

# Hazardous Material Plan



SAN MATEO COUNTY  
**COMMUNITY**  
COLLEGE DISTRICT

# Hazardous Materials

## *Recognizing a Hazardous Materials Incident*

- Hazardous material is any material that poses an unreasonable risk of damage or injury to persons, property, or the environment if it is not properly controlled during handling, storage, manufacture, processing, packaging, use and disposal, or transportation.







# Recognize a Hazardous Material Incident

- Scan the scene and interpret visual clues.
  - Dead animals near the release
  - Discolored pavement
  - Dead grass
  - Visible vapors or puddles
  - Identifying labels
- Can occur almost anywhere
- Hazardous materials are stored in
  - Warehouses
  - Hospitals
  - Industrial occupancies
  - Schools



# Senses

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- Another way to detect the presence of hazardous materials
- Must be done carefully to avoid exposure
- Getting close enough may expose you
- Clues that are seen or heard provide warning information from a distance, enabling you to take precautionary steps





# Container Characteristics

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- Container type, size, and material provide important clues about the nature of the substance inside.
- Do not rely solely on the type of container when making a determination about hazardous materials.



# DOT System and Placards



- Characterized by a system of labels and placards
- ERG
  - Also a part of the system
  - Offers a certain amount of guidance for fire fighters operating at a hazardous materials incident
- Diamond-shaped indicators
- Measures 10<sup>3</sup>/<sub>4</sub>" (27.3 cm) on a side
- Must be displayed on all four sides of vehicle carrying hazardous materials
- DOT system does not require that all chemical shipments be marked with placards or labels.
- In most cases, the package or tank must contain a certain amount of hazardous material before a placard is required.



The background image shows a close-up of a blue tanker truck. Two diamond-shaped hazard labels are visible. The top one is white with a black border, featuring an illustration of a hand being burned by a liquid being poured from a test tube. Below the illustration, the word "CORROSIVE" is written in bold black letters, and the number "8" is at the bottom. The bottom one is red with a black border, featuring a black flame icon. Below the icon, the words "FLAMMABLE LIQUID" are written in black, and the number "3" is at the bottom. A yellow cap is visible on the top of the tanker. An orange horizontal bar is located in the top left corner of the slide.

# Labels

- Smaller version of placards
- 4" (10.2-cm) diamond-shaped indicators
- Used on the four sides
- Intended to give a general idea of the hazard inside a particular container
- Placard may identify the broad hazard class that a tanker contains.
- Labels on a book inside a delivery truck relate only to the potential hazard inside that package.

# DOT Response Guidebook (ERG)

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- Can be used during the initial phase of the hazardous materials incident
- Nine basic hazard classes or families
  - Each exhibits similar properties.
  - “Dangerous” placard indicates more than one hazard class is contained in the same load.
  - DOT system is a broad-spectrum look at chemical hazards.

# 2020

## EMERGENCY RESPONSE GUIDEBOOK



United States Government  
DOT Department of Transportation



U.S. Department  
of Transportation  
**Pipeline and  
Hazardous Materials  
Safety Administration**



