 12 (1999) reports human epidemiological evidence suggesting skin sensitization. However, CICAD does not make conclusions about the presence of sensitization.
5	Germ cell mutagenicity	Classification not possible				No data available
6	Carcinogenicity	Classification not possible				Classification not possible based on expert judgment in the absence of existing classification.
7	Toxic to reproduction	Classification not possible				No data available
8	Specific target organs/systemic toxicity following single exposure	Category 1 (respiratory organs)				"Acute exposure to manganese dust (in particular, MnO_2 and Mn_3O_4) induces pulmonary inflammation which progresses to pulmonary impairment with time. Pulmonary effects increase the infectiousness of bronchitis etc., resulting in manganese pneumonia" (CICAD 12 (1999)).
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (respiratory organs, nervous system, cardiovascular system)				Based on the human evidence including "increased incidence of cases diagnosed as pneumonia," "the patient exhibited facial masking, reduced blinking reflex, micrographia, loss of associated arm movements, tremor of the right hand and some cogwheel rigidity of the right extremities," "psychopathological/neurological collapse" (EHC 17 (1981)), "impaired eye-hand coordination/visual reaction" (CICAD 12 (1999)), "a greater incidence of low diastolic blood pressure," "impaired visual reaction time, hand-eye coordination, and hand steadiness" (ATSDR (2000)), and the evidence from animal studies including "sudden movement and torpor, nervousness, severe tremor, flexion-extension movements of upper limbs, yawning, and cyanosis; atrophy of the cerebellar cortex," "peribronchial and perivascular sclerosis and inflammatory changes" (EHC 17 (1981)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
10	Aspiration hazard	Classification not possible				No data available

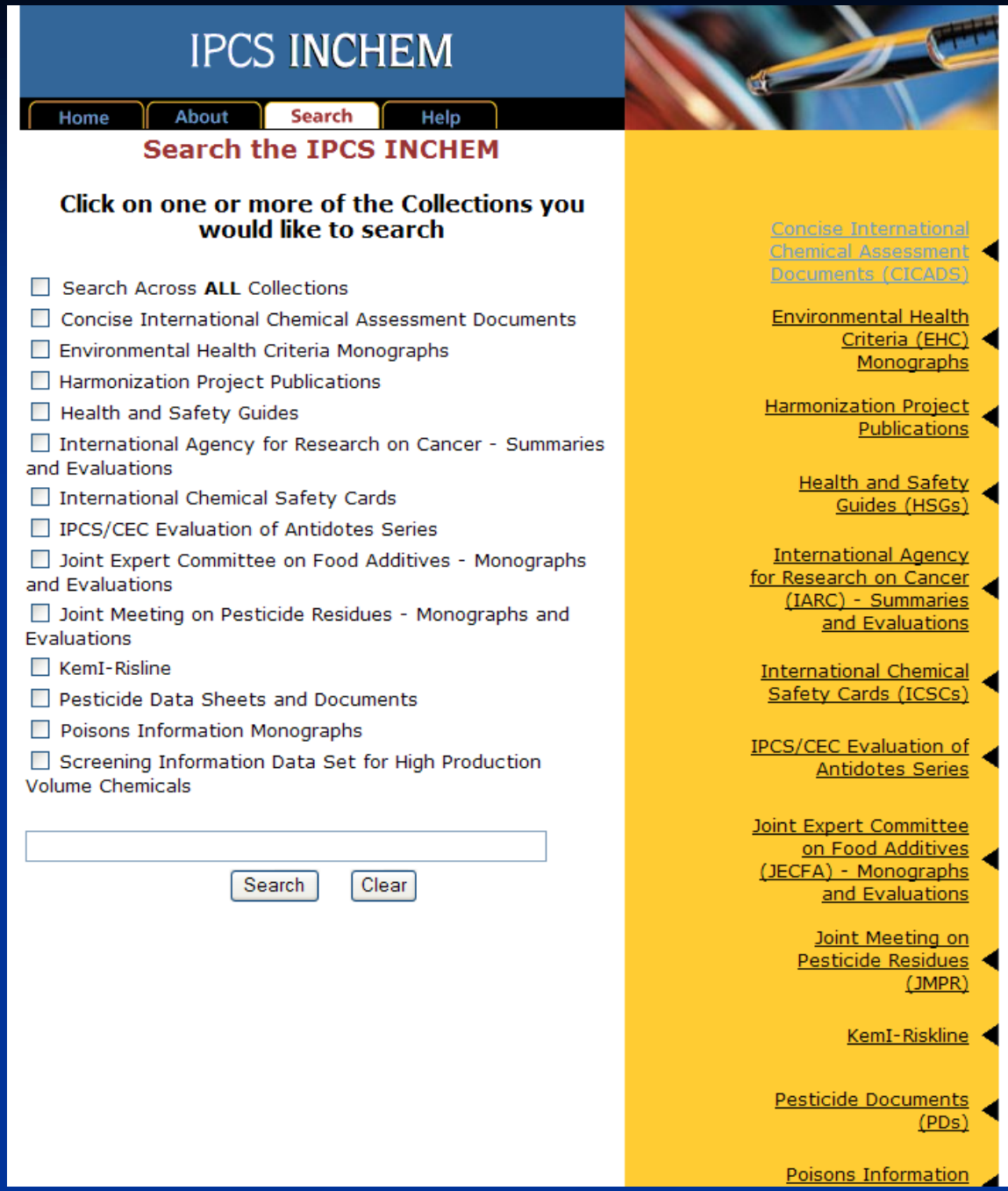
Environmental Hazards

Hazard class		Classification	symbol	signal word	hazard statement	Rational for the classification
11	Hazardous to the aquatic environment (acute)	Classification not possible	-	-	-	No data available
11	Hazardous to the aquatic environment (chronic)	Classification not possible	-	-	-	No data available

