CHEMTANE®

The Cutting Fuel for Cutting Cost

CHEMTANE 2

The intelligent choice

for cutting, brazing, heating,

and other applications.

Characteristics

As a Gas	CHEMTANE 2	Acetylene	Propylene	Propane	Natural Gas
Flame Temperature in Oxygen - Degrees F	*5800+	5589	5295	4579	4600
Heating Values: BTU's per cu. ft.	2810	1470	2371	2510	1050
BTU's per pound	24,812	21,315	21,864	21,636	24,780
Cu. Ft. per pound of gas (or liquid)	8.83	14.5	8.89	8.62	23.6
Wt. Compared to air	1.5	0.91	1.47	1.52	0.55
Limits of Flammability in air - %	2.3-9.4	2.5-80.0	2.0-11.1	2.4-9.6	5.3-14.0
Toxicity	None	Low	Low	Low	Low
Reactivity	Low	Copper & Silver Alloys	Low	Low	Low
Backfire Tendency	Low	High	Slight	Low	Low
Max. Pressure	Cylinder	15 psi	Cylinder	Cylinder	Supply
Shock Sensitivity	Stable	Unstable	Stable	Stable	Stable
As a Liquid	**CHEMTANE 2**	**Acetylene**	**Propylene**	**Propane**	**Natural Gas**
Wt. Per Gallon-lbs.	4.24	-	4.35	4.23	-
Boiling Point - Degrees F	-43.6	-81	-47	-44	-250
At 70 Degrees F generates vapor pressure of	120 psi	-	130 psi	120 psi	-
Shock Sensitivity	Stable	Unstable	Stable	Stable	Stable

*By Computer Image Testing & Comparison with other gases.

Chemtane 2 - a trademark of Chemtane Energy, LLC.

Manufactured by:
CHEMTANE ENERGY, LLC
Baytown, TX
(281) 573-1100
www.chemtane2.com

CHEMTANE 2

Distributed by:

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What is Chemtane 2?

Chemtane 2 is an environmentally friendly product developed to meet the global need for a safer, more economical cutting and heating fuel. During the past decade, Chemtane Energy has devoted extensive resources to developing and refining the blending of its chemicals.

Chemtane 2 gas is a new generation cutting fuel that is more economical, environment friendly, and safer than acetylene and other fuel gases.

Chemtane 2 performance offers the consistency and reliability not usually associated with other products. Our quality control program and stringent distribution guidelines guarantee the end user a dependable cutting fuel alternative.

Who is using Chemtane 2?

Because **Chemtane 2** has a wide range of advantages over other cutting and heating gases, **Chemtane 2** is being used in a variety of industries.

Here are a few of the industries that are using **Chemtane 2:**

- Flame Cutting Shops
- Shipbuilding and Repair
- Field Construction
- Fabrication
- Machine Shops
- Government Agencies
- Metal Spray Shops
- Brazing Shops
- Jewelry & Glass
- Scrap Yards

Product Features and Benefits

- Reduces fuel cost up to 50%
- High cutting speed - reducing labor
- Equal oxygen consumption
- Reduced handling and storage
- Reduced change out time
- Extremely high flame temperature
- Minimum slag and weldback
- Burns clean - no soot or smoke
- Limited torch backfire
- Narrow explosive limits
- Stable, not sensitive to shock
- Non toxic-odorized for detection

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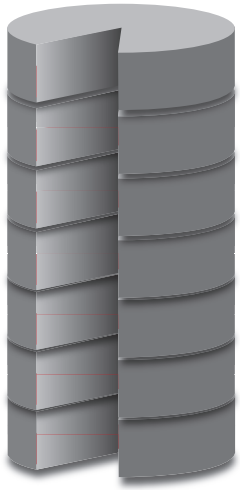
100 LBS. = Acetylene 2100 Cu. Ft.



Vaporization Rate of Chemtane 2 | Cubic Feet Per Hour @ 60% full

Size	Temperature Degrees F **40% Full** - Multiply by 0.8 **20% Full** - Multiply by 0.6				
	-5	+10	+20	+40	+60
25 lb.	8	15	20	31	40
60 lb.	14	28	37	56	75
100 lb.	19	38	51	77	102
420 lb.	42	85	114	171	228
1000 gal.	197	324	512	759	1142

Chemtane 2 is available in most cylinder sizes.

(2 lb., 6 lb., 25 lb., 60 lb., 100 lb., 424 lb. and also in bulk storage tanks ranging in sizes from 500 to 10,000 W. G. capacity.)