Transport  
Canada

Transports  
Canada



**SCT**  
SECRETARÍA DE  
COMUNICACIONES  
Y TRANSPORTES

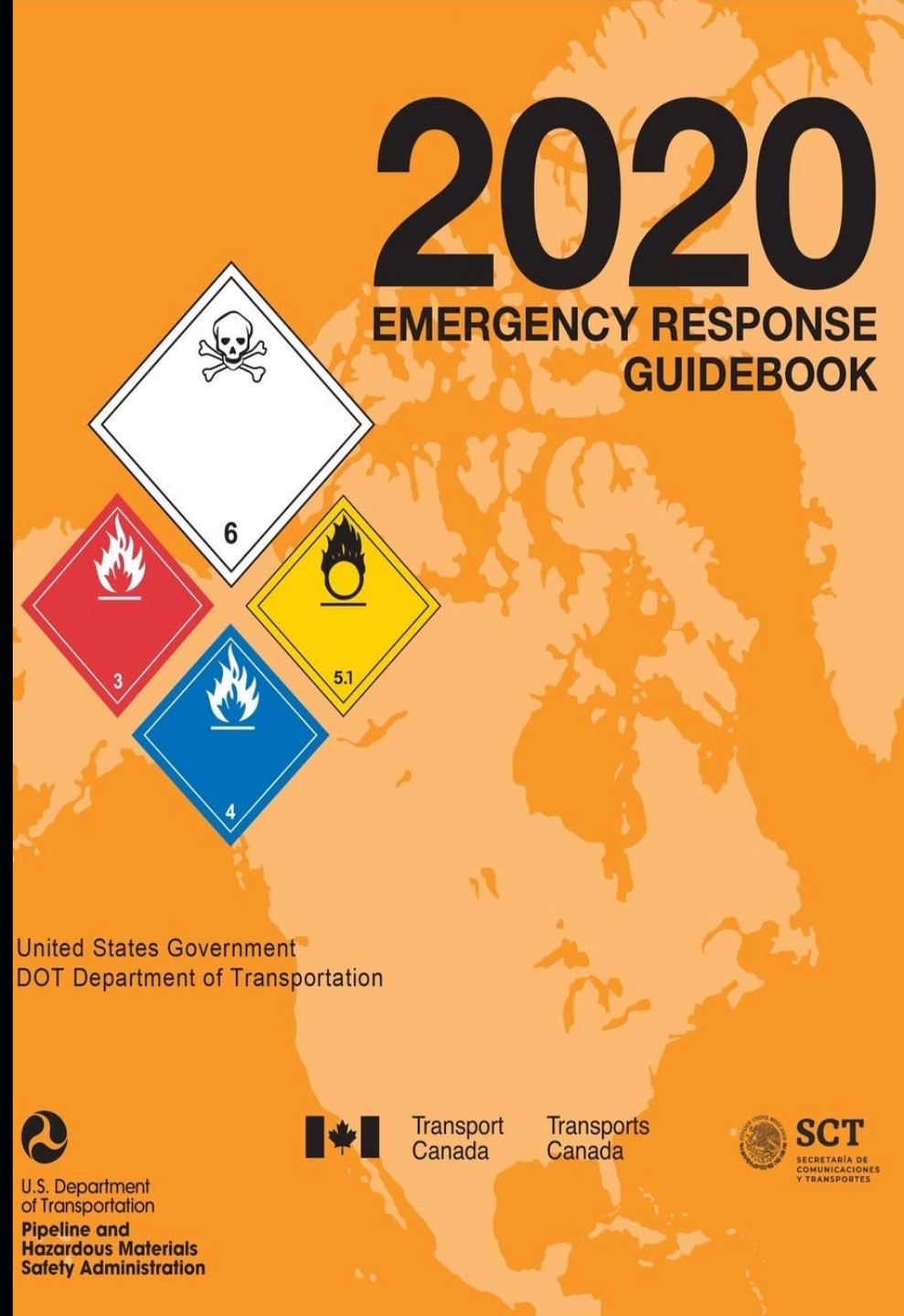


# Nine Chemical Families

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable combustible liquids
- Class 4: Flammable solids
- Class 5: Oxidizers
- Class 6: Poisons
- Class 7: Radioactive materials
- Class 8: Corrosives
- Class 9: Other regulated materials (ORM)

# Using the ERG

- *ERG* is a preliminary action guide.
- Useful during the initial 10 to 15 minutes of an incident
  - Cannot be used to create a comprehensive action plan
- Divided into four sections: yellow, blue, orange, and green



United States Government  
DOT Department of Transportation



U.S. Department  
of Transportation  
**Pipeline and  
Hazardous Materials  
Safety Administration**



Transport  
Canada

Transports  
Canada



**SCT**  
SECRETARÍA DE  
COMUNICACIONES  
Y TRANSPORTES



# Yellow Section

Chemicals are listed in this section numerically by their four-digit United Nations (UN) number.

Use when the UN number is known or can be identified.

Entries include the name of the chemical and the emergency action guide number.