Data Sources

- Supplier MSDS
- EPA IRIS http://www.epa.gov/ncea/iris/search_keyword.htm
- EPA HPVIS http://www.epa.gov/hpvis/index.html
- EPA OPPT Chemical Fact Sheets http://www.epa.gov/chemfact/
- EU ESIS http://esis.jrc.ec.europa.eu/
- IPCS INCHEM http://www.inchem.org/pages/search.html
- NTP Study Reports http://ntp.niehs.nih.gov/
- OECD SIDS http://www.oecd.org/document/63/0,3343,en_2649_34379_1897983_1_1_1_1,00.html
  http://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html
- ATSDR http://www.atsdr.cdc.gov/
- NLM Databases http://toxnet.nlm.nih.gov/index.html
- IARC Monographs http://monographs.iarc.fr/
- REACH Registrations ECHA Website http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

101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Joint Expert Committee on Food Additives - Monographs and Evaluations
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102


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Registry Numbers
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Toxicity
Physical Properties
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File Locator
CCRIS NCI Chem Carcino Res Info Sys
DART Developmental and Reprod.Tox.
EINECS EU Inv of Exist. Comm. Chem Sub
EMIC Env. Mutagen Info. Center
GENETOX EPA GENetic TOXicology
HSDB Hazardous Substances Data Bank
Haz-Map Occ. Exposure to Haz. Agents
Household Products Household Products Database
IRIS EPA Integrated Risk Info. System
ITER International Tox. Est. for Risk
MeSH Medical Subject Headings File
MeSH Heading Medical Subject Headings
PubChem PubChem
PubMed Biomedical Citations From PubMed
PubMed Cancer Cancer Citations from PubMed
PubMed Toxicology Toxicology Citations From PubMed
RTECS Reg. of Toxic Eff. of Chem. Sub.
TOXLINE NLM TOXLINE on TOXNET
TOXMAP NLM Enviro. Health e-Maps
TRI2000 EPA Toxics Release Inv. 2000
TRI2001 EPA Toxics Release Inv. 2001
TRI2002 EPA Toxics Release Inv. 2002
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Internet Locator
ATSDR PHSs ATSDR Public Health Statements
ATSDR Tox Profiles ATSDR Toxicological Profiles
ATSDR ToxFAQs ATSDR ToxFAQS
CAMEO NOAA CAMEO Chemicals
CPDB Carcinogenic Potency Database
CTD Comparative Toxicogenomics Database
EPA Envirofacts EPA Master Chemical Integrator
EPA SRS EPA Substance Registry System
IUCLID EU IUCLID Chemical Data Sheet
NIOSH ICSC NIOSH Intl. Chem. Safety Cards
NIOSH Pocket Guide NIOSH Pocket Guide to Chem Haz
NIST WebBook NIST Chemistry WebBook
NJ-HSFS New Jersey Haz. Sub. Fact Sheets
NTP DBS NTP Database Search
OSHA Chem OSHA Chemical Sampling Info
SRC CHEMFATE Syracuse Res. Corp. CHEMFATE
SRC DATALOG Syracuse Res. Corp. DATALOG
Superlist Locator
CAA1 EPA Toxic Air Pollutants
CGB DOT Coast Guard Bulk Haz. Mat.
CGN DOT Coast Guard Nox. Liquid Sub.
DOT DOT Hazardous Materials
DSL Domestic Sub. List of Canada
HPV EPA High Production Vol. Chem.
IARC Int. Agency for Res. on Cancer
INER EPA Pesticide Inert Ingredients
MA Massachusetts Right-to-know Sub.
MI Michigan Critical Materials Register
MPOL Marine Pollutants List
MTL EPA Master Testing List
NJ New Jersey Right-to-know Sub.
NTPT NTP Technical Reports
PA Pennsylvania Right-to-know Sub.
PAFA FDA Substances added to food
PEL OSHA Toxic and Haz. Sub.
REL NIOSH Rec. Exposure Limits
RQ CERCLA Reportable Quantities
S110 ATSDR Priority List of Haz. Sub.
TLV ACGIH Threshold Limit Values
TRI EPA Toxics Release Inventory
TSCAINV EPA Chem. Sub. Inventory
WHMI Workplace Haz. Mat. Information

103

European Commission
Joint Research Centre
Institute for Health and Consumer Protection

European Commission > JRC > IHCP > ESIS

ESIS | EINECS | ELINCS | NLP | BPD | PBT | CLP/GHS | HPV-LPV | IUCLID DS | ORATS

Search Annex VI

Details on Substances Classified in Annex VI to Regulation (EC) No 1272/2008

General Information			
Index number	Notes (alphabetic / numeric)		ATP inserted / ATP updated
	Table 3.1	Table 3.2	
601-021-00-3	- / -	- / -	CLP00 / -