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Powerful, Versatile, Economical, Safe.

General Information

The key factors in selecting a fuel gas are: a) flame temperature because it is an indicator of cutting and heating ability; b) BTU content because it is an indicator of the quantity of energy being purchased; and c) the unit cost which must be compared with competitive products.

Chemtane 2's properties enable it to cut, heat treat, flame harden, metallize, and braze quickly, cleanly and economically.

Chemtane 2 is an outstanding product because it has a high flame temperature of *5800+ °F in oxygen, a flame structure well suited to heavy burning and heating and startling cost effectiveness.

The purpose of this booklet is to show how these properties enable **Chemtane 2**, to cut, heat treat, flame harden, metallize, and braze quickly, cleanly and economically.

In starting a cut on plate, pipe, or any structural shape, the preheat time will be noticeably less than competitive fuels. This is due to the flame temperature of **Chemtane 2** being several hundred degrees hotter than other fuel gases including acetylene, which brings the steel to ignition temperature more quickly. The cutting speed is appreciably greater when making straight cuts, beveling, and gouging due to the higher flame temperature which preheats the surface rapidly as the torch advances. At the same time the heat release of the high energy secondary flame adds to the heat of combustion of the burning steel beneath the surface. The flame temperature-secondary flame combination allows intricate patterns to be accurately cut and sharp turns to be made without "losing the preheat". Piercing is accomplished quickly and cleanly. Cuts are smooth with no gouge marks. There are no rolled edges. Preheating with another torch is often eliminated. These results are obtained with either a hand or machine torch.

As various types of cuts are made, it will be noted that slag and weldback is minimal. Again, labor expense is saved because cleanup time is virtually nil. Weldback is minimal because **Chemtane 2** does not have an excess of carbon available during combustion as is the case with acetylene and some other fuel gases. Extra carbon promotes the welding process and causes weldback. It is the absence of the excess carbon, which makes gas welding with **Chemtane 2** difficult. On the other hand, those fuels with excess carbon produce a black, sooty flame, a hindrance in certain applications.

**By Computer Image Testing & Comparison with other gases.*

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Data Sheet

- Mixing (blending) proportions are one (1) part **Chemtane 2** concentrate to 199 parts propane/LPG. Independent laboratory tests have shown that **Chemtane 2** blends equally well with LPG ranging from 70% propane/30 % butane or 30% propane/70% butane.

- MSDS (Material Safety Data Sheet) on both **Chemtane 2** gas and **Chemtane 2** concentrate are available upon request.

- Codes for customs and regulatory purposes:
  - Harmonized code = 2901.10.6000
  - U.S. Department of Commerce ECCN No. for export bills of lading = IC 82D
  - U.S. Department of Transportation chemical concentrate classification No. = UN 1993
  - U.S. Department of Transportation blended fuel gas classification No. = UN 1075

- The types of cylinders used by customers are those which are standard in the LPG/propane industry. In the U.S., 240 or 260 psi (pounds per square inch) cylinders are typically used. Various cylinder sizes are available and vary by distributor.

- Instead of using an acetylene tip which will not work with **Chemtane 2**, Chemtane Energy recommends using an industry standard 2-piece propane tip or natural gas tip. The two-piece tip is recessed, and it has more splines which are the openings from which the cutting fuel flows for better heat dispersion.

- With **Chemtane 2**, customers can use Grade T hoses, regulators and gauges which are standard in the industry and which are recommended by the manufacturer for the particular application of the cutting fuel. There are, however, certain qualities that make **Chemtane 2** cutting fuel more versatile than acetylene as the brochure outlines in the "Product Features and Benefits" section.

- Other benefits, for example, specifically on the acetylene gauges, there is a red line at 15 psi, which is the maximum psi acetylene can be used safely. The reason for this is that there is a danger of drawing acetone from the acetylene cylinder above 15 psi.

- Although a pressure setting of, say 5 psi, might be recommended for cutting 1-inch steel plate with **Chemtane 2**, you can operate with a much higher psi if required for a particular application. Acetylene must not be used at depths greater than approximately 20 ft., because its maximum safe operating pressure is 15 psi. **Chemtane 2** can cut at greater depths using recommended pressures and equipment.

