

## **UC Irvine Campus Fire Marshal Researcher Information**

**UC Irvine researchers use different type of hazardous materials. These materials in many cases are regulated by different state agencies. The Campus Fire Marshal regulates many of these materials by use of State Fire code, CCR Title 19, NFPA and building code regulations. The classes of materials that are most highly regulated are but are not limited to:**

- **Explosives**  
Regulated on a case by case basis.
- **Pyrophorics**  
Regulated by maximum allowable quantities per control area.  
Permitted in sprinklered buildings only.
- **Highly Toxics**  
Regulated by maximum allowable quantities per control area.
- **Flammable and Combustible Liquids, Gases, & Solids.**  
Regulated by maximum allowable quantities per control area.

### **Contact Information:**

**Campus Fire Marshal: Scott Jackson Environmental, Health & Safety**  
**824-9665. Lab Design & Construction.**

**Campus Fire Marshal: Dale Saunders Environmental Health & Safety 824-4077. Fire Prevention.**

# COMMON TOXIC GASES AS DEFINED BY THE TOXIC GAS ORDINANCE AND CFC

For Use By All Jurisdictions: Cities and County, Within the Limits of Santa Clara County.  
 Authority Cited: California Fire Code (CFC); California Building Code (CBC); Toxic Gas Ordinance (TGO)

GAS & FORMULA	CAS No./ UN No.	CBC/CFC CLASS <sup>1</sup>	TGO CLASS <sup>2</sup>	IDLH <sup>3</sup>	LC <sub>50</sub> <sup>4</sup>	LOC	MAX TQ	PEL <sup>5</sup>
Ammonia - NH <sub>3</sub>	7664-41-7 UN1005	Corrosive <sup>6,7</sup> Flammable	III	300 ppm	4,000 ppm	30 ppm	8,000 lbs.	50 ppm
Arsine - AsH <sub>3</sub>	7784-42-1 UN2188	Highly Toxic Flammable	I	3 ppm	20 ppm	0.3 ppm	N/A	0.05 ppm
Boron Tribromide - BBr <sub>3</sub>	10294-33-4 UN2692	Toxic WR-2	II	50 ppm	380 ppm	5 ppm	760 lbs.	1 ppm ☉
Boron Trichloride - BCl <sub>3</sub>	10294-34-5 UN1741	Corrosive <sup>6</sup> WR-1	II	25 ppm <sup>8</sup>	2,541 ppm	2.5 ppm	5,082 lbs.	5 ppm
Boron Trifluoride - BF <sub>3</sub>	7637-07-2 UN1008	Toxic WR-1	II	25 ppm	806 ppm	2.5 ppm	1,612 lbs.	1 ppm ☉
Bromine - Br <sub>2</sub>	7726-95-6 UN1744	Highly Toxic Corrosive Oxidizer	I	3 ppm	113 ppm	0.3 ppm	N/A	0.1 ppm
Carbon Monoxide - CO	630-08-0 UN1016	Flammable <sup>6</sup>	III	1,200 ppm	3,760 ppm	120 ppm	7,520 lbs.	50 ppm
Chlorine - Cl <sub>2</sub>	7782-50-5 UN1017	Toxic Corrosive Oxidizer	II	10 ppm	293 ppm	1 ppm	586 lbs.	1 ppm ☉
Chlorine Dioxide - ClO <sub>2</sub>	10049-04-4 NA9191	Toxic UR-3 Oxidizer WR-1	II	5 ppm	250 ppm	0.5 ppm	500 lbs.	0.1 ppm
Chlorine Trifluoride - ClF <sub>3</sub>	7790-91-2 UN1749	Toxic Oxidizer WR-3	II	20 ppm	299 ppm	2 ppm	598 lbs.	0.1 ppm ☉
Diborane - B <sub>2</sub> H <sub>6</sub>	19278-45-7 UN1911	Highly Toxic Flammable WR-2	I	15 ppm	80 ppm	1.5 ppm	N/A	0.1 ppm