Sub	EC No	Cas No	Name
1	203-625-9	108-88-3	toluene

Regulation (EC) No 1272/2008 Annex VI Table 3.1

Classification		Labelling		
Hazard Class and Category Code(s)	Hazard Statement Code(s)	Pictogram Signal Word Code(s)	Hazard Statement Code(s)	Suppl. Hazard statement code(s)
Flam. Liq. 2 Repr. 2 Asp. Tox. 1 STOT RE 2 * Skin Irrit. 2 STOT SE 3	H225 H361d *** H304 H373 ** H315 H336	GHS02 GHS08 GHS07 Dgr	H225 H361d *** H304 H373 ** H315 H336	

Specific Concentration Limits and M Factors	
Concentration	Classification
-	-

Pictogram(s)

Flame Health hazard Exclamation mark

104

U.S. ENVIRONMENTAL PROTECTION AGENCY

High Production Volume Information System (HPVIS)

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Detailed Chemical Results

Chemical Name: Benzene, 1-chloro-4-nitro-
CAS Number: 100-00-5

Click on the endpoint link to see the data on a tab page.

Physical-Chemical SIDS

- Melting Point(1)
- Boiling Point(1)
- Vapor Pressure(1)
- Partition Coefficient(1)
- Water Solubility(2)

Fate SIDS

- Photodegradation(2)
- Stability in Water(1)
- Transport Between Environmental Compartments Fugacity/Dist(1)
- Biodegradation(3)

EcoToxicity SIDS

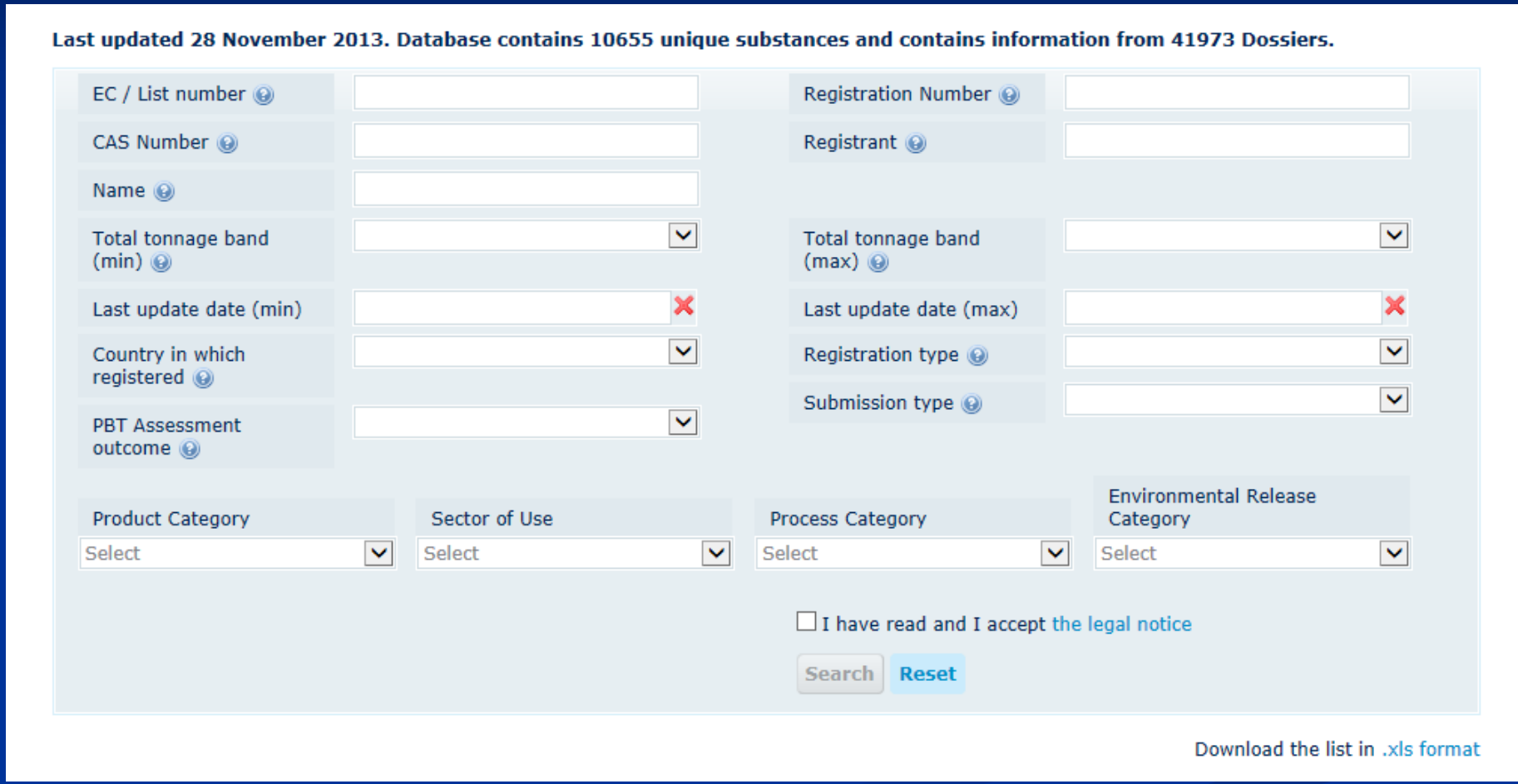
- Acute Toxicity to Aquatic Vertebrates(2)
- Acute Toxicity to Aquatic Invertebrates(2)
- Acute Toxicity to Aquatic Plants(2)

