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## Propane - Thermophysical properties

### Chemical, physical and thermal properties of propane gas - $C_3H_8$ .

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#### Phase diagram of propane

Chemical, physical and thermal properties of Propane -  $C_3H_8$ :

(values at 25°C (77°F, 298 K) and atmospheric pressure)

Molecular Weight	44.097
Specific Gravity of gas (air = 1)	1.52
Specific Volume ( $ft^3/lb$ , $m^3/kg$ )	8.84, 0.552
Density of liquid at atmospheric pressure ( $lb/ft^3$ , $kg/m^3$ )	36.2, 580
Vapor pressure at 25°C ( $psia$ , $MN/m^2$ )	135.7, 0.936
Absolute Viscosity ( $lb_m/ft s$ , centipoises)	$5.38 \cdot 10^{-6}$ , 0.0074
Sound velocity in gas ( $m/s$ )	253
Specific Heat - $c_p$ - ( $Btu/lb^{\circ}F$ or $cal/g^{\circ}C$ , $J/kgK$ )	0.39, 1630
Specific Heat Ratio - $c_p/c_v$	1.13
Gas constant - $R$ - ( $ft lb/lb^{\circ}R$ , $J/kg^{\circ}C$ )	35.0, 188
Thermal Conductivity ( $Btu/hr ft^{\circ}F$ , $W/m^{\circ}C$ )	0.010, 0.017
Boiling Point - saturation pressure 14.7 psia and 760 mm Hg - ( $^{\circ}F$ , $^{\circ}C$ )	-44, -42.2
Latent Heat of Evaporation at boiling point ( $Btu/lb$ , $J/kg$ )	184, 428000
Freezing or Melting Point at 1 atm ( $^{\circ}F$ , $^{\circ}C$ )	-309.8, -189.9
Latent Heat of Fusion ( $Btu/lb$ , $J/kg$ )	19.1, 44400
Critical Temperature ( $^{\circ}F$ , $^{\circ}C$ )	205, 96
Critical Pressure ( $psia$ , $MN/m^2$ )	618, 4.26
Critical Volume ( $ft^3/lb$ , $m^3/kg$ )	0.073, 0.0045
Flammable	yes
Heat of combustion ( $Btu/ft^3$ , $Btu/lb$ , $kJ/kg$ )	2450, 21660, 50340

See the following documents for changes in propane properties with *changes in pressure and temperature*:

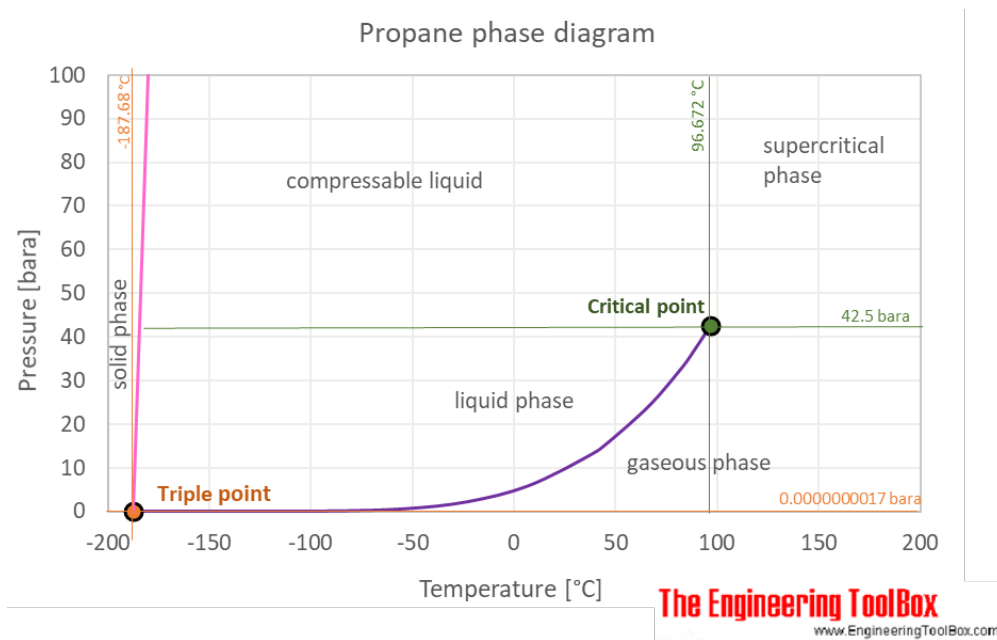
- [Density and Specific Weight](#)