| ID Guide No. No. | Name of Material  | ID Guide No. No. | Name of Material   | ID Guide No. No. | Name of Material                               | ID Guide No. No. | Name of Material                    |
|------------------|---|------------------|--|------------------|--|------------------|-------------------------------------|
| 1035 115         | Ethane  | 1050 125         | Hydrogen chloride, anhydrous   | 1066 121         | Nitrogen, compressed                           | 1079 125         | Sulfur dioxide                      |
| 1035 115         | Ethane, compressed  | 1051 117         | AC   | 1067 124         | Dinitrogen tetroxide                           | 1079 125         | Sulphur dioxide                     |
| 1036 118         | Ethylamine  | 1051 117         | Hydrocyanic acid, aqueous solutions, with more than 20% Hydrogen cyanide     | 1067 124         | Nitrogen dioxide                               | 1080 126         | Sulfur hexafluoride                 |
| 1037 115         | Ethyl chloride  | 1051 117         | Hydrogen cyanide, anhydrous, stabilized                                      | 1069 125         | Nitrosyl chloride                              | 1080 126         | Sulphur hexafluoride                |
| 1038 115         | Ethylene, refrigerated liquid (cryogenic liquid)  | 1051 117         | Hydrogen cyanide, stabilized   | 1070 122         | Nitrous oxide                                  | 1081 116P        | Tetrafluoroethylene, stabilized     |
| 1039 115         | Ethyl methyl ether  | 1052 125         | Hydrogen fluoride, anhydrous   | 1070 122         | Nitrous oxide, compressed                      | 1082 119P        | Trifluoroethoxyethylene, stabilized |
| 1039 115         | Methyl ethyl ether  | 1053 117         | Hydrogen sulfide   | 1071 119         | Oil gas  | 1083 118         | Trimethylamine, anhydrous           |
| 1040 119P        | Ethylene oxide  | 1053 117         | Hydrogen sulphide  | 1071 119         | Oil gas, compressed                            | 1085 116P        | Vinyl bromide, stabilized           |
| 1040 119P        | Ethylene oxide with Nitrogen  | 1055 115         | Isobutylene  | 1072 122         | Oxygen   | 1086 116P        | Vinyl chloride, stabilized          |
| 1041 115         | Carbon dioxide and Ethylene oxide mixture, with more than 9% but not more than 67% Ethylene oxide | 1056 121         | Krypton  | 1072 122         | Oxygen, compressed                             | 1087 116P        | Vinyl methyl ether, stabilized      |
| 1041 115         | Carbon dioxide and Ethylene oxide mixtures, with more than 6% Ethylene oxide                      | 1056 121         | Krypton, compressed  | 1073 122         | Oxygen, refrigerated liquid (cryogenic liquid) | 1088 127         | Acetal                              |
| 1041 115         | Ethylene oxide and Carbon dioxide mixture, with more than 9% but not more than 87% Ethylene oxide | 1057 115         | Lighter refills (cigarettes) (flammable gas)                                 | 1075 115         | Butane   | 1089 129         | Acetaldehyde                        |
| 1041 115         | Ethylene oxide and Carbon dioxide mixtures, with more than 6% Ethylene oxide                      | 1057 115         | Lighters (cigarettes) (flammable gas)  | 1075 115         | Butane mixture                                 | 1090 127         | Acetone                             |
| 1043 125         | Fertilizer, ammoniating solution, with free Ammonia   | 1057 115         | Lighters (cigarettes) (flammable gas)  | 1075 115         | Butylene                                       | 1091 127         | Acetone oils                        |
| 1044 126         | Fire extinguishers with compressed gas  | 1058 120         | Liquefied gases, non-flammable, charged with Nitrogen, Carbon dioxide or Air | 1075 115         | Isobutane                                      | 1092 131P        | Acrolin, stabilized                 |
| 1044 126         | Fire extinguishers with liquefied gas   | 1060 116P        | Methylacetylene and Propadiene mixture, stabilized                           | 1075 115         | Isobutane mixture                              | 1093 131P        | Acrylonitrile, stabilized           |
| 1045 124         | Fluorine  | 1060 116P        | Propadiene and Methylacetylene mixture, stabilized                           | 1075 115         | Isobutylene                                    | 1098 131         | Allyl alcohol                       |
| 1045 124         | Fluorine, compressed  | 1061 118         | Methylamine, anhydrous   | 1075 115         | Liquefied petroleum gas                        | 1099 131         | Allyl bromide                       |
| 1046 121         | Helium  | 1062 123         | Methyl bromide   | 1075 115         | LPG  | 1100 131         | Allyl chloride                      |
| 1046 121         | Helium, compressed  | 1063 115         | Methyl chloride  | 1075 115         | Petroleum gases, liquefied                     | 1104 129         | Amyl acetates                       |
| 1048 125         | Hydrogen bromide, anhydrous   | 1063 115         | Refrigerant gas R-40   | 1075 115         | Propane  | 1105 129         | Amyl alcohols                       |
| 1049 115         | Hydrogen  | 1064 117         | Methyl mercaptan   | 1075 115         | Propane mixture                                | 1105 129         | Pentanol                            |
| 1049 115         | Hydrogen, compressed  | 1065 121         | Neon   | 1075 115         | Propylene                                      | 1106 132         | Amylamines                          |
|                  |   | 1066 121         | Nitrogen   | 1076 125         | CG   | 1107 129         | Amyl chloride                       |
|                  |   |                  |  | 1076 125         | Diphosgene                                     | 1108 128         | n-Amylene                           |
|                  |   |                  |  | 1076 125         | DP   | 1108 128         | 1-Pentene                           |
|                  |   |                  |  | 1076 125         | Phosgene                                       | 1109 129         | Amyl formates                       |
|                  |   |                  |  | 1077 115         | Propylene                                      | 1110 127         | n-Amyl methyl ketone                |
|                  |   |                  |  | 1078 126         | Dispersant gas, n.o.s.                         | 1110 127         | Amyl methyl ketone                  |
|                  |   |                  |  | 1078 126         | Refrigerant gas, n.o.s.                        | 1110 127         | Methyl amyl ketone                  |

# Blue Section

Chemicals are listed alphabetically by name.

Entry will include the emergency action guide number and the identification number.

The same information, organized differently, is in both the blue and yellow sections.