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Dichlorosilane - SiH <sub>2</sub> Cl <sub>2</sub> (HCl)	4109-96-0 UN2189	Toxic Corrosive Flammable	II	50 ppm	314 ppm	5 ppm	628 lbs.	5 ppm ©
Ethylene Oxide - C <sub>2</sub> H <sub>4</sub> O	75-21-8 UN1040	Flammable <sup>6</sup> UR-3	III	800 ppm	4,350 ppm	80 ppm	8,700 lbs.	1 ppm
Fluorine - F <sub>2</sub>	7782-41-4 UN1045	Highly Toxic Oxidizer	I	25 ppm	185 ppm	2.5 ppm	N/A	0.1 ppm
Germane - GeH <sub>4</sub>	7782-65-2 UN2192	UR-3 Toxic Flammable	II	6 ppm <sup>8</sup>	622 ppm	0.6 ppm	1,244 lbs.	0.2 ppm <sup>9</sup>
Hydrogen Bromide - HBr	10035-10-6 UN1048	Corrosive <sup>6</sup>	II	30 ppm	2,860 ppm	3 ppm	5,720 lbs.	3 ppm
Hydrogen Chloride - HCl	7647-01-0 UN1050	Corrosive <sup>6</sup>	II	50 ppm	2,810 ppm	5 ppm	5,620 lbs.	5 ppm ©
Hydrogen Cyanide - HCN	74-90-8 UN1051	Highly Toxic Flammable	I	50 ppm	40 ppm	5 ppm	N/A	10 ppm
Hydrogen Fluoride - HF	7664-39-3 UN1052	Toxic	II	30 ppm	1,300 ppm	3 ppm	2,600 lbs.	3 ppm
Hydrogen Selenide - H <sub>2</sub> Se	7783-07-5 UN2202	Highly Toxic Flammable	I	1 ppm	2 ppm	0.1 ppm	N/A	0.05 ppm
Hydrogen Sulfide - H <sub>2</sub> S	7783-06-4 UN1053	Toxic Flammable	II	100 ppm	712 ppm	10 ppm	1,424 lbs.	20 ppm
Methyl Bromide - CH <sub>3</sub> Br	74-83-9 UN1062	Toxic Flammable	II	250 ppm	1,007 ppm	25 ppm	2,014 lbs.	20 ppm ©
Methylisocyanate - CH <sub>3</sub> NCO	624-83-9 UN2480	Highly Toxic Flammable WR-2	I	3 ppm	22 ppm	0.3 ppm	N/A	0.02 ppm

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Methyl Mercaptan - CH <sub>3</sub> SH	74-93-1 UN1064	Toxic Flammable	II	150 ppm	1,350 ppm	15 ppm	2,700 lbs.	10 ppm ©
Nickel Carbonyl - Ni(CO) <sub>4</sub>	13463-39-3 UN1259	Highly Toxic UR-3 Flammable WR-1	I	2 ppm	18 ppm	0.2 ppm	N/A	0.001 ppm
Nitric Oxide - NO	10102-43-9 UN1660	Highly Toxic Oxidizer	I	100 ppm	115 ppm	10 ppm	N/A	25 ppm
Nitrogen Dioxide - NO <sub>2</sub>	10102-44-0 UN1067	Highly Toxic Oxidizer WR-1	I	20 ppm	115 ppm	2 ppm	N/A	5 ppm ©
Phosgene - COCl <sub>2</sub>	75-44-5 UN1076	Highly Toxic WR-1	I	2 ppm	5 ppm	0.2 ppm	N/A	0.1 ppm
Phosphine - PH <sub>3</sub>	7803-51-2 UN2199	Highly Toxic Pyrophoric	I	50 ppm	20 ppm	5 ppm	N/A	0.3 ppm
Phosphorus Oxychloride - POCl <sub>3</sub>	10025-87-3 UN1810	Highly Toxic WR-2	I	0.96 ppm <sup>8</sup>	96 ppm	0.096 ppm	N/A	0.1 ppm <sup>8,9</sup>
Phosphorus Pentafluoride - PF <sub>5</sub>	7647-19-0 UN2198	Toxic Oxidizer WR-1	II	2.6 ppm <sup>8</sup>	260 ppm	0.26 ppm	520 lbs.	3 ppm
Phosphorus Trichloride - PCl <sub>3</sub>	7719-12-2 UN1809	Toxic UR-2 WR-2 Oxidizer	II	25 ppm	208 ppm	2.5 ppm	416 lbs.	0.5 ppm
Selenium Hexafluoride - SeF <sub>6</sub>	7783-79-1 UN2194	Highly Toxic	I	2 ppm	50 ppm	0.2 ppm	N/A	0.05 ppm (as Se)
Silicon Tetrachloride - SiCl <sub>4</sub> (HCl)	10026-04-7 UN1818	Toxic Corrosive	II	50 ppm	750 ppm	5 ppm	1,500 lbs.	5 ppm ©
Silicon Tetrafluoride - SiF <sub>4</sub> (HF)	7783-61-1 UN1859	Toxic WR-2	II	30 ppm	450 ppm	3 ppm	900 lbs.	0.1 ppm