- In addition to reduced product and labor costs, there are a couple of other factors which should be considered when analyzing the cost savings associated with **Chemtane 2**:

  (1) With acetylene, up to 20% is trapped in the cylinder and can thus never be used. This factor becomes important when comparing cylinder quantities of acetylene vs. **Chemtane 2**.

  (2) Another factor to consider is production. Acetylene cuts 1-inch steel at 13 inches per minute. **Chemtane 2** cuts 1-inch steel at 20 inches per minute or about 54% more than acetylene.

- Cutting with **Chemtane 2** consumes approximately the same oxygen when performing the same task as acetylene, but **Chemtane 2** consumes 42% less oxygen than when that same cutting task is performed with propane.

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What is Chemtane 2 and how does it produce an increase in flame temperature?

This is a phenomenon we call "Secondary Combustion".

To answer this question we have analyzed the Flame Structure and the Action of Propane Chemtane 2 with its unique additives:

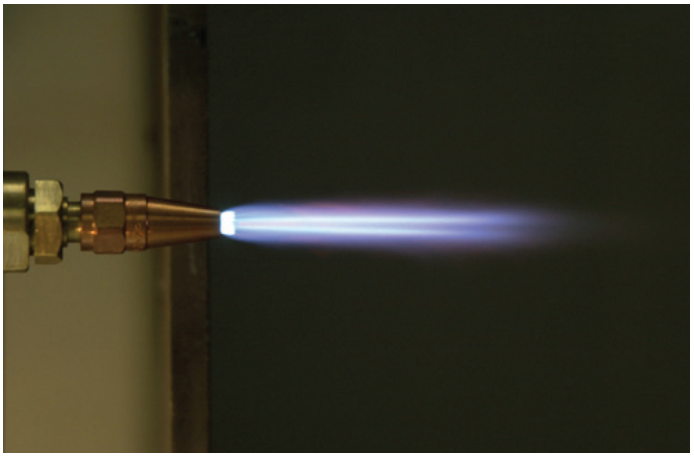
Flame Structure

A premixed fuel and oxygen torch flame has a definite structure. There are four zones in the structure which are (1) the cool blue flame region (2) the inner cone (3) the outer cone and (4) the preheat zone outside of the flame. **Chemtane 2** enhances a portion of the propane flame. This improves the cutting ability of the torch flame. Two photographs are provided labeled Pic3583 and Pic3589.

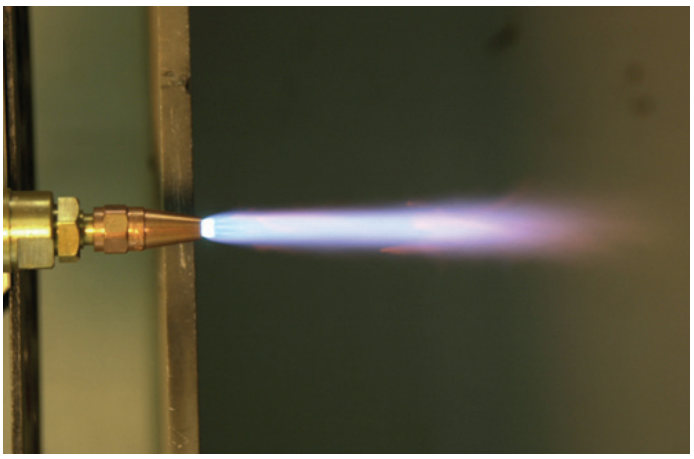
The Cool Blue Flame Zone

The first step in combustion in a premix flame is the combination of oxygen and the fuel gas. This produces oxygenated fuel molecules. Many of the combination reactions are endothermic (meaning they absorb heat) and thus the region is not at a high temperature. Some of the oxygenated molecules undergo combustion producing heat. Oxygenated molecules burn with a blue-white flame. The combustion of alcohol provides an example of the blue-white flame. Combustion is an exothermic reaction (that is, it produces heat). The cool blue zone thus has endothermic oxygenation reactions absorbing heat and exothermic combustion reactions producing heat. The net result is a flame that is cool by comparison with most flames and is blue-white in color. It is thus called the cool blue flame zone and it is located at the torch tip. It can be seen in both of the photographs as a small bright flame at the torch tip.

Pic 3583 shows the stable premix flame and Pic 3589 has excess oxygen added as used in cutting.