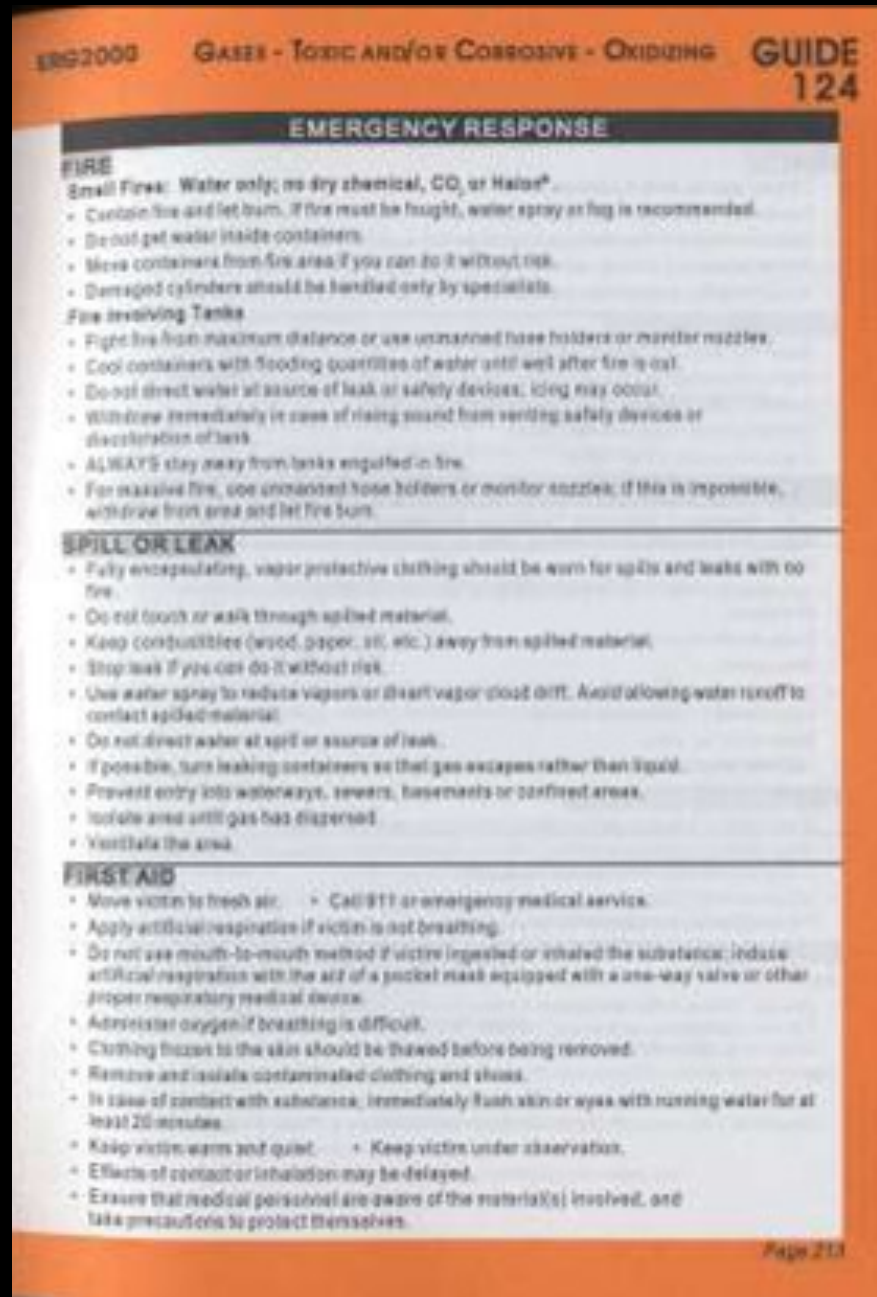
| Name of Material  | Guide No. | ID No. | Name of Material  | Guide No. | ID No. | Name of Material                 | Guide No. | ID No. | Name of Material  | Guide No. | ID No. |
|---|-----------|--------|---|-----------|--------|----------------------------------|-----------|--------|---|-----------|--------|
| Alcohols, toxic, n.o.s.                                   | 131       | 1988   | Alkaloid salts, liquid, n.o.s. (poisonous)                              | 181       | 3140   | Allyl bromide                    | 131       | 1099   | Aluminum remelting by-products                                      | 138       | 3170   |
| Aldehydes, flammable, poisonous, n.o.s.                   | 131       | 1988   | Alkaloid salts, solid, n.o.s. (poisonous)                               | 181       | 1544   | Allyl chloride                   | 131       | 1100   | Aluminum resinate   | 133       | 2715   |
| Aldehydes, flammable, toxic, n.o.s.                       | 131       | 1988   | Alkylamines, n.o.s.   | 132       | 2733   | Allyl chloroformate              | 131       | 1722   | Aluminum silicon powder, uncoated                                   | 138       | 1398   |
| Aldehydes, n.o.s.   | 129       | 1989   | Alkylamines, n.o.s.   | 132       | 2734   | Allyl chloroformate              | 131       | 1722   | Aluminum smelting by-products                                       | 138       | 3170   |
| Aldehydes, poisonous, n.o.s.                              | 131       | 1988   | Alkylamines, n.o.s.   | 183       | 2735   | Allyl ethyl ether                | 131       | 2335   | Amines, flammable, corrosive, n.o.s.                                | 132       | 2733   |
| Aldehydes, toxic, n.o.s.                                  | 131       | 1988   | Alkyl phenols, liquid, n.o.s. (including C2-C12 homologues)             | 183       | 3145   | Allyl formate                    | 131       | 2336   | Amines, liquid, corrosive, flammable, n.o.s.                        | 132       | 2734   |
| Aldol   | 163       | 2839   | Alkyl phenols, solid, n.o.s. (including C2-C12 homologues)              | 183       | 2430   | Allyl glycidyl ether             | 129       | 2219   | Amines, liquid, corrosive, n.o.s.                                   | 132       | 2734   |
| Alkali metal alcoholates, self-heating, corrosive, n.o.s. | 136       | 3206   | Alkyl sulfonic acids, liquid, with more than 5% free Sulfuric acid      | 183       | 2584   | Allyl iodide                     | 132       | 1723   | Amines, liquid, corrosive, flammable, n.o.s.                        | 132       | 2735   |
| Alkali metal alloy, liquid, n.o.s.                        | 138       | 1421   | Alkyl sulfonic acids, liquid, with not more than 5% free Sulfuric acid  | 183       | 2586   | Allyl isothiocyanate, stabilized | 165       | 1545   | Amines, liquid, corrosive, n.o.s.                                   | 163       | 2735   |
| Alkali metal amalgam                                      | 138       | 1389   | Alkyl sulfonic acids, solid, with more than 5% free Sulfuric acid       | 183       | 2583   | Allyltrichlorosilane, stabilized | 165       | 1724   | Amines, solid, corrosive, n.o.s.                                    | 164       | 3259   |
| Alkali metal amalgam, liquid                              | 138       | 1389   | Alkyl sulfonic acids, solid, with not more than 5% free Sulfuric acid   | 183       | 2585   | Aluminum, molten                 | 169       | 9260   | 2-Amino-4-chlorophenol  | 181       | 2673   |
| Alkali metal amalgam, solid                               | 138       | 1389   | Alkyl sulfonic acids, liquid, with more than 5% free Sulfuric acid      | 183       | 2583   | Aluminum alkyl halides           | 135       | 3052   | 2-Amino-5-diethylaminopentane                                       | 183       | 2946   |
| Alkali metal dispersion, flammable                        | 138       | 3482   | Alkyl sulfonic acids, solid, with not more than 5% free Sulfuric acid   | 183       | 2585   | Aluminum alkyl halides, liquid   | 135       | 3052   | 2-Amino-4,6-dinitrophenol, wetted with not less than 20% water      | 113       | 3317   |
