

# Liquid Helium

Colorless, odorless, inert, non-corrosive, extremely cold, and nonflammable.

<b>CAS Number</b>	7440-59-7
<b>UN Number</b>	1963
<b>Shipping Name</b>	Helium, Refrigerated Liquid
<b>Hazard Class</b>	2.2
<b>Label</b>	Nonflammable Gas

## Applications

Used as a cryogenic refrigerant; it is produced commercially for use in superconducting properties of magnets in applications, such as MRI, NMR spectroscopy and particle physics research. Gaseous helium is used for inert shielding gas in metal arc and laser welding. Helium provides a protective atmosphere in the production of reactive metals, such as titanium and zirconium. It is also used as a coolant during the drawing of optical fibers, as a carrier gas for chromatography and as a leak detection gas in variety of industries, and to inflate balloons and airships.

## Physical Properties

Chemical formula . . . . .	He	Triple point pressure	
Molecular weight . . . . .	4.0026	Absolute atmospheres . . . . .	0.1238
Specific gravity (Air = 1)		Absolute psi . . . . .	1.819
70°F (21.1°C) 1 atm . . . . .	0.13796	Triple point temperature	
Density lb. per cu. ft.		Specific heat, BTU/lb, °F . . . . .	1.2404 @ 70°F
70°F 1 atm . . . . .	0.01034	At constant pressure (1 atm) 70°F (21.1°C) . . . . .	
Specific Volume, cu ft		At constant volume (1 atm) 70°F (21.1°C) . . . . .	
per lb 70°F 1 atm . . . . .	96.71	Ratio of specific heats at . . . . .	1.6671 @ 70°F
Density of saturated vapor (1 atm)		70°F (21.1°C) . . . . .	
lb/cu ft, 1 atm . . . . .	1.0434	Coefficient of viscosity, micropoises . . . . .	198.5
Normal boiling point . . . . .	-452.1° F	70°F (21.1°C) . . . . .	178.7
Heat vaporization, BTU/lb . . . . .	9.0	Thermal conductivity, . . . . .	0.08266 @ 40°F
Critical pressure		32° F (0°C) . . . . .	
Absolute atmospheres . . . . .	2.26	BTU/ (sq ft) (hr) (°F)/ft. . . . .	
Absolute psi . . . . .	33.2	Ionization potential, volts . . . . .	24.5
Critical point temperature . . . . .	-450.1° F	Excitation potential, first resonance potential, volts . . . . .	20.91



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# Liquid Helium *(continued)*

## Helium Specifications

MTG Grade Designation	Grade 4	Grade 4.5 Industrial
CGA Designation	J	L
Assay % v/v Min	99.0	99.995
Maximum Guaranteed Impurities	-76	50 ppm
Water, ppm or Dew Point	None condensed	15 ppm
Hydrocarbons (condensed)	None condensed	See "hydrocarbons as methane," below
Hydrocarbons (as methane)		
Oxygen		5 ppm
Nitrogen & Argon		
Neon		
Hydrogen		
CO + CO <sub>2</sub>		
Typical Applications	Standard Welding Medical	Used for CGA, A B C or D

## Conversion Data

	WEIGHT		GAS		LIQUID	
	POUNDS Lb	KILOGRAMS Kg	CUBIC FEET SCF	CUBIC METERS Nm <sup>3</sup>	GALLONS Gal	LITERS L
1 Pound	1.0	0.4536	96.71	2.542	0.9593	3.631
1 Kilogram	2.205	1.0	213.2	5.603	2.115	8.006
1 SCF Gas	0.01034	0.004690	1.0	0.02628	0.009919	0.03754
1 Nm <sup>3</sup> Gas	0.3935	0.17847	38.04	1.0	0.3775	1.4289
1 Gal Liquid	1.0423	0.4728	100.80	2.649	1.0	3.785
1 L Liquid	0.2754	0.1249	26.63	0.6998	0.2642	1.0

SCF (standard cubic feet) gas measured at 1 atmosphere and 70°F.  
 Liquid measured at 1 atmosphere and boiling temperature.  
 All values rounded to nearest 4/5 significant numbers.  
 Nm<sup>3</sup> (normal cubic meter) gas measured at 1 atmosphere and 0°C.



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