Mammalian Health Effects SIDS

- Acute Toxicity(1)
- Repeated-Dose Toxicity(3)
- Genetic Toxicity in vivo(1)
- Genetic Toxicity in vitro(2)
- Reproductive Toxicity(2)
- Developmental Toxicity/Teratogenicity(2)

105

REACH Registrations



106

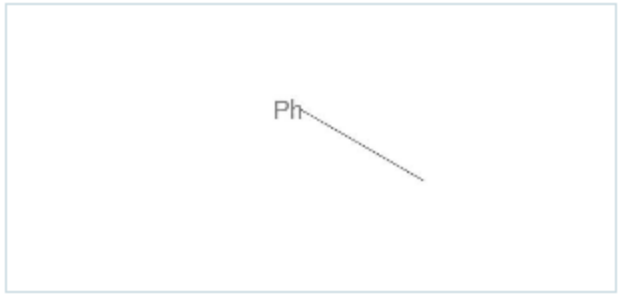
Identification | Registration data | Administrative data | Contact persons

Identification

Substance identification

toluene

EC Number	203-625-9
EC Name	toluene
CAS Number	108-88-3
Molecular formula	C7H8
IUPAC Name	toluene



Type of substance

Composition	mono constituent substance
Origin	organic

Total Tonnage Band

	1,000,000 - 10,000,000 tonnes per annum

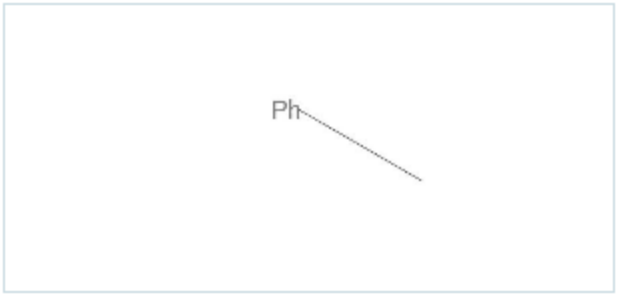
Registrants / Suppliers

- Compositions
- Classification and Labelling
  - GHS
    - Toluene
    - toluene
    - Toluene containing 0.13% benzene
    - Toluene - harmonised classification
    - Toluene - self classification
  - DSD - DPD
- Manufacture, Use & Exposure
- PBT assessment
- Physical and chemical properties
- Environmental fate and pathways
- Ecotoxicological Information
- Toxicological information
- Guidance on safe use
- Reference substances

Substance identification

toluene

EC Number	203-625-9
EC Name	toluene
CAS Number	108-88-3
Molecular formula	C7H8
IUPAC Name	toluene



Type of substance

Composition	mono constituent substance
Origin	organic

Composition

Toluene

Constituents

Flammable liquids	Flam. Liquid 2 H225: Highly flammable liquid and vapour.
Flammable solids	conclusive but not sufficient for classification
Self-reactive substances and mixtures	conclusive but not sufficient for classification
Pyrophoric liquids	conclusive but not sufficient for classification
Pyrophoric solids	conclusive but not sufficient for classification
Self-heating substances and mixtures	conclusive but not sufficient for classification
Substances and mixtures which in contact with water emits flammable gases	conclusive but not sufficient for classification
Oxidising liquids	conclusive but not sufficient for classification
Oxidising solids	conclusive but not sufficient for classification
Organic peroxides	conclusive but not sufficient for classification
Corrosive to metals	conclusive but not sufficient for classification