Chemtane 2 Pic. #3589



Chemtane 2 Pic.#3583

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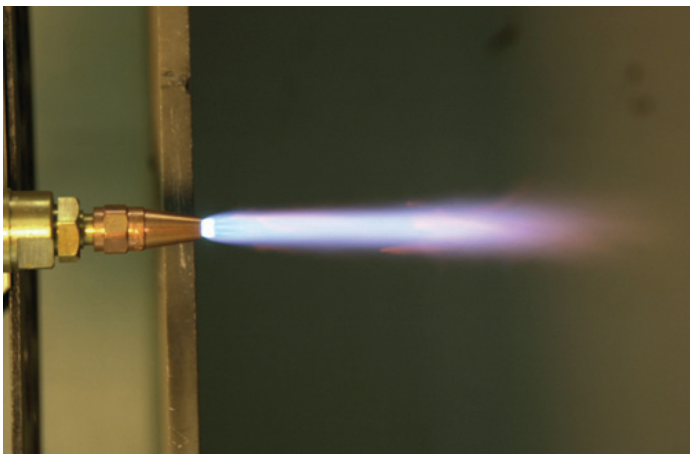
The Inner Cone Zone

The second step in combustion is the breakup of the primary products accompanied with additional oxidation. This is a fast free radical chain reaction. Almost all of the reactions are exothermic. The inner cone reaction zone produces much of the heat of combustion for the torch flame. The inner cone is visible in Pic3583 before excess oxygen is added. The highest temperature for most oxyfuel torch flames is at the tip of the inner cone. The inner cone is predominantly produced from the oxygen exclusively from the oxygen tank and is not diluted from the surrounding air with nitrogen and oxygen.



Chemtane 2 Pic.#3583

The Outer Cone Zone

The third step in combustion is formation of the final combustion products from the primary products accompanied by additional oxidation. It is a free radical chain reaction with carbon dioxide and water as the reaction products. Intermediates are not predominantly formed in this stage. The reactions are exothermic. The outer cone reaction zone is diluted by the surrounding atmosphere. It thus has some reaction from atmospheric oxygen which is still a minor component compared to oxygen from the torch. There is a large admixture of inert nitrogen from the surrounding atmosphere. The outer cone is visible in Pic3583 before excess oxygen is added. The outer cone is responsible for much of the heat which is effective in preheat of the working piece.

Most of the time, engineers think in terms of the thermodynamic enthalpy of a fuel which predicts the amount of heat produced by combustion. **Chemtane 2** does not add significantly to the thermodynamic enthalpic value of the fuel. How then can **Chemtane 2** produce an increase in flame temperature?

Flame temperature can be calculated by knowing the initial temperatures of the oxygen and fuel, the heat of combustion (thermodynamic enthalpy) of the fuel and the combustion products along with their respective specific heat values at constant pressure (Cp). The mechanism of action whereby **Chemtane 2** enhances the flame temperature is fundamentally a kinetic phenomenon not strictly a result of thermodynamics.

To understand the enhancement it is first necessary to understand the relationship of the initial temperature and the thermodynamic heating effect. Consider a given quantity of fuel which produces a given amount of heat and thus an increase in temperature.

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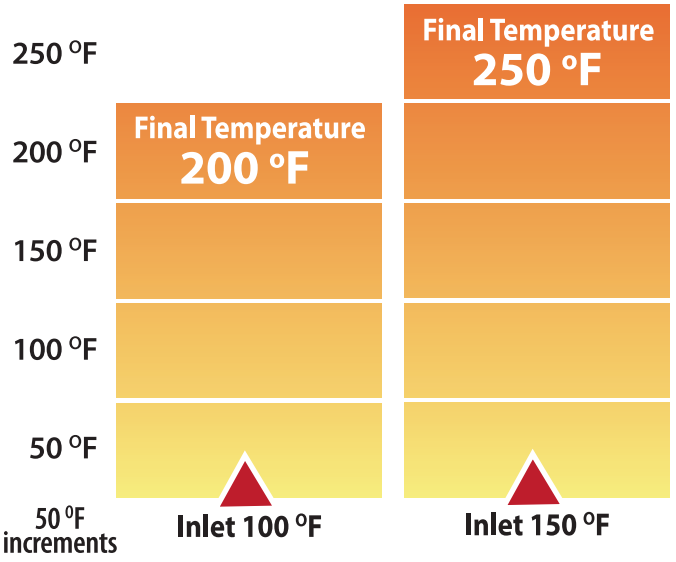
Combustion of fuel increases temperature

In the example, the combustion of fuel increases the temperature by 100 °F no matter what the inlet temperature is. If the inlet temperature is raised by a 50 °F increment, then the final temperature is also raised by 50 °F.

