7.3.2 Flammable

For mixtures containing flammable components, refer to the guidelines in CGA P-23, *Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components*, to determine labeling of the mixture [14].

7.3.3 Oxidizing

Mixtures containing oxygen greater than 23.5% require an oxidizer label.

NOTE—For DOT/TC transportation purposes, mixtures containing less than 23.5% oxygen are to be considered nonoxidizers.

7.4 Signal word

The signal word shall indicate the relative degree of severity of a hazard in the diminishing order of DANGER or WARNING. When a product has more than one hazard, only the signal word corresponding to the class of the greatest immediate hazard shall be used.

7.4.1 Danger

The signal word DANGER should be used on labels and markings of flammable, toxic (poison), corrosive, and similar gases where the release of gas to the atmosphere would create an immediate physical hazard or significant acute or chronic health hazard.

7.4.2 Warning

The signal word WARNING should be used on labels and markings of gases such as oxygen, nitrous oxide, and cryogenic liquids where a release of gas or liquid creates a less than immediate hazard but can be hazardous to health or property under certain conditions.

7.5 Statement of hazard

A statement of hazard (such as FLAMMABLE GAS) gives notice of the hazards present in connection with the customary or reasonably anticipated handling or use of the product and should follow the signal word. If a product has several hazardous properties, a statement of each significant hazard should be included. The most serious hazard should be listed first.

Examples of statements of hazard and associated signal words are:

Statement of hazard	Associated signal word	
Extremely flammable gas		
May form explosive mixtures with air		
Toxic if inhaled		
Corrosive gas and/or liquid		
May cause eye, skin, and respiratory burns	DANGER	
May cause central nervous system damage		
May cause or intensify fire; oxidizer		
May cause cancer		
Catches fire spontaneously if exposed to air		
Flammable gas		
Contains gas under pressure; may explode if heated		
May cause frostbite	WARNING	
May cause rapid suffocation		

7.6 Precautionary measures

Precautionary statements (such as <u>"Do not breathe gas"</u>) are intended to supplement, if necessary, the statement of hazard by briefly describing measures to be taken to avoid injury or damage from stated hazards. Normally, one or more precautionary measures accompany each statement of hazard.

7.7 First aid

Instructions in case of contact and exposure shall be included where the results of contact or exposure are severe and immediate treatment is desirable, and where simple remedial measures may be taken safely before medical assistance is available. These instructions shall be limited to recognized procedures based on simple methods and commonly available materials. Simple remedial measures (such as washing or removing clothing) shall be included where they lessen injury following contact or exposure.

7.8 Container handling and storage

Important instructions in handling and storage (such as "Store and use in a well ventilated place" and "Close valve after each use and when empty") should be included on the label.

7.9 Additional information

Instructions in case of fire or leak and additional instructions for container handling and storage may be included on the precautionary labels and markings or in safety literature referenced on the precautionary label. Such references on the label to safety literature could include safety data sheets (material safety data sheets), supplier's safety booklets, or CGA publications.

8 Precautionary label groupings

Gases and liquids in this publication are grouped according to the most commonly associated principal hazard. The precautionary label for each listed gas or liquid can be found in the section indicated.

8.1 Asphyxiant gases

Argon	9.1.1
Argon, liquid; see 8.6 Refrigerated liquefied gases	
Bromochlorodifluoromethane (R12B1)	9.1.3
Bromotrifluoromethane (R13B1)	9.1.2
Carbon dioxide	9.1.5
Carbon dioxide, liquid; see 8.6 Refrigerated liquefied gases	
Chlorodifluoromethane (R22)	9.1.3
Chloroheptafluorocyclobutane (RC317)	9.1.2
Chloropentafluoroethane (R115)	9.1.3
Chloropentafluoroethane-Chlorodifluoromethane (R502)	9.1.3
Chlorotetrafluoroethane (R124)	9.1.3
Chlorotrifluoroethane (R133a)	9.1.3
Chlorotrifluoromethane (R13)	9.1.3
1,2-Dibromotetrafluoroethane (R114B2)	9.1.2
1,2-Dichlorodifluoroethylene	9.1.2
Dichlorodifluoromethane (R12)	9.1.3
Dichlorofluoromethane (R21)	9.1.4
1,2-Dichlorohexafluorocyclobutane (RC316)	9.1.2
1,1-Dichlorotetrafluoroethane (R114a)	9.1.3
2,2-Dichloro 1,1,1 trifluoroethane (R123)	9.1.3
Helium	9.1.1
Helium, liquid; see 8.6 Refrigerated liquefied gases	
Hexafluoroethane (R116)	9.1.2
Hexafluoropropylene	9.1.2
Krypton	9.1.1
Neon	9.1.1