Health hazards

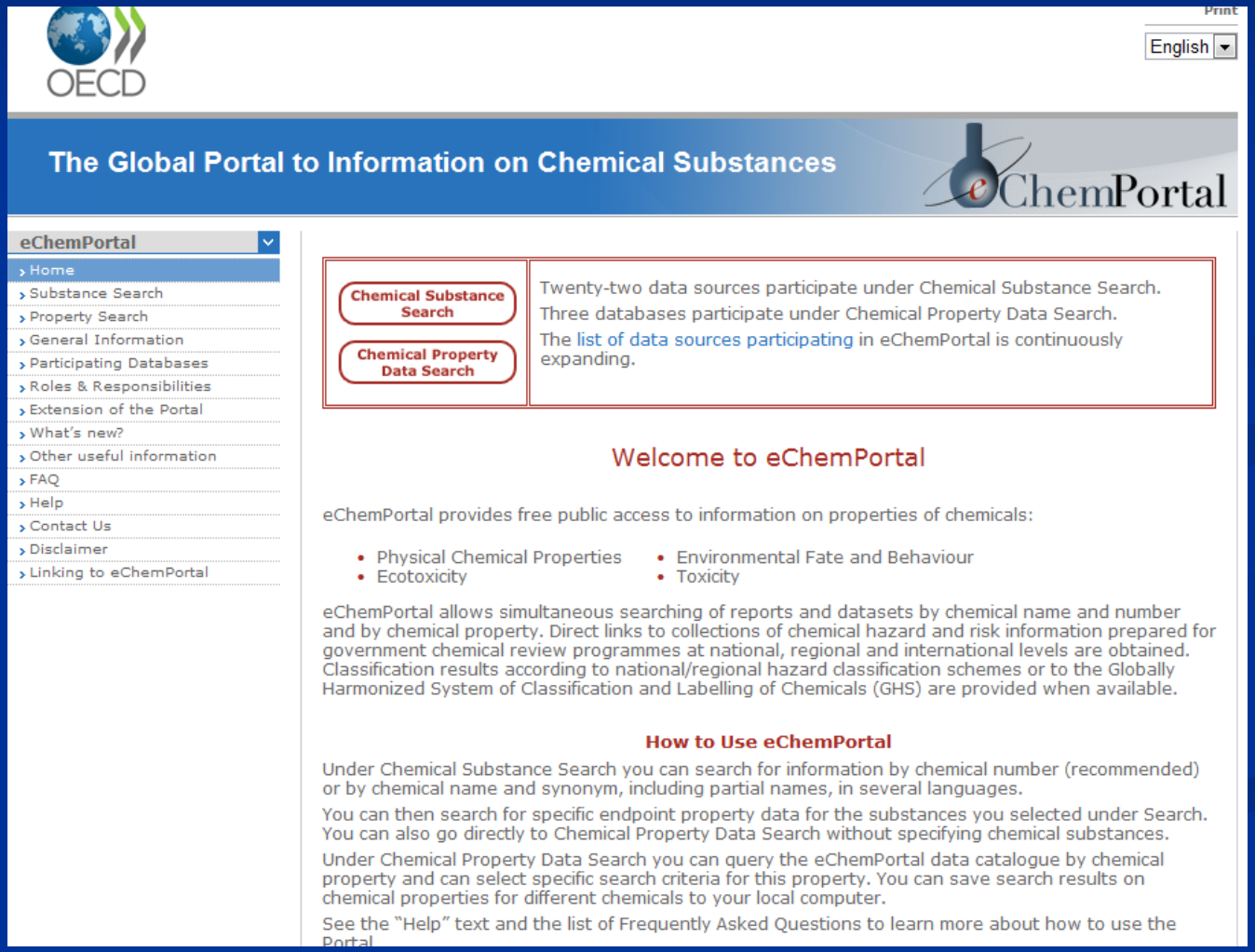
Acute toxicity - oral	conclusive but not sufficient for classification
Acute toxicity - dermal	conclusive but not sufficient for classification
Acute toxicity - inhalation	conclusive but not sufficient for classification
Skin corrosion / irritation	Skin Irrit. 2 H315: Causes skin irritation.
Serious eye damage / eye irritation	Eye Irrit. 2 H319: Causes serious eye irritation.
Respiratory sensitization	conclusive but not sufficient for classification
Skin sensitization	conclusive but not sufficient for classification
Aspiration hazard	Asp. Tox. 1 H304: May be fatal if swallowed and enters airways.

Reproductive toxicity

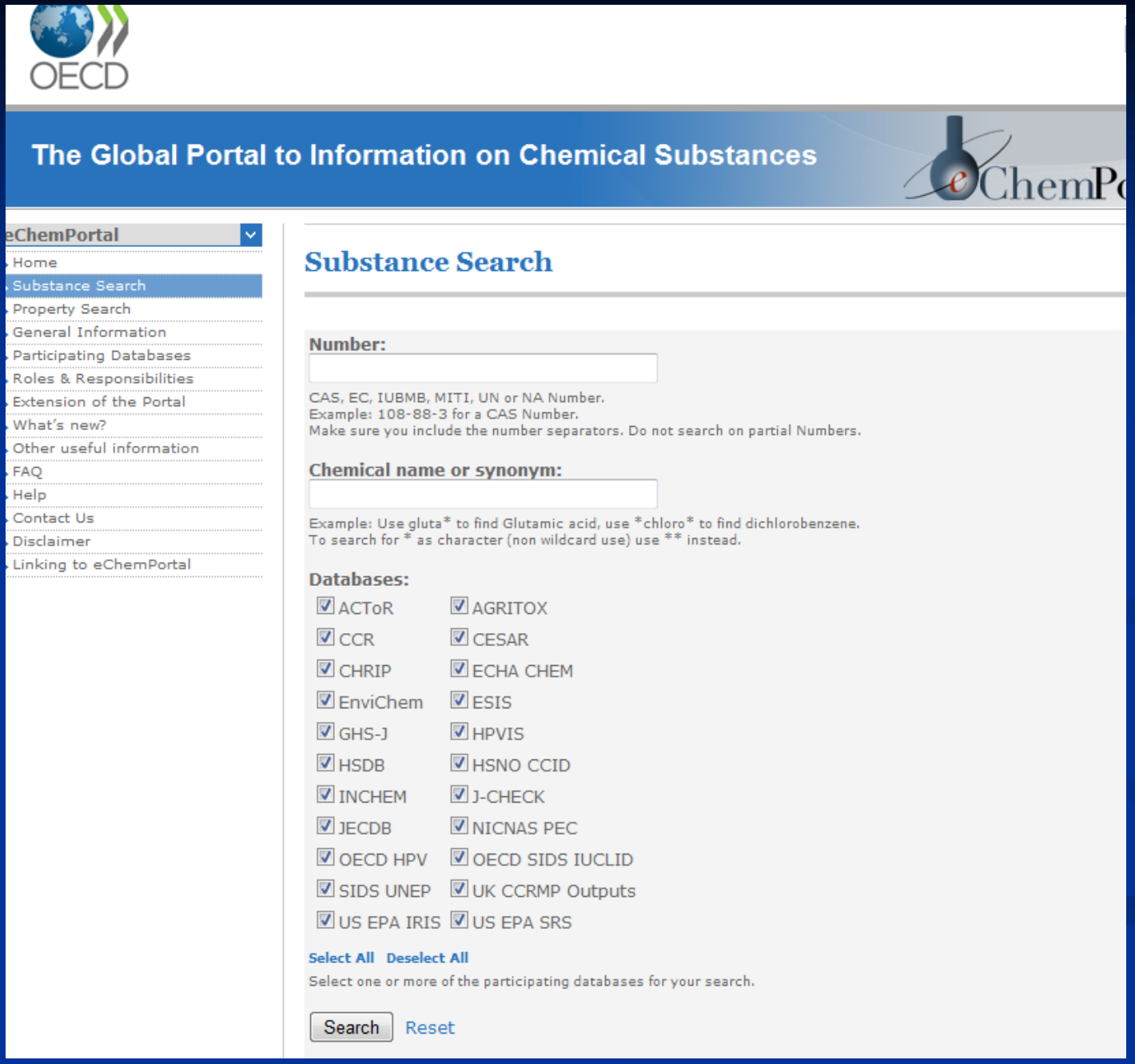
Reproductive toxicity	Repr. 2 H361: Suspected of damaging fertility or the unborn child <state specific effect if known> <state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard>. Specific effect: Suspected of damaging the unborn child
Effects via lactation	conclusive but not sufficient for classification