| Alkaline earth metal alcoholates, n.o.s.                  | 136       | 3205   | Alkyl sulfonic acids, solid, with not more than 5% free Sulfuric acid   | 183       | 2585   | Aluminum alkyl halides, solid    | 135       | 3052   | 2-(2-Aminoethoxy)ethanol  | 164       | 3055   |
| Alkaline earth metal alloy, n.o.s.                        | 138       | 1393   | Alkylsulfuric acids   | 166       | 2571   | Aluminum alkyl hydrides          | 138       | 3076   | N-Aminoethylpiperazine  | 183       | 2815   |
| Alkaline earth metal amalgam                              | 138       | 1392   | Alkyl sulphonic acids, liquid, with more than 5% free Sulphuric acid    | 183       | 2584   | Aluminum alkyls                  | 135       | 3051   | Aminophenols  | 182       | 2512   |
| Alkaline earth metal amalgam, liquid                      | 138       | 1392   | Alkyl sulphonic acids, liquid, with more than 5% free Sulphuric acid    | 183       | 2586   | Aluminum borohydride             | 135       | 2870   | Aminopyridines  | 183       | 2671   |
| Alkaline earth metal amalgam, solid                       | 138       | 3402   | Alkyl sulphonic acids, solid, with more than 5% free Sulphuric acid     | 183       | 2583   | Aluminum borohydride in devices  | 135       | 2870   | Ammonia, anhydrous  | 126       | 1005   |
| Alkaline earth metal dispersion                           | 138       | 1391   | Alkyl sulphonic acids, solid, with not more than 5% free Sulphuric acid | 183       | 2585   | Aluminum bromide, anhydrous      | 137       | 1725   | Ammonia, solution, with more than 10% but not more than 35% Ammonia | 164       | 2672   |
| Alkaline earth metal dispersion, flammable                | 138       | 3482   | Alkyl sulphuric acids   | 186       | 2571   | Aluminum bromide, solution       | 164       | 2580   | Ammonia, solution, with more than 35% but not more than 50% Ammonia | 128       | 2073   |
| Alkaloids, liquid, n.o.s. (poisonous)                     | 181       | 3140   | Allyl acetate   | 131       | 2333   | Aluminum carbide                 | 138       | 1394   | Ammonia solution, with more than 50% Ammonia                        | 128       | 3318   |
| Alkaloids, solid, n.o.s. (poisonous)                      | 181       | 1544   | Allyl alcohol   | 131       | 1098   | Aluminum chloride, anhydrous     | 137       | 1726   | Ammonium arsenate   | 161       | 1546   |
|   |           |        | Allylamine  | 131       | 2334   | Aluminum chloride, solution      | 164       | 2581   | Ammonium bifluoride, solid  | 184       | 1727   |
|   |           |        |   |           |        | Aluminum dross                   | 138       | 3170   | Ammonium bifluoride, solution                                       | 184       | 2817   |
|   |           |        |   |           |        | Aluminum ferrosilicon powder     | 139       | 1395   | Ammonium dichromate   | 141       | 1439   |
|   |           |        |   |           |        | Aluminum hydride                 | 138       | 2463   | Ammonium dinitro-o-cresolate  | 141       | 1843   |
|   |           |        |   |           |        | Aluminum nitrate                 | 140       | 1438   |   |           |        |
|   |           |        |   |           |        | Aluminum phosphide               | 139       | 1397   |   |           |        |
|   |           |        |   |           |        | Aluminum phosphide pesticide     | 167       | 3048   |   |           |        |
|   |           |        |   |           |        | Aluminum powder, coated          | 170       | 1309   |   |           |        |
|   |           |        |   |           |        | Aluminum powder, pyrophoric      | 138       | 1383   |   |           |        |
|   |           |        |   |           |        | Aluminum powder, uncoated        | 138       | 1396   |   |           |        |
|   |           |        |   |           |        | Aluminum processing by-products  | 138       | 3170   |   |           |        |