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Stibine - SbH <sub>3</sub>	7803-52-3 UN2676	Highly Toxic Flammable	I	5 ppm	20 ppm	0.5 ppm	N/A	0.1 ppm
Sulfur Dioxide - SO <sub>2</sub>	7446-09-5 UN1079	Corrosive <sup>6</sup>	II	100 ppm	2,520 ppm	10 ppm	5,040 lbs.	5 ppm
Sulfuryl Fluoride - SO <sub>2</sub> F <sub>2</sub>	2699-79-8 UN2191	Corrosive <sup>6</sup>	III	200 ppm	3,020 ppm	20 ppm	6,040 lbs.	5 ppm
Tellurium Hexafluoride - TeF <sub>6</sub>	7783-80-4 UN2195	Highly Toxic	I	1 ppm	25 ppm	0.1 ppm	N/A	0.02 ppm (as Te)
Titanium Tetrachloride - TiCl <sub>4</sub>	7550-45-0 UN1838	Highly Toxic Corrosive WR-2	I	1.3 ppm	119 ppm	0.13 ppm	N/A	
Tungsten Hexafluoride - WF <sub>6</sub> (HF)	7783-82-6 UN2196	Toxic Corrosive WR-2	II	30 ppm	217 ppm	3 ppm	434 lbs.	0.1 ppm

**Notes:**

- 1 Class as defined in CFC: 1.) Health Hazards per Chapter 27: Highly Toxic = < 200 LC<sub>50</sub>, Toxic = 200 - 2,000 LC<sub>50</sub>. 2.) Physical Hazards per CFC Chapter 27 and NFPA 704.
- 2 TGO Class Defined As: Class I = < 200 LC<sub>50</sub>, Class II = 200 – 3,000 LC<sub>50</sub>, Class III = 3,001 – 5,000 LC<sub>50</sub>
- 3 IDLH values published in 1994 by the National Institute for Occupational Safety and Health (NIOSH).
- 4 LC<sub>50</sub> data: Lowest reported value, 1 hour adjusted, taken from DOT, CGA, RTECS.
- 5 PEL values published by OSHA (29 CFR, part 1910.1000, Table Z-1) dated 7/1/95. OSHA values used if available, otherwise Threshold Limit Value (TLV) from American Conference of Governmental Industrial Hygienists (ACGIH) (1994-1995) or Cal OSHA values used.
- 6 = Ceiling Limit.
- 6 Moderately toxic as adopted by the cities of San Jose, Santa Clara, and Milpitas: LC50 = 2,000 – 5,000.
- 7 When used as a refrigerant, CBC Class does not apply. See TGO consensus guidelines for additional information regarding ammonia refrigeration systems.
- 8 IDLH determined by 0.01 of LC<sub>50</sub>.
- 9 Cal OSHA PEL, Title 8, Section 5155, 9/1/95.