

Gas burner

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A **gas burner** is a device which is used to generate a flame, in order to heat up products using a gaseous fuel such as acetylene, natural gas, or propane. Some burners have an air inlet to mix the fuel gas with air, to enable complete combustion. Acetylene is commonly used in combination with oxygen.

The gas burner has many applications such as soldering, brazing and welding, the latter using oxygen instead of air for producing a hotter flame, which is required for melting steel. For laboratory uses, a natural-gas fueled Bunsen burner is used. For melting metals with melting points of up to 1100 °C (such as copper, silver, and gold), a propane burner with a natural drag of air can be used.

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Propane burner used with forced air into a metal melting furnace.



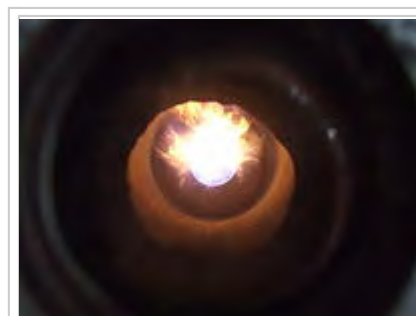
Propane burner with a Bunsen flame



Propane oxygen burner used for cutting through steel rails

Flame temperatures of common gases and fuels

Gas / Fuels	Flame temperature
Propane in air	1980 °C 3596 °F
Butane in air	1970 °C 3578 °F
Wood in air (normally not reached in a wood stove)	1980 °C 3596 °F
Acetylene in air	2550 °C 4622 °F
Methane (natural gas) in air	1950 °C 3542 °F
Hydrogen in air	2111 °C 3831 °F
Propane with oxygen	2800 °C 5072 °F
Acetylene in oxygen	3100 °C + 5612 °F
Propane-butane mix with air	~1970 °C 3578 °F
Coal in air (blast furnace)	1900 °C 3542 °F
Cyanogen (C ₂ N ₂) in oxygen	4525 °C 8177 °F
Dicyanoacetylene (C ₄ N ₂) in oxygen (highest flame temperature)	4982 °C 9000 °F



Flame of a gas and oil, in a dual burner

The above data is given with the following assumptions:

- The flame is adiabatic
- The surrounding air is at 20°C, 1 bar atm
- Complete combustion (no soot, and more blue-like flame is the key) (Stoichiometric)
- Peak Temperature
- Speed of Combustion (has no effect on temp, but more energy released per second (as adiabatic) compared to normal flame)
- Spectral bands also affect colour of flame, as of what part and elements of combustion
- Blackbody radiation (colour appearance only because of heat)
- Atmosphere - affects temperature of flame and colour due to the atmospheric colour effect

Explosive limits and ignition temperatures of common gases

	Explosive limits (lower & upper, in %)	Ignition temperatures
Natural gas	4.7 & 15	482-632 °C
Propane	2.15 & 9.6	493-604 °C
Butane	1.9 & 8.5	482-538 °C
Acetylene	2.5 & 81	305 °C
Hydrogen	4 & 75	500 °C
Ammonia	16 & 25	651 °C
Carbon monoxide	12.5 & 74	609 °C
Ethylene	3.4 & 10.8	490 °C

Note: Atmosphere is air at 20 degrees Celsius.

Combustion values of common gases

Gas	Combustion value	
	(Btu/ft ³)	(MJ/m ³)
Natural gas (methane)	950 to 1,150	35 to 43
Propane-butane mix	2,500 to 3,200	90 to 120
Propane	2,572	95.8
Butane	3,225	120.1

References

- *Pocket Guide to Fire and Arson Investigation*, second edition, FM Global, Table 1,2 and 3

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