eChem Portal

- http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en



110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Example: Use gluta* to find Glutamic acid, use *chloro* to find dichlorobenzene.
To search for * as character (non wildcard use) use ** instead.
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CESAR
CHRIP
ECHA CHEM
EnviChem
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INCHEM
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111

Examples on Classification

112

Example 1

Chemical Name	PCT	Composition	Classification	Relevant Data	Source	Other
Phenolic Resin	38.0	Phenolic modified rosin resin Proprietary 53-57, Technical White Oil Proprietary 44-47	Eye Irrit 2A, Skin Irrit 2		MSDS	
Blue Flush	20.0	Linseed Oil 1-5, Copper Salt 0.5-1.5	Eye Irrit 2A		MSDS	Naphthalene 0.01%
Hydrocarbon Resin #1	16.0	Hydrocarbon Petroleum Resin 60-80, Petroleum Solvent 64742-46-7, 64741-44-2 20-40	Acute Inhalation Tox 2, Asp 1 ?	64742-44-2 LC50 rat 1.72 mg/L/4 hr (actual form aerosol)	MSDS, REACH	contains Naphthalene
Kaolin Clay	8.0	Kaolin 1332-58-7, Titanium Dioxide 0.3-2	STOT RE 1, Carc 2		MSDS	contains 0.3-2% TiO2
Hydrocarbon oil #1	6.0	Petroleum Distillates 64742-46-7 100	Asp 1	Viscosity 40 SUS @ 100 F (~8 mm2/sec @40C)	MSDS	
Hydrocarbon Resin #2	4.0	Hydrocarbon Resin Proprietary	Not Hazardous		MSDS	NAPHTHALENE 0.05%
Hydrocarbon oil #2	3.0	Kerosene 64742-81-0 100	Asp 1	Not systemically Toxic	MSDS	
Vegetable oil	2.0	Refined Soybean Oil 8001-22-7 100	Not Hazardous		MSDS	
PTFE Wax	1.0	Polytetrafluoroethylene 9002-84-0, Petrolarum	Not Hazardous		MSDS	
Gum Rosin	1.0	Rosin 8050-09-7	Skin Sensitizer 1	Not systemically Toxic	MSDS, REACH	
Soy Lecithin	1.0	Lecithin 8002-43-5	Not Hazardous	Not systemically Toxic	MSDS	

Classification Issues

Acute Toxicity

1 relevant ingredient

6.4% max Acute Inh Tox 2 LC50 1.72 mg/L

100 /ATE = 6.4/1.72

ATE = 100/3.72

ATE = 26.88 mg/L

Not Classified

Skin Irritation

Total ingredients classified Skin 1 = 0

Skin 2 = 38%

Classified Skin Irritant Category 2

Eye Irritation

Eye 1 = 0

Eye 2A = 58%

Classified Eye Irritant Category 2A

Classification Issues

Respiratory Sensitization

no relevant ingredients

Not classified

Germ Cell Mutagenicity

no relevant ingredients

Not classified

Skin Sensitization

1 relevant ingredient

Gum Rosin >0.1%

Classified Skin Sensitization Category 1

Carcinogenicity

1 Relevant Ingredient

Titanium Dioxide 0.24% max, Bound? (assume yes)

Not Classified

Classification Issues

Reproductive Toxicity

no relevant ingredients

Not classified

STOT SE

no relevant ingredients

Not classified

STOT RE

1 relevant ingredient

Kaolin >1% (Bound? Assume yes) Not classified

Aspiration

3 Relevant Ingredients

Total 15.4%, Need Viscosity

Aspiration Category 1

Overall Classification

- Physical Hazards – not hazardous
- Health Hazards
  - Skin Irritation Category 2
  - Eye Irritation Category 2A
  - Skin Sensitizer Category 1
  - Aspiration Toxicity Category 1

