

Types of Semiconductor Process Gases

Semiconductor process gases play a significant role in the manufacture of semiconductor devices. The gases are used throughout all stages of fabrication – from the growing of single silicon crystals, through the steps of wafer fabrication, to final assembly and packaging.

This table lists the primary process gases used for semiconductor fabrication. Other gases are also available.



Classification of Some Selected Semiconductor Process Gases

Silicon-Precursor Gases	Dopant Gases	Etchant Gases	Atmospheric/Purge Gases	Reactant Gases
Dichlorosilane (SiH_2Cl_2)	Boron Trifluoride (BF_3)	Boron Trichloride (BCl_3)	Argon (Ar)	Ammonia (NH_3)
Disilane (Si_2H_6)	Boron Trifluoride	Chlorine (Cl_2)	Helium (He)	Carbon Dioxide (CO_2)
Germane (GeH_4)	Enriched ($^{11}\text{BF}_3$)	FMAT ($\text{C}_2\text{F}_8\text{O}$)	Hydrogen (H_2)	Nitrous Oxide (N_2O)
Silane (SiH_4)	Diborane (B_2H_6)	Halocarbon-14 (CF_4)	Nitrogen (N_2)	Sulfur Dioxide (SO_2)
Silicon Tetrachloride (SiCl_4)	Phosphine (PH_3)	Halocarbon-23 (CHF_3)	Oxygen (O_2)	
Silicon Tetrafluoride (SiF_4)		Halocarbon-41 (CH_3F)	Xenon (Xe)	
Trichlorosilane (SiHCl_3)		Halocarbon-116 (C_2F_6)		
Trimethylsilane ($(\text{CH}_3)_3\text{SiH}$)		Halocarbon-218 (C_3F_8)		
		Halocarbon-C318 (C_4F_8)		
		Hydrogen Bromide (HBr)		
		Hydrogen Chloride (HCl)		
		Nitrogen Trifluoride (NF_3)		
		Sulfur Hexafluoride (SF_6)		

The Purest Product

The semiconductor process gases production centers are designed to meet the critical quality requirements of the semiconductor industry. These requirements demand not only producing consistent semiconductor process gases, but also maintaining purity throughout the filling operation directly into the process reactor.

Description	Grade	Purity%
Silicon-Precursor Gases		
Dichlorosilane (SiH ₂ Cl ₂)	2.7	99.7
Silane (SiH ₄)	2.0	99.0
	6.0	99.9999
	4.7	99.997
	4.0	99.99
Silicon Tetrachloride (SiCl ₄)	4.0	99.99
	3.8	99.98
Trichlorosilane (SiHCl ₃)	3.5	99.95
	3.0	99.9
Etchant Gases		
Boron Trichloride (BCl ₃)	3.6	99.96
Chlorine (Cl ₂)	5.0	99.999
Halocarbon 14 (CF ₄)	4.7	99.997
	3.7	99.97
Halocarbon 23 (CHF ₃)	4.5	99.995
	2.0	99.0
Halocarbon 116 (C ₂ F ₆)	4.6	99.996
	3.6	99.96
Halocarbon 218 (C ₃ F ₈)	3.6	99.96
Halocarbon 318 (C ₄ F ₈)	3.8	99.98
Hydrogen Bromide (HBr)	4.5	99.995
Hydrogen Chloride (HCl)	5.0	99.999
Nitrogen Trifluoride (NF ₃)	4.0	99.99
Sulfur Hexafluoride (SF ₆)	4.5	99.995
	2.8	99.8

Product Description	Grade	Purity%
Atmospheric/Purge Cylinder Gases		
Argon (Ar)	6.0	99.9999
	5.5	99.9995
	5.0	99.999
Helium (He)	6.0	99.9999
	5.5	99.9995
	5.0	99.999
Hydrogen (H ₂)	6.0	99.9999
	5.5	99.9995
	5.0	99.999
Nitrogen (N ₂)	6.0	99.9999
	5.5	99.9995
	5.0	99.999
Oxygen (O ₂)	5.0	99.999
	4.0MO	99.99
Xenon (Xe)	5.0	99.999
Dopant Gases		
Boron Trifluoride (BF ₃)	2.5	99.5
Phosphine (PH ₃)	6.0	99.9999
	5.7	99.9997
Reactant Gases		
Ammonia (NH ₃)	6.5	99.99995
	5.5	99.9995
	5.0	99.999
Carbon Dioxide (CO ₂)	4.8	99.998
	4.0	99.99
Nitrous Oxide (N ₂ O)	5.5	99.9995
	4.8	99.998
Sulfur Dioxide (SO ₂)	3.8	99.98