# Orange Section

Contains the emergency action guides

Guide numbers are organized by general hazard class and indicate what basic emergency actions should be taken, based on hazard class.



# Green Section

Organized numerically by UN identification number

Chemicals included in this section are highlighted in the blue or yellow sections.

Toxic inhalation hazardous materials (TIH)

Table of water-reactive materials that produce toxic gas and actions to be taken

TABLE 2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES

Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH) Gas(es) When Spilled In Water

| ID No. | Guide No. | Name of Material                                  | TIH Gas(es) Produced |
|--------|-----------|---|----------------------|
| 1716   | 156       | Acetyl bromide                                    | HBr                  |
| 1717   | 155       | Acetyl chloride                                   | HCl                  |
| 1724   | 155       | Allyltrichlorosilane, stabilized                  | HCl                  |
| 1725   | 137       | Aluminum bromide, anhydrous                       | HBr                  |
| 1726   | 137       | Aluminum chloride, anhydrous                      | HCl                  |
| 1728   | 155       | Amyltrichlorosilane                               | HCl                  |
| 1732   | 157       | Antimony pentafluoride                            | HF                   |
| 1741   | 125       | Boron trichloride                                 | HCl                  |
| 1745   | 144       | Bromine pentafluoride                             | HF, Br <sub>2</sub>  |
| 1746   | 144       | Bromine trifluoride                               | HF, Br <sub>2</sub>  |
| 1747   | 155       | Butyltrichlorosilane                              | HCl                  |
| 1752   | 156       | Chloroacetyl chloride                             | HCl                  |
| 1753   | 156       | Chlorophenyltrichlorosilane                       | HCl                  |
| 1754   | 137       | Chlorosulfonic acid                               | HCl                  |
| 1754   | 137       | Chlorosulfonic acid and Sulfur trioxide mixture   | HCl                  |
| 1754   | 137       | Chlorosulphonic acid                              | HCl                  |
| 1754   | 137       | Chlorosulphonic acid and Sulphur trioxide mixture | HCl                  |
| 1754   | 137       | Sulfur trioxide and Chlorosulfonic acid           | HCl                  |
| 1754   | 137       | Sulphur trioxide and Chlorosulphonic acid         | HCl                  |
| 1758   | 137       | Chromium oxychloride                              | HCl                  |
| 1762   | 156       | Cyclohexenyltrichlorosilane                       | HCl                  |
| 1763   | 156       | Cyclohexyltrichlorosilane                         | HCl                  |
| 1765   | 156       | Dichloroacetyl chloride                           | HCl                  |

Chemical Symbols for TIH Gases:

|                 |                   |                  |                   |                 |                  |
|-----------------|-------------------|------------------|-------------------|-----------------|------------------|
| Br <sub>2</sub> | Bromine           | HF               | Hydrogen fluoride | NO <sub>2</sub> | Nitrogen dioxide |
| Cl <sub>2</sub> | Chlorine          | HI               | Hydrogen iodide   | PH <sub>3</sub> | Phosphine        |
| HBr             | Hydrogen bromide  | H <sub>2</sub> S | Hydrogen sulfide  | SO <sub>2</sub> | Sulfur dioxide   |
| HCl             | Hydrogen chloride | H <sub>2</sub> S | Hydrogen sulfide  | SO <sub>2</sub> | Sulfur dioxide   |
| HCN             | Hydrogen cyanide  | NH <sub>3</sub>  | Ammonia           |                 |                  |

TABLE 2 - WATER-REACTIVE MATERIALS WHICH PRODUCE TOXIC GASES

Materials Which Produce Large Amounts of Toxic-by-Inhalation (TIH) Gas(es) When Spilled In Water