- [Dynamic and Kinematic Viscosity](#)
- [Prandtl Number](#)
- [Specific Heat \(Heat Capacity\)](#)
- [Thermal Conductivity](#)
- [Thermal Diffusivity](#)
- [Vapor Pressure at Gas-Liquid Equilibrium](#)

See also [more about atmospheric pressure](#) , and [STP - Standard Temperature and Pressure & NTP - Normal Temperature and Pressure](#) , as well as **Thermophysical properties** of: [Acetone](#) , [Acetylene](#) , [Air](#) , [Ammonia](#) , [Argon](#) , [Benzene](#) , [Butane](#) , [Carbon dioxide](#) , [Carbon monoxide](#) , [Ethane](#) , [Ethanol](#) , [Ethylene](#) , [Helium](#) , [Hydrogen](#) , [Hydrogen sulfide](#) , [Methane](#) , [Methanol](#) , [Nitrogen](#) , [Oxygen](#) , [Pentane](#) , [Toluene](#) , [Water](#) and [Heavy water, D<sub>2</sub>O](#) .

Propane is a *gas* at standard conditions. However, at low temperature and/or high pressures the gas becomes a liquid (or a solid at very cold conditions).

The phase diagram for propane shows the phase behavior with changes in temperature and pressure. The curve between the critical point and the triple point shows the propane boiling point with changes in pressure. It also shows the saturation pressure with changes in temperature.



At the **critical point** there is no change of state when pressure is increased or if heat is added.

The **triple point** of a substance is the temperature and pressure at which the three phases (gas, liquid, and solid) of that substance coexist in thermodynamic equilibrium.

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## Related Topics

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- **Combustion** - Boiler house topics, fuels like oil, gas, coal, wood - chimneys, safety valves, tanks - combustion efficiency.
- **Material Properties** - Material properties of gases, fluids and solids - densities, specific heats, viscosities and more.

## Related Documents

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- **Acetone - Thermophysical Properties** - Chemical, physical and thermal properties of acetone, also called 2-propanone, dimethyl ketone and pyroacetic acid. Phase diagram included.
- **Adiabatic Flame Temperatures** - Adiabatic flame temperatures for hydrogen, methane, propane and octane - in Kelvin.
- **Benzene - Thermophysical properties** - Chemical, physical and thermal properties of benzene, also called benzol. Phase diagram included.
- **Butane - Thermophysical Properties** - Chemical, physical and thermal properties of n-Butane.
- **Combustion Heat** - Heat of combustion (energy content) for some common substances - with examples how to calculate heat of combustion.
- **Energy Content in common Energy Sources** - Heating fuels and their energy content.
- **Ethane - Thermophysical Properties** - Chemical, Physical and Thermal Properties of Ethane -  $C_2H_6$ .
- **Ethylene - Thermophysical Properties** - Chemical, physical and thermal properties of ethylene, also called ethene, acetene and olefiant gas. Phase diagram included.
- **Flame Temperatures - Gases** - Adiabatic flame temperatures for common fuel gases - propane, butane, acetylene and more - in air or oxygen atmospheres.
- **Fuel Gases - Heating Values** - Combustion heat values for gases like acetylene, blast furnace gas, ethane, biogas and more - Gross and Net values.
- **Fuels - Higher and Lower Calorific Values** - Higher and lower calorific values (heating values) for fuels like coke, oil, wood, hydrogen and others.