If a small amount of additional propane (at the same inlet temperature is added) it will not increase the final temperature because the additional heat of combustion is insignificant. However, if a small amount of additional propane, at a temperature of 4000 °F higher than the inlet temperature is added, then the final temperature may be increased by several hundred degrees. This is not due to additional heat of combustion, but rather it is due to the additional heat input.



Now, this is significant to the situation with **Chemtane 2** for kinetic reasons not strictly and only thermodynamic reasons. Say **Chemtane 2** has a C7 hydrocarbon and is mixed with a C3 hydrocarbon (propane) which is then burned. In a given period of time the propane is burned. This is called the burn rate or velocity of combustion. The linear flow rate of fuel to the torch must be faster than the velocity of combustion. In this same period of time the C7 hydrocarbon is partially burned giving a C3 to C4 hydrocarbon fragment which is heated to a high temperature like 4000 °F. The combustion process continues as the fragments travel away from the torch into the region of the inner and outer cone. Their combustion raises the flame temperature and does so at the outer edge of the inner cone. This is exactly where the heat is needed for cutting metal. It might be said that the "business end" of the cutting torch has been enhanced. The hot zone of the cutting torch is increased in diameter and length. The increased diameter of the hot zones allows smooth cuts and the increased length allows a greater working distance.

The phenomenon cannot be understood by looking at quantities and thermodynamic heats of combustion. A torch is not a closed thermodynamic system. When excess oxygen is added, as in actual cutting, the flame structure is changed. Pic3589 shows an enhanced bright region in the primary cone when the oxygen feed is increased. The hot zone is shaped like a cylinder and viewing it from the side, the top and bottom of the cylinder shaped zone is brighter. In this open thermodynamic system, the flame temperature cannot be modeled simply on a computer. The torch is turbulent flow and the mixing with air is variable. The enhancement cannot be predicted from knowledge of thermodynamic values, because they cannot account for kinetic phenomena. What is important is to evaluate fuel gas additives by experimental demonstration. ***There is a variety of temperatures present at different zones in the flame structure of the torch. Chemtane 2 increases the temperature within the portion of the flame used for actual cutting.*** Understanding the combustion kinetics as described provides good reason to put these materials to the test.

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The secondary flame energy release, mentioned earlier, makes **Chemtane 2** a "forgiving" gas. That is, the operator can achieve good results even though he might hold the heating or cutting tip too close to the workpiece or open the distance to one to two inches. Maintaining an exact distance from the workpiece is not critical, as with acetylene. The ability to cut effectively at a two inch distance is advantageous when flamecutting in tight corners or other inaccessible places. With the tolerance afforded by **Chemtane 2** the experienced operator adapts quickly to its use and less experienced personnel learn to use it more readily, ruining less material.

It was stated that one cubic foot of **Chemtane 2** vapor releases 2810 BTU's when combusted. Acetylene vapor releases only 1470. Therefore, to apply a given amount of heat (BTU's) to a piece of steel, only 53% as much **Chemtane 2** vapor must be used in comparison. This allows the flow of **Chemtane 2** to be reduced accordingly, so that it can be drawn from the cylinder at about one half the rate of acetylene. With less **Chemtane 2** being burned, the amount and cost of oxygen consumed in combustion are proportionately reduced.

The significant heat content advantage and reduced flow rates of gas and oxygen are the primary reasons that **Chemtane 2** costs substantially less to use than acetylene.

Various tests and several years of customer experience have established that one pound of **Chemtane 2** will do as much work as twenty-one cubic feet of acetylene. In as much as **Chemtane 2** is sold by the pound and acetylene is sold by the hundred cubic feet, the cost comparison is easy to make.

Since one 100 pound size cylinder of **Chemtane 2** does as much work as seven of the 300 cubic feet size cylinders of acetylene, substantial savings in freight, storage, and handling are realized.

Earlier, the ability of **Chemtane 2** to flamecut metal at short or extended distance from the workpiece was discussed. The ultimate in short distance is to set the cutting or heating tip against the workpiece. Even under the extreme, **Chemtane 2** does not tend to backfire. Operators and safety engineers appreciate this significant safety feature.