Example 2

Generic Magenta Ink Formula

	Composition/CAS#	%	Classification	Relevant Data	Source	Other
Phenolic Modified Rosin Ester	185765-80-4	17.00	Not Hazardous		MSDS	Contains <0.1% Formaldehyde
Maleic Modified Rosin Ester	68333-69-7	8.00	Combustible Dust		MSDS	
Hydrocarbon Resin		3.60	Combustible Dust		MSDS	
Linseed Oil	8001-26-1	21.00	Not Hazardous		MSDS, C&L	
Sweetened Middle Distillate	64741-44-2	8.00	Acute inh tox 4, skin irrit 2, asp 1,	LC50 rat 4.6 mg/L/4 hr aerosol	REACH and MSDS	
Technical White Oil	8042-47-5	6.00	Asp 1	Not systemically toxic		
Technical White Oil	8042.47-5	3.00	Asp 1	Not systemically toxic	MSDS	
Alkyd		7.00	Not Hazardous		MSDS	
Lithol Rubine Pigment	5281-04-9, calcium resinate 9007-13-0 5-10%	17.00	Combustible dust, Skin Sens 1		MSDS , REACH Not Hazardous	
Mn Drier	Manganese Compound Proprietary 60%, Mineral Spirits 8052-41-3 25%, Ethylene Glycol Butyl Ether 111-76-2 9%, Proprietayr Components 5%	2.00	Flammable Liquid 3, Eye 2A, Skin 2, Asp 1, STOT RE 1 (nervous system and pulmonary system)		MSDS	
Co Drier	Cobalt Carboxylates 27253-31-2/68955-83-9 70%, Mineral Spirits 8052-41-3 27%, Diethylene Glycol Methyl Ether 3%	2.00	Flammable Liquid 3, Eye 2A, Skin 2, Skin Sens 1, Resp Sens 1, Asp 1. 27253-31-2 Acute oral tox 4, Skin Irrit 2, Skin Sens 1, Repr 2 (REACH), Cobalt Cmpds Carc 2	27253-31-2 LD50 oral rat 1098 mg/kg	MSDS and REACH	Contains toluene and benzene
PE Wax	9002-88-4	1.00	Not Hazardous	Not systemically toxic	MSDS	
PE Wax Cpd.		3.00	Not Hazardous	Not systemically toxic	MSDS	
Hydroquinone Cpd.	123-31-9 Hydroquinone 40%	0.40	Hydroquinone: Acute oral tox 4, Eye Dam 1, Skin Sens 1, Muta 2, Carc 2 (Not IARC or NTP)		MSDS and REACH	
N-methyl-2-pyrrolidone	872-50-4	1.00	Skin 2, Eye 2A, Repr 1B, STOT SE 3 resp irrit,		REACH and MSDS	
		100.00				

Classification Issues

Acute Inhalation Toxicity

1 relevant ingredient

8% Acute Inh Tox 4 LC50 4.6 mg/L

100 /ATE = 8/4.6

ATE = 100/1.74

ATE = 57.47 mg/L

Not Classified

Acute Oral Toxicity

1 relevant ingredient (cobalt carboxylate – hydroquinone <1%)

1.4% Acute Oral Tox 4 LD50 1098 mg/kg

100 /ATE = 1.4/1098

ATE = 100/0.0013

ATE = 76,923 mg/kg

Not Classified

Classification Issues

Skin Irritation

Total ingredients classified

Skin 1 = 0

Skin 2 = 13%

Classified Skin Irritant Category 2

Eye Irritation

Total ingredients classified

Eye 1 = 0.16

Eye 2A = 5%

10x0.16 + 5 = 6.6

Not classified

Classification Issues

Respiratory Sensitization

1 relevant ingredient 1.4%

Respiratory Sensitization Category 1

Skin Sensitization

2 relevant ingredients

Calcium resinate, cobalt carboxylate, Hydroquinone each >0.1%

Classified Skin Sensitization Category 1

Germ Cell Mutagenicity

no relevant ingredients (Hydroquinone 0.16% cat 2 cutoff is 1%)

Not classified

Carcinogenicity

2 Relevant Ingredients

Cobalt Cmpds 1.4%, Hydroquinone 0.16%)

Classified Carcinogen Category 2

Classification Issues

Reproductive Toxicity

2 relevant ingredients

Cobalt carboxylate 1.4%, NMP 1%

Classified Reproductive Toxicity Category 1B

STOT SE

1 relevant ingredient (NMP 1% - cutoff 20%)

Not classified

STOT RE

1 relevant ingredient

Manganese Cmpd 1.2%
Classified STOT RE1 nervous system, pulmonary system

Aspiration

4 Relevant Ingredients

Total 10.4%, Need Viscosity

Aspiration Category 1

Overall Classification

- Physical Hazards – not hazardous (Combustible dust will not apply)
- Health Hazards
  - Skin Irritation Category 2
  - Respiratory Sensitizer Category 1
  - Skin Sensitizer Category 1
  - Carcinogen Category 2
  - Reproductive Toxicity Category 1B
  - Specific Target Organ Toxicity Repeated Exposure Category 1 (nervous system, pulmonary system)
  - Aspiration Toxicity Category 1