- **Fuels and Chemicals - Autoignition Temperatures** - Autoignition points for fuels and chemicals like butane, coke, hydrogen, petroleum and more.
- **Gases - Explosion and Flammability Concentration Limits** - Flame and explosion limits for gases like propane, methane, butane, acetylene and more.
- **Gases - Gross and Net Heat Values** - Gross heat and net heat values for gases like hydrogen, methane and more.
- **Hydrocarbons - Vapor Pressure** - Vapor pressure vs. temperature for propane, n-butane, n-heptane and n-pentane hydrocarbons.
- **Liquids - Dynamic Viscosities** - Absolute (dynamic) viscosity values for some common fluids.
- **LP Gas Properties** - Liquefied Petroleum - LP - gas properties.
- **Pentane - Thermophysical Properties** - Chemical, physical and thermal properties of pentane, also called n-pentane. Phase diagram included.
- **Propane - Density and Specific Weight vs. Temperature and Pressure** - Online calculator, figures and tables showing density and specific weight of propane,  $C_3H_8$ , at temperatures ranging from -187 to 725 °C (-305 to 1300 °F) at atmospheric and higher pressure - Imperial and SI Units.
- **Propane - Dynamic and Kinematic Viscosity vs. Temperature and Pressure** - Online calculators, figures and tables showing dynamic and kinematic viscosity of liquid and gaseous propane at varying temperature and pressure, SI and Imperial units.
- **Propane - Latent Heat of Vaporization vs. Temperature** - Latent heat with vaporized propane.
- **Propane - Prandtl Number vs. Temperature and Pressure** - Figures and tables with Prandtl Number of liquid and gaseous propane at varying temperature and pressure, SI and Imperial units.
- **Propane - Thermal Conductivity vs. Temperature and Pressure** - Online calculator, figures and tables showing thermal conductivity of liquid and gaseous propane at varying temperature and pressure, SI and Imperial units.
- **Propane - Thermal Diffusivity vs. Temperature and Pressure** - Figures and tables showing thermal diffusivity of liquid and gaseous propane at varying temperature and pressure, SI and Imperial units.
- **Propane - Vapor Pressure vs. Temperature** - Vapor pressure vs. temperature.
- **Propane Butane Mixture - Evaporation Pressure** - Evaporation pressure of propane butane mixture vs. temperature.
- **Propane Gas - Sizing Pipe Lines** - Sizing low pressure propane gas pipe lines - Metric units.
- **Propane Gas Piping - Capacity vs. Size** - Sizing of propane gas pipe lines with pressures above 5 psig (35 kPa).
- **Propane Gas Piping - Low Pressure Capacity vs. Size** - Sizing of low pressure propane gas pipe lines - Imperial units.

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### Unit Converter

#### Temperature

0.0

°C

°F

Convert!

#### Length

1.0

*m*

*km*

*in*

*ft*

*yards*

*miles*

*naut miles*

Convert!

#### Area

1.0

*m<sup>2</sup>*

*km<sup>2</sup>*

*in<sup>2</sup>*

*ft<sup>2</sup>*

*miles<sup>2</sup>*

*acres*

Convert!

#### Volume

1.0

$m^3$   
 liters  
  $in^3$   
  $ft^3$   
 us gal

Convert!

### Weight

1.0

$kg_f$   
 N  
  $lb_f$

Convert!

### Velocity

1.0

m/s  
 km/h  
 ft/min  
 ft/s  
 mph  
 knots

Convert!

### Pressure

1.0

Pa ( $N/m^2$ )  
 bar  
 mm  $H_2O$   
  $kg/cm^2$   
 psi  
 inches  $H_2O$

Convert!



Flow

1.0

- $m^3/s$
- $m^3/h$
- US gpm
- cfm

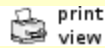
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### Scientific Online Calculator



2.17

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