Neon, liquid; see 8.6 Refrigerated liquefied gases Nitrogen Nitrogen, liquid; see 8.6 Refrigerated liquefied gases Octafluorocyclobutane (RC318) Octafluoropropane (R218) (perfluoropropane) Pentachlorofluoroethane (R111) Pentafluoroethane (R125) Pentafluoroethyliodide Sulfur hexafluoride 1,1,2,2-Tetrachlorodifluoroethane (R112a) 1,1,2,2-Tetrachlorodifluoroethane (R112) 1,1,2,2-Tetrafluoro-1-Chloroethane Tetrafluoromethane (R14) (Carbon tetrafluoride) Trifluoromethane (R23) (Fluoroform) Xenon 8.2 Flammable gases	9.1.1 9.1.2 9.1.2 9.1.3 9.1.2 9.1.2 9.1.2 9.1.2 9.1.2 9.1.3 9.1.3 9.1.3 9.1.3 9.1.1 9.1.6 9.1.1
Acetylene Allene (Propadiene) 1,3-Butadiene Butane 1-Butene 2-Butene 1-Chloro-1,1-Difluoroethane (R142b) Chlorotrifluoroethylene (R1113) Cyclopropane Deuterium 1,1-Difluoroethane (R152a) Dimethyl ether 2,2 Dimethypropane (Neopentane) Ethane Ethyl acetylene Ethyl chloride Ethylene Hydrogen	$\begin{array}{c} 9.2.7\\ 9.2.1\\ 9.2.12\\ 9.2.1\\ 9.2.1\\ 9.2.1\\ 9.2.1\\ 9.2.1\\ 9.2.10\\ 9.2.3\\ 9.2.3\\ 9.2.3\\ 9.2.1\\ 9.2.5\\ 9.2.14\\ 9.2.3\\ 9.2.1\\ 9.2.15\\ 9.2.3\\ 9.2.8\end{array}$
Hydrogen, liquid; see 8.6 Retrigerated liquetied gases Isobutane Isobutylene Liquefied petroleum gas (LPG) Methane Methyl acetylene-Propadiene mixture (MAPP Gas) Methyl acetylene-Propadiene mixture (MAPP Gas) Methyl chloride Methyl ethyl ether Methyl fluoride Methyl ethyl ether Methyl fluoride Methyl nuride (R32) Methyl vinyl ether (Vinyl methyl ether) Natural gas Propane Propylene Trifluoroethane Vinyl bromide Vinyl chloride Vinyl fluoride	$\begin{array}{c} 9.2.1\\ 9.2.1\\ 9.2.3\\ 9.2.9\\ 9.2.1\\ 9.2.1\\ 9.2.11\\ 9.2.14\\ 9.2.14\\ 9.2.1\\ 9.2.6\\ 9.2.2\\ 9.2.9\\ 9.2.1\\ 9.2.3\\ 9.2.1\\ 9.2.3\\ 9.2.1\\ 9.2.12\\ 9.2.13\\ 9.2.4\end{array}$