Chemtane 2 is available in various cylinder sizes:

Diameter	Height	Cylinder Tare Weight	Chemtane 2 Capacity
4 inches	17 inches	5.5 pounds	2 pounds
6 inches	22 inches	8 pounds	6 pounds
8 inches	28 inches	22 pounds	25 pounds
12 inches	44 inches	47 pounds	60 pounds
15 inches	50 inches	75 pounds	100 pounds
30 inches	52 inches	325 pounds	424 pounds

Chemtane 2 is also available in bulk tanks of 500 gallons and up based on usage.

If you will contact us, one of our dealers will be pleased to go into greater detail and depth in explaining and demonstrating the advantages of Chemtane 2 under your working conditions.

Call for a Demonstration To Compare Chemtane 2 With Other Products.

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Welding Supply Company Advantages

The future of the welding supply business is to cut costs in order to increase profits. Becoming a **Chemtane 2** gas distributor is one way to achieve this. As a distributor of **Chemtane 2** gas, the following cost savings can be realized because a 100lb. cylinder of **Chemtane 2** gas equals up to seven 300 cu. ft. cylinders of acetylene.

Therefore,

- The **Chemtane 2** cylinders required cost less than required acetylene cylinders
- There is less capital required due to the reduction of cylinder inventory needed vs. the inventory required with acetylene cylinders
- Less storage space is needed for **Chemtane 2** cylinders
- Less labor is required in field & office, due to reduced handling of materials & processing of paper work
- Less deliveries are made which means less maintenance to delivery trucks
- Lower liability could be realized due to less time the delivery trucks are on the road and could possibly lead to reduced insurance premiums
- A cylinder of **Chemtane 2** is approximately ½ the weight of an equal size cylinder of acetylene, which could lessen the liability of job injuries
- Less weight on the delivery trucks could lessen the fuel costs to operate the trucks
- With **Chemtane 2** gas, your company is able to provide liquid bulk manifold systems instead of the bulk vapor manifold pack system to the end-user
- With **Chemtane 2** gas, being offered as a fuel gas your company is able to maintain its customer base and possibly prevent the competition from taking your company's clients

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Acetylene @ _____ per 100 cubic feet x 300 cubic feet is

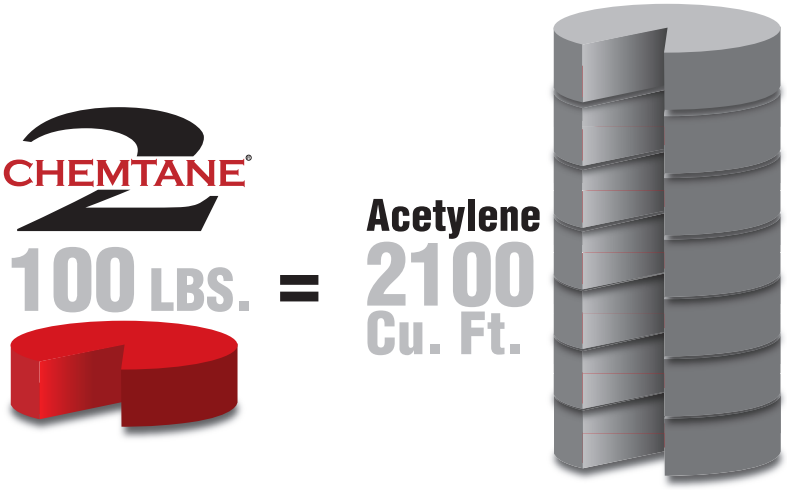
$ _____ per cylinder x 7 cylinders = $ _____.

Chemtane 2 @ _____ lb. x 100 lbs. = $ _____.

Cost Savings $ _____.

Product Features and Benefits

- Reduced fuel costs up to 50% or better
- High cutting speed - reducing labor
- Equal oxygen consumption
- Reduced handling and storage
- Reduced change out time
- Extremely high flame temperature
- Minimum slag and weldback
- Burns clean - no soot or smoke
- Limited torch backfire
- Narrow explosive limits
- Stable, not sensitive to shock
- Non toxic-odorized for detection



A 100 lb. Cylinder of Chemtane 2 equals up to seven 300 cubic feet acetylene cylinders. See the difference in savings and make the change today.