| ID No. | Guide No. | Name of Material              | TIH Gas(es) Produced                    |
|--------|-----------|-------------------------------|---|
| 1766   | 156       | Dichlorophenyltrichlorosilane | HCl                                     |
| 1767   | 155       | Diethyltrichlorosilane        | HCl                                     |
| 1769   | 156       | Diphenyltrichlorosilane       | HCl                                     |
| 1771   | 156       | Dodecyltrichlorosilane        | HCl                                     |
| 1777   | 137       | Fluorosulfonic acid           | HF                                      |
| 1777   | 137       | Fluorosulphonic acid          | HF                                      |
| 1781   | 156       | Hexadecyltrichlorosilane      | HCl                                     |
| 1784   | 156       | Hexyltrichlorosilane          | HCl                                     |
| 1799   | 156       | Nonyltrichlorosilane          | HCl                                     |
| 1800   | 156       | Octadecyltrichlorosilane      | HCl                                     |
| 1801   | 156       | Octyltrichlorosilane          | HCl                                     |
| 1804   | 156       | Phenyltrichlorosilane         | HCl                                     |
| 1806   | 137       | Phosphorus pentachloride      | HCl                                     |
| 1808   | 137       | Phosphorus trichloride        | HBr                                     |
| 1809   | 137       | Phosphorus trichloride        | HCl                                     |
| 1810   | 137       | Phosphorus oxychloride        | HCl                                     |
| 1815   | 132       | Propionyl chloride            | HCl                                     |
| 1816   | 155       | Propyltrichlorosilane         | HCl                                     |
| 1818   | 157       | Silicon tetrachloride         | HCl                                     |
| 1828   | 137       | Sulfur chlorides              | HCl, SO <sub>2</sub> , H <sub>2</sub> S |
| 1828   | 137       | Sulphur chlorides             | HCl, SO <sub>2</sub> , H <sub>2</sub> S |
| 1834   | 137       | Sulfonyl chloride             | HCl                                     |
| 1834   | 137       | Sulphuryl chloride            | HCl                                     |

Chemical Symbols for TIH Gases:

|                 |                   |                  |                   |                 |                  |
|-----------------|-------------------|------------------|-------------------|-----------------|------------------|
| Br <sub>2</sub> | Bromine           | HF               | Hydrogen fluoride | NO <sub>2</sub> | Nitrogen dioxide |
| Cl <sub>2</sub> | Chlorine          | HI               | Hydrogen iodide   | PH <sub>3</sub> | Phosphine        |
| HBr             | Hydrogen bromide  | H <sub>2</sub> S | Hydrogen sulfide  | SO <sub>2</sub> | Sulfur dioxide   |
| HCl             | Hydrogen chloride | H <sub>2</sub> S | Hydrogen sulfide  | SO <sub>2</sub> | Sulfur dioxide   |
| HCN             | Hydrogen cyanide  | NH <sub>3</sub>  | Ammonia           |                 |                  |