8.3 Flammable liquids

3-Methyl-1-Butene (Isopentene)	9.3.1
8.4 Pyrophoric materials	
Silane Dimethylzinc Disilane	9.4.1 9.4.3 9.4.2
8.5 Oxidizing gases	
Air, Compressed Nitrogen trifluoride Nitrous oxide Nitrous oxide, liquid; see 8.6 Refrigerated lique Oxygen Oxygen, liquid; see 8.6 Refrigerated liquefied g	9.5.1 9.5.4 9.5.2 fied gases 9.5.3 jases
8.6 <u>Refrigerated liquefied gases</u>	
Argon, Refrigerated liquid Carbon dioxide, Refrigerated liquid Helium, Refrigerated liquid Hydrogen, Refrigerated liquid Neon, Refrigerated liquid Nitrogen, Refrigerated liquid Nitrous oxide, Refrigerated liquid Oxygen, Refrigerated liquid	9.6.1 9.6.2 9.6.3 9.6.4 9.6.3 9.6.1 9.6.6 9.6.5
8.7 <u>Toxic (poison) liquids and gases</u>	
Arsine Carbon monoxide Carbonyl sulfide Cyanogen Deuterium selenide Diborane Diethyltelluride Ethylene oxide Germane Hydrogen cyanide Hydrogen selenide Hydrogen sulfide Methyl bromide Methyl mercaptan Nickel carbonyl Phosphine	9.7.4 9.7.1 9.7.6 9.7.5 9.7.5 9.7.9 9.7.13 9.7.12 9.7.3 9.7.12 9.7.3 9.7.5 9.7.5 9.7.5 9.7.5 9.7.7 9.7.10 9.7.11 9.7.2 9.7.8
8.8 <u>Toxic (poison), corrosive liquids a</u>	ind gases
Boron trichloride Boron trifluoride Carbonyl fluoride Chlorine Deuterium chloride Dichlorosilane Hydrogen bromide Hydrogen chloride	9.8.1 9.8.3 9.8.4 9.8.5 9.8.1 9.8.6 9.8.1 9.8.1

Hydrogen fluoride	9.8.7
Hydrogen iodide	9.8.1
Phosgene	9.8.8
Silicon tetrafluoride	9.8.2
Sulfur dioxide	9.8.1
Tungsten hexafluoride	9.8.9

8.9 Toxic (poison), oxidizing, and corrosive gases

Chlorine trifluoride	9.9.1
Fluorine	9.9.2
Nitric oxide	9.9.3
Nitrogen dioxide	9.9.4

8.10 Corrosive liquids and gases

Anhydrous ammonia	9.10.1
Dimethylamine	9 10.3
Monoethylamine	9.10.3
Monomethylamine	9.10.3
Trichlorosilane	9.10.2
Trimethylamine	9.10.3

9 Illustrative precautionary labels and markings

The following are examples of precautionary labels <u>and markings</u> for compressed gas and cryogenic liquid containers prepared in accordance with the general principles given in this publication and showing recommended minimum requirements. For other gases not presented in this section, precautionary labels <u>and markings</u> may be prepared by incorporating applicable portions of the specific labels shown.

These illustrative precautionary labels <u>and markings</u> might not contain all language necessary to comply with government regulations such as those of FDA, EPA, DOT, OSHA, TC, HPFBI, and other applicable state, provincial, territorial, and local agencies. It is the responsibility of the gas supplier to ensure that the label contains any additional information necessary to comply with applicable government regulations.

The health hazard warning statements shown are recommended minimum warnings based upon sources, technical information, and experience at the time this edition was published. These warning statements are subject to periodic review and might change as new information becomes available.

When transportation and GHS labels require the same symbols, the transportation label must be displayed as duplication of the symbols is not required. GHS requires hazard symbols and must be displayed when the transportation label is not in association with the GHS label.

When a UN Model Regulations on the Transport of Dangerous Goods pictogram appears on a label, a GHS pictogram for the same hazard should not appear.