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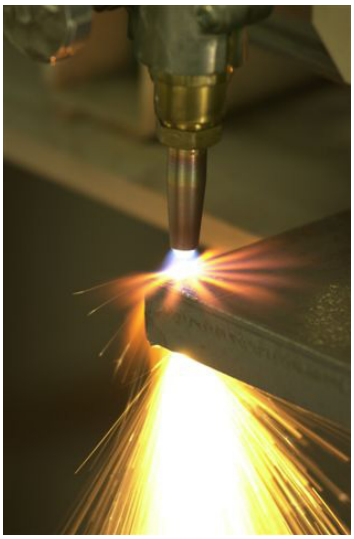
Acetylene Versus Chemtane 2 Consumption Comparison On 1" Steel



Acetylene	7 cylinders X 300 cu ft.	= 2100 cu ft.
Chemtane 2	100 lbs. X 8.83 cu ft.	= 883 cu ft.

2100 cu ft. Acetylene = 2.37 times more Acetylene to do 883 cu ft. **Chemtane 2** the same job as **Chemtane 2**

However, keep in mind this analysis is for consumption only.

ACTUAL CONSUMPTION PER HOUR CUTTING 1" STEEL:

Acetylene consumes	14.65 cu ft.
Chemtane 2 consumes	6 cu ft.

Divide the Acetylene consumption by the **Chemtane 2** consumption to see that you will use 2.44 times more

Acetylene per hour than **Chemtane 2**. This is more Acetylene consumed than in the illustration above, proving that (7) 300 cu ft. cylinders of Acetylene will perform equal to only (1) 100 lb. cylinder of **Chemtane 2**.

7 Acetylene cylinders X 300 cu/ft = 2100 cu/ft
2100 cu/ft X 1470 BTUs per cu/ft = 3,087,000 BTUs

100 lbs **Chemtane 2** X 8.83 cu/ft per lb = 883 cu/ft
883 cu/ft X 2810 BTUs per cu/ft = 2,481,230 BTUs

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Acetylene Facts According To Acetylene Manufacturer:

- 14% to 16% trapped in cylinder (waste)
- Truth Is: 20% trapped in cylinder (MORE waste)
- Based on 20% loss the following holds true:
  - 2100 cu/ft. X 80% = 1680 cu/ft of useable gas per (7) cylinders
  - This is 240 cu/ft per cylinder. (1680 divided by 7 = 240)
  - 240 cu/ft X 1470 BTUs per cu/ft = 352,800 BTUs

COMPARISON: **2,481,230 BTUs** = 7.032 cylinders of Acetylene
352,800 BTUs to 1 cylinder of **Chemtane 2**

ACETYLENE **20% LOSS 1" STEEL**

- 1680 cu/ft (divided by) 14.65 cu/ft used per hour = 114.7 hrs. of production
- 15" per minute X 60 minutes = 900" per hour
- 900" per hour X 114.7 working hours = 103,230" total production per 7 cylinders of Acetylene

CHEMTANE 2 **1" STEEL**

- 100 lbs = 883 cu/ft
- 883 cu/ft (divided by) 6 cu/ft used per hour = 147.2 hrs. of production
- 19" per minute X 60 minutes = 1140" per hour
- 1140" per hour X 147.2 working hours = **167,808"**
- TOTAL PRODUCTION per 100 lb cylinder of **Chemtane 2**.

USING CHEMTANE 2 THERE WERE 64,578 MORE INCHES CUT THAN WITH ACETYLENE. THIS EQUALS 63% MORE PRODUCTION.

RESULTS IF THERE WAS NO LOSS WITH ACETYLENE:

- 2100 cu/ft (divided by) 14.65 cu/ft used per hour = 143.3 hrs. of production
- 15" per minute X 60 minutes = 900" per hour
- 900" per hr X 143.3 = 128,970" total production per 7 cylinders of Acetylene

167,808" Total production with **Chemtane 2**
128,970" Total production with **Acetylene**
38,838" **MORE WITH CHEMTANE 2**

38,838" (divided by) 128,970 = .301 or 30% MORE PRODUCTION WITH **CHEMTANE 2** THAN WITH ACETYLENE

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Acetylene Vs. Chemtane 2
Preheat Oxygen Consumption

ACETYLENE/OXYGEN MIXTURE IS:

2.5 PARTS OF OXYGEN TO 1 PART ACETYLENE
1 Part of the oxygen is consumed from the atmosphere
1.5 parts of the oxygen is consumed from the oxygen cylinder

ACETYLENE : 2100 cu. ft. X 1.5 parts oxygen = 3,150 cu. ft. oxygen consumed

CHEMTANE 2/OXYGEN MIXTURE IS:
3.4 PARTS OF OXYGEN TO 1 PART CHEMTANE 2

CHEMTANE 2: 100 lbs X 8.83 cu.ft. = 883 cu. ft.
883 cu. ft. X 3.4 parts oxygen = 3,002 cu. ft. oxygen consumed

TOTAL OXYGEN CONSUMPTION

ACETYLENE	3,150 cu. ft.
CHEMTANE	2 3,002 cu. ft.

ACETYLENE: 1.5 - 1 PART MIXTURE CHEMTANE 2: 3.4 - 1 PART MIXTURE

ACETYLENE: 2100 cu. ft. divided by 883 cu. ft. CHEMTANE 2 = 2.37 times more acetylene than CHEMTANE 2

ACETYLENE / OXYGEN:
1.5 parts X 2.37 times more gas than CHEMTANE 2 = 3.5 parts of oxygen , total percentage volume compared to 3.4 part of oxygen total percentage volume with CHEMTANE 2

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Chemtane 2 vs. Propylene

Temperature

Chemtane 2 has a flame temperature of 5800+ degrees
Propylene has a flame temperature of 5295 degrees

BTU's

Chemtane 2 takes 4.03 pounds of gas to produce 100,000 BTU's
Propylene takes 4.57 pounds of gas to produce 100,000 BTU's

Flammability

Chemtane 2 has lower flammability units in air at 2.3 - 9.4
Propylene flammability limits in air 2.0 - 11.1

Stability

Chemtane 2 has 120 PSI at 70 degrees. Stable Gas
Propylene has 130 PSI at 70 degrees. Moderately Stable Gas

The lower PSI makes Chemtane 2 less sensitive to shock than Propylene.

Reporting Regulations

Chemtane 2 *does not contain a chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorizations Act of 1986 and 40 CFR Part 372. Propylene is listed as a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40* ***CFR*** *Part 37.*

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Chemtane 2 Versus Natural Gas

Natural Gas

Facts:
Natural Gas cuts 1″ steel at 15″/min.
Natural Gas is consumed at 50 cu. ft./hr.
Natural Gas has 23.6 cu. ft./pound
Pre-Heat Oxygen/Natural Gas Ratio=4.1 to 1

Time:
10,000 cu. ft. gas divided by 50 cu. ft/hr. = 200 hr.
200 hr. x 60 min/hr = 12,000 min.
12,000 min. x 15″/min = 180,000 inches
180,000″ divided by 12″/min = 15,000 ft.

Speed of Cut:
15″/min. cutting 1″ steel
15″/min. = 1.25 ft./min.

Labor Cost:
$16.25/hr.
$16.25/ x 200 hr. = $3,250.00

Natural Gas Cost:
$0.00/gallon
$0.0 divided by 0 lb. in a gallon
$0.0 lb. x 100 lb. cylinder = $.00

Pre-Heat Oxygen Cost:
$0.08/ cu. ft.
10,000 cu. ft. x 4.1 parts = 41,000 cu. ft. oxygen
41,000 cu. ft. oxygen x $0.08/ cu. ft = $3,280.00

Labor Cost:	**$3,250.00**
Cutting Fuel Cost:	**$0.00**
Pre-Heat Oxygen Cost:	**$3,280.00**

Total cost to cut 15,000 feet: $6,530.00

Chemtane 2

Facts:
Chemtane 2 cuts 1″ steel at 20″/min.
Chemtane 2 is consumed at 6 cu. ft./hr.
Chemtane 2 has 8.83 cu. ft./pound
Pre-Heat Oxy/Chemtane 2 Ratio = 3.4 to 1

Time:
15,000 ft. x 12″ = 180,000″
180,000″ divided 20″/min. = 9,000 min.
9,000 min. divided by 60 min. = 150 hrs.

Speed of Cut:
20″/min. cutting 1″ steel
150 hr. x 60 min. x 20″/min. = 180,000 inches
180,000″ divided by 12″/min. = 15,000 ft.

Labor Cost:
$16.25/hr.
$16.25/hr. x 150 hr. = $2,437.50

Chemtane 2 Cost:
$1.21/lb.
150 hr. x 6 cu. ft./hr. = 900 cu. ft.
900 cu. ft. divided by 8,83 cu. ft./hr. = 101.93 lb.
101.93 lb. x $1.21/lb. = $123.34

Pre-Heat Oxygen Cost:
$0.08/cu. ft.
900 cu. ft. x 3.4 mix = 3,060 cu. ft. oxygen
3,060 cu. ft. oxygen x $0.08 cu. ft. = $244.80