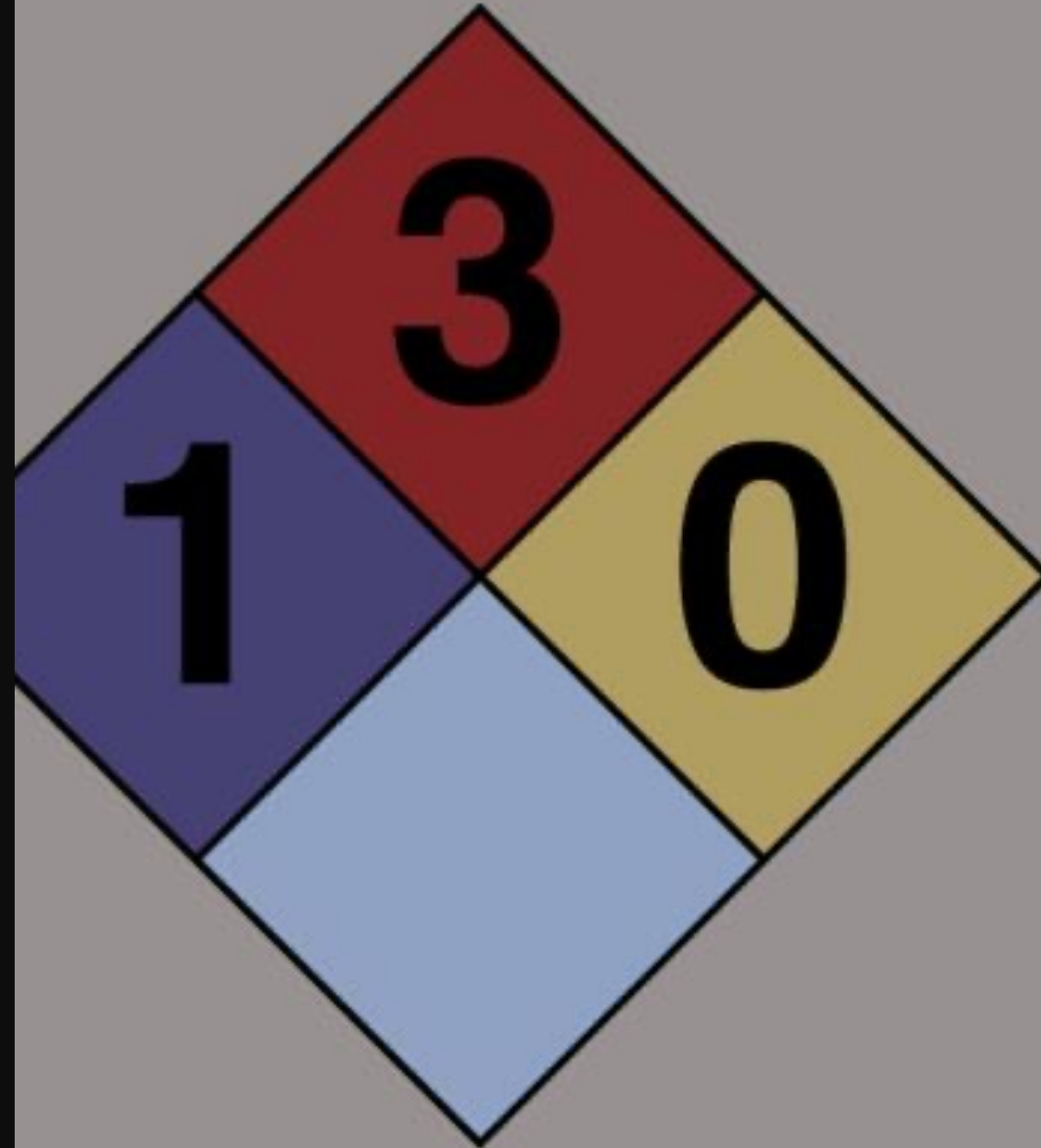


Use Your ERG

# NFPA 704 System

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- Designed for fixed facility use
  - Found on the outside of buildings, on doorways to chemical storage areas, and on fixed storage tanks
  - Building Captains can use the NFPA diamonds to determine a course of action at a hazardous material incident.
  - NFPA 704 hazard identification system uses a diamond-shaped symbol of any size.
- 







# NFPA System

- Broken into four smaller diamonds, each representing a property or characteristic
  - Blue diamond indicates the health hazard posed.
  - Red diamond indicates flammability.
  - Yellow diamond indicates reactivity.
  - White diamond is used for special symbols and handling instructions.
- Blue, red, and yellow diamonds each contain a numerical rating of 0 to 4.
  - 0 is the least hazardous.
  - 4 is the most hazardous.
- White quadrant will not have a number but may contain special symbols.
  - Burning O symbolizes oxidizing capability.
  - Three-bladed fan symbolizes radioactivity.
  - A W with a slash through it symbolizes water reactive.



|                     |   |
|---------------------|---|
| Health              | 1 |
| Fire                | 1 |
| Reactivity          | 0 |
| Personal Protection | C |

## Material Safety Data Sheet Ethylene glycol MSDS

### Section 1: Chemical Product and Company Identification

|   |   |
|---|---|
| <b>Product Name:</b> Ethylene glycol  | <b>Contact Information:</b>   |
| <b>Catalog Code:</b> SLE1072  | ScienceLab.com, Inc.  |
| <b>CAS#:</b> 107-21-1   | 14025 Smith Rd.   |
| <b>RTECS:</b> KW2975000   | Houston, Texas 77396  |
| <b>TSCA:</b> TSCA 8(b) Inventory: Ethylene glycol   | US Sales: 1-800-801-7247  |
| <b>CMR:</b> Not available.  | International Sales: 1-281-441-4400                                 |
| <b>Synonym:</b> 1,2-Dihydroxyethane; 1,2-Ethanediol;<br>1,2-Ethandiol; Ethylene dihydrate; Glycol alcohol;<br>Monoethylene glycol; Tescol | Order Online: <a href="http://ScienceLab.com">ScienceLab.com</a>    |
| <b>Chemical Name:</b> Ethylene Glycol   | <b>CHEMTREC (24HR Emergency Telephone), call:</b><br>1-800-424-9300 |
| <b>Chemical Formula:</b> HOCH <sub>2</sub> CH <sub>2</sub> OH   | <b>International CHEMTREC, call:</b> 1-703-527-3887                 |
|   | <b>For non-emergency assistance, call:</b> 1-281-441-4400           |

### Section 2: Composition and Information on Ingredients

#### Composition:

| Name            | CAS #    | % by Weight |
|-----------------|----------|-------------|
| Ethylene glycol | 107-21-1 | 100         |

**Toxicological Data on Ingredients:** Ethylene glycol: ORAL (LD50): Acute: 4700 mg/kg [Rat]. 5500 mg/kg [Mouse]. 6610 mg/kg [Guinea pig]. VAPOR (LC50): Acute: >gt;200 mg/m 4 hours [Rat].

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Hazardous in case of Ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation. Severe over-exposure can result in death.

#### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Non-mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

### Section 4: First Aid Measures

# Other Reference Sources

- Material safety data sheets (MSDSs)
- Shipping papers
- CHEMTREC
- National Response Center (NRC)

# MSDS



- Provides basic information about:
  - The chemical makeup of a substance
  - The potential hazards it presents
  - Appropriate first aid in the event of an exposure
  - Other pertinent data for safe handling of the material



# MSDS



- Generally an MSDS will include:
  - Physical and chemical characteristics
  - Physical hazards of the material
  - Health hazards of the material
  - Signs and symptoms of exposure
  - Routes of entry
  - Permissible exposure limits
  - Responsible party contact
  - Precautions for safe handling
  - Applicable control measures, including personal protective equipment (PPE)
  - Emergency and first-aid procedures
  - Appropriate waste disposal

## Chemical Hazards

Routes of exposure include:

- Inhalation
- Ingestion
- Absorption
- Injection



## Routes of Exposure

- Inhalation-?????????
- Ingestion-?????????
- Absorption-?????????
- Injection-?????????