Example 3

Formula %	Description	CAS#	Composition %	Classification	Relevant Data	Source
12.0	BEDE	64401-02-1	97	Skin Sens 1 (REACH registration No)		MSDS, REACH
8.0	DPE	60506-81-2	100	Skin Sens 1		MSDS
22.0	Dry 146			Combustible Dust		MSDS
10.0	EAO	55818-57-0	98	Skin Sens 1		REACH
6.0	EAR		100	Skin 2, Eye 2A, Skin Sens 1		MSDS
10.0	ETP	28961-43-5	100	Eye 2A, Skin Sens 1		
3.0	MPD			Not Hazardous		MSDS
20.0	OPA		99	Eye Dam 1, Skin 2, Skin Sens 1, STOT SE 3 (resp irrit		MSDS
1.0	P W		100	Not Hazardous		MSDS
1.0	P1	7473-98-5	98	Acute oral tox 4	LD50 oral rat 1694 mg/kg	MSDS, REACH
2.0	P2	71868-10-5	99	Acute oral tox 4, Repr 1B	LD50 oral rat 1800 mg/kg	MSDS REACH
2.0	P3	119313-12-1	100	Not Hazardous		MSDS REACH
2.0	Talc	14807-96-6	99	Not Hazardous		MSDS
1.0	TAS	15305-07-4, 52408-84-1		Eye 2A, Skin Sens 1		REACH

Classification Issues

Acute Oral Toxicity

2 relevant ingredient

1% LD50 1694 mg/kg; 2% LD50 1800 mg/kg

100 /ATE = 1/1694+2/1800

ATE = 100/0.0017

ATE = 58,824 mg/kg

Not Classified

Classification Issues

Skin Irritation

Total ingredients classified

Skin 1 = 0

Skin 2 = 26%

Classified Skin Irritant Category 2

Eye Irritation

Total ingredients classified

Eye 1 = 20

Eye 2A = 17%

Classified Eye Damage 1

Classification Issues

Respiratory Sensitization

no relevant ingredients

Not classified

Skin Sensitization

7 relevant ingredients

each >0.1%

Classified Skin Sensitization Category 1

Germ Cell Mutagenicity

no relevant ingredients

Not classified

Carcinogenicity

no relevant ingredients

Not Classified

Classification Issues

Reproductive Toxicity

1 relevant ingredient

P2 2%

Classified Reproductive Toxicity Category 1B

STOT SE

1 relevant ingredient (OPA 20% - cutoff 20%)

Classified STOT SE Category 3 (respiratory irritation)

STOT RE

no relevant ingredients

Not classified

Aspiration

No relevant ingredients

Not classified

Overall Classification

- Physical Hazards – not hazardous (Combustible dust will not apply)
- Health Hazards
  - Skin Irritation Category 2
  - Eye Damage Category 1
  - Skin Sensitizer Category 1
  - Reproductive Toxicity Category 1B
  - Specific Target Organ Toxicity Single Exposure Category 3 (respiratory irritation

Environmental Hazards

- Currently only Aquatic Toxicity and Hazardous to the Ozone Layer
- Acute Toxicity based on LC50 96 hr fish, ErC50 (growth rate) 72/96 hr algae, EC50 (immobilization) 48 hr crustacea
- Chronic Toxicity based chronic toxicity testing or on acute toxicity with persistence and/or bioaccumulation
- Classify for both acute and chronic toxicity
- Substances with extreme toxicity contribute at lower concentrations – assigned M (multiplying) factor
- Rev 3 of the GHS changed chronic toxicity classification but not yet adopted by Transport (in 2009 Orange Book- not 2010 IMDG)

130

Table 4.1.2: Classification scheme for substances hazardous to the aquatic environment

Classification categories			
Acute hazard (*Note 1*)	**Long-term hazard** (*Note 2*)		
	Adequate chronic toxicity data available		**Adequate chronic toxicity data not available** (*Note 1*)
	Non-rapidly degradable substances (*Note 3*)	**Rapidly degradable substances** (*Note 3*)	
Category: Acute 1 $L(E)C_{50} \leq 1.00$	**Category: Chronic 1** NOEC or $EC_x \leq 0.1$	**Category: Chronic 1** NOEC or $EC_x \leq 0.01$	**Category: Chronic 1** $L(E)C_{50} \leq 1.00$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$
Category: Acute 2 $1.00 < L(E)C_{50} \leq 10.0$	**Category: Chronic 2** $0.1 <$ NOEC or $EC_x \leq 1$	**Category: Chronic 2** $0.01 <$ NOEC or $EC_x \leq 0.1$	**Category: Chronic 2** $1.00 < L(E)C_{50} \leq 10.0$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$
Category: Acute 3 $10.0 < L(E)C_{50} \leq 100$		**Category: Chronic 3** $0.1 <$ NOEC or $EC_x \leq 1$	**Category: Chronic 3** $10.0 < L(E)C_{50} \leq 100$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$
	Category: Chronic 4 (*Note 4*) Example: (*Note 5*) No acute toxicity and lack of rapid degradability and BCF ≥ 500 or, if absent log Kow ≥ 4, unless NOECs > 1 mg/l		

131

For More Information

The GHS

http://www.unece.org/trans/danger/publi/ghs/ghs_rev04/04files_e.html

Final HCS Standard (Hazcom 2012)

http://www.osha.gov/dsg/hazcom/ghs-final-rule.html

Side by Side Comparison – Current Standard – New Standard

http://www.osha.gov/dsg/hazcom/side-by-side.html

OSHA GHS Information

http://www.osha.gov/dsg/hazcom/global.html

SCHC OSHA Alliance Webpage

www.schc.org

Part II March 12, 2015

- How to Develop a Plan of Attack
- What to do when you have an old MSDS but not the new SDS
- How to verify classifications
- Strategies for moving forward
- Do you need a consultant?
- What is OSHA's Enforcement Policy
- Trade Secrets
- Future Change

Thank You

Questions?