Asphyxiant gases 9.1

9.1.1	Argon *Helium Krypton Neon	Nitrogen Tetrafluoromethane (R14) Xenon
NOTE—The number in parentheses is a refrigerant designation that is shown here for reference only and is not required on the label.		
<u>WARNING:</u>	MAY CAUSE RAPID SUFFOCATION. CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED. Do not breathe gas. Store and use in a well ventilated place. Protect from sunlight when ambient temperature exceeds 52 °C/125 °F. Container temperature should not exceed 52 °C/125 °F.	
	Use a back flow preventive device in the piping. Close valve after each use and when empty. Do not handle until all safety precautions have been read and understood.	
FIRST AID:	IF INHALED: If breathing is di comfortable for breathing. Call	fficult, remove to fresh air and keep at rest in a position a physician.
	DO NOT REMOVE THIS PRO	DUCT LABEL (or equivalent wording).

* Additional warning is suggested for helium cylinders against the foreseeable "recreational" misuse of inhaling helium to alter the voice.

Required symbols		
GHS pictogram(s)	[Gas Cylinder]	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		

9.1.2	Bromotrifluoromethane (R13B1) Chloroheptafluorocyclobutane (RC317) <u>1,2-Dibromotetrafluoroethane (R114B2)</u> 1,2-Dichlorohexafluorocyclobutane (RC316) 1,2-Dichlorodifluoroethylene Hexafluoroethane (R116)	Hexafluoropropylene Octafluorocyclobutane (RC318) Octafluoropropane (R218) Pentafluoroethane (R125) Pentafluoroethyliodide Sulfur Hexafluoride
NOTE—The numbers in parentheses are refrigerant designations that are shown here for reference only and are not required on the label.		
<u>WARNING:</u>	<u>CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.</u> <u>MAY</u> CAUSE RAPID SUFFOCATION. MAY CAUSE FROSTBITE.	
	Do not breathe gas. Do not get in eyes, on skin, or on clothing. Store and use in a well ventilated place. Protect from sunlight when ambient temperature exceeds 52 °C/125 °F. Container temperature should not exceed 52 °C/125 °F. Close valve after each use and when empty. Use a back flow preventive device in the piping. Do not handle until all safety precautions have been read and understood.	
FIRST AID:	IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician.	
	IN CASE OF FROSTBITE: Obtain medical treatment immediately.	
	DO NOT REMOVE THIS PRODUCT LABEL (or e	equivalent wording).

Required symbols		
GHS pictogram(s)	[Gas Cylinder]	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		

9.1.3	*Bromochlorodifluoromethane (R12B1) *Chlorodifluoromethane (R22) *Chloropentafluoroethane (R115) Chloropentafluoroethane- *Chlorodifluoromethane (R502) Chlorotetrafluoroethane (R124) Chlorotrifluoroethane (R133a) *Chlorotrifluoromethane (R13)	*Dichlorodifluoromethane (R12) *1,1-Dichlorotetrafluoroethane (R114a) 2,2-Dichloro 1,1,1 trifluoroethane (R123) *Pentachlorofluoroethane (R111)* *1,1,1,2-Tetrachlorodifluoroethane (R112a) *1,1,2,2-Tetrachlorodifluoroethane (R112) *1,1,2,2-Tetrafluoro-1-Chloroethane	
NOTE—The numb required on the lab	pers in parentheses are refrigerant designations th pel.	at are shown here for reference only and are not	
<u>WARNING:</u>	CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED. CONTAINS LIQUEFIED GAS UNDER PRESSURE. MAY CAUSE RAPID SUFFOCATION. MAY CAUSE FROSTBITE. Do not breathe gas.		
	Do not get in eyes, on skin, or on clothing. Store and use in a well ventilated place. Close valve after each use and when empty. Use a back flow preventive device in the piping. Do not handle until all safety precautions have been read and understood. Use in closed system.		
FIRST AID:	IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician.		
	IN CASE OF FROSTBITE: Obtain medical treatment immediately.		
	DO NOT REMOVE THIS PRODUCT LABEL (or equivalent wording).		

* These products because of ozone depleting properties shall be labeled as follows: Warning: Contains (compound name), a substance which harms the public health and environment by destroying ozone in the upper atmosphere. Gases marked with an asterisk require the GHS pictogram exclamation mark.

Required symbols		
GHS pictogram(s)	[Gas Cylinder]], Exclamation Mark*	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		

9.1.4 Dichlorofluoromethane (R21)

NOTE—The number in parentheses is a refrigerant designation that is shown here for reference only and is not required on the label.

<u>WARNING:</u>	<u>CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.</u> CONTAINS LIQUEFIED GAS UNDER PRESSURE. ODOR IS ETHER LIKE. MAY CAUSE RAPID SUFFOCATION. MAY CAUSE FROSTBITE.
	Do not breathe gas. Do not get in eyes, on skin, or on clothing. Store and use in a well ventilated place. Protect from sunlight when ambient temperature exceeds 52 °C/ 125 °F. Container temperature should not exceed 52 °C/ 125 °F. Close valve after each use and when empty. Use a back flow preventive device in the piping. Do not handle until all safety precautions have been read and understood. Use in closed system.
<u>FIRST AID:</u>	IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position com- fortable for breathing. Call a physician. IN CASE OF FROSTBITE: Obtain medical treatment immediately. DO NOT REMOVE THIS PRODUCT LABEL (or equivalent wording).

NOTE—This product because of ozone depleting properties shall be labeled as follows: Warning: Contains (compound name), a substance which harms the public health and environment by destroying ozone in the upper atmosphere.

Required symbols		
GHS pictogram(s)	[Gas Cylinder], Exclamation Mark	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		

9.1.5	Carbon Dioxide
WARNING:	<u>CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.</u> <u>CONTAINS LIQUEFIED GAS UNDER PRESSURE.</u> <u>MAY</u> CAUSE RAPID SUFFOCATION. MAY CAUSE FROSTBITE. <u>MAY</u> INCREASE RESPIRATION AND HEART RATE.
	Do not breathe gas. Do not get in eyes, on skin, or on clothing. Store and use in a well ventilated place. Protect from sunlight when ambient temperature exceeds 52 °C/125 °F. <u>Container</u> temperature should not exceed 52 °C/125 °F. Use a back flow preventive device in the piping. Close valve after each use and when empty. <u>Do not handle until all safety precautions have been read and understood.</u> Use equipment rated for cylinder pressure.
FIRST AID:	 IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician. IN CASE OF FROSTBITE: Obtain medical treatment immediately. DO NOT REMOVE THIS PRODUCT LABEL (or equivalent wording).
L	

Required symbols		
GHS pictogram(s)	[Gas Cylinder]	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		

9.1.6 Trifluoromethane (R23)

NOTE—The number in parentheses is a refrigerant designation that is shown here for reference only and is not required on the label.

<u>WARNING:</u>	<u>CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.</u> <u>CONTAINS LIQUEFIED GAS UNDER PRESSURE.</u> <u>MAY CAUSE RAPID SUFFOCATION.</u> <u>MAY CAUSE FROSTBITE.</u>
	<u>Do not breathe gas.</u> <u>Do not get in eyes, on skin, or on clothing.</u>
	Store and use in a Well Ventilated place. Protect from sunlight when ambient temperature exceeds 52 °C/125 °F
	Container temperature should not exceed 52 °C/125 °F.
	Use a back flow preventive device in the piping.
	Close valve after each use and when empty.
	Do not handle until all safety precautions have been read and understood.
	Use equipment rated for cylinder pressure.
FIRST AID:	IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician.
	IN CASE OF FROSTBITE: Obtain medical treatment immediately.
	DO NOT REMOVE THIS PRODUCT LABEL (or equivalent wording).

Required symbols		
GHS pictogram(s)	[Gas Cylinder]	
Transportation label(s)	2.2 Nonflammable Gas	
NOTE—Use of transportation label(s) satisfies the requirements for the GHS pictogram(s) shown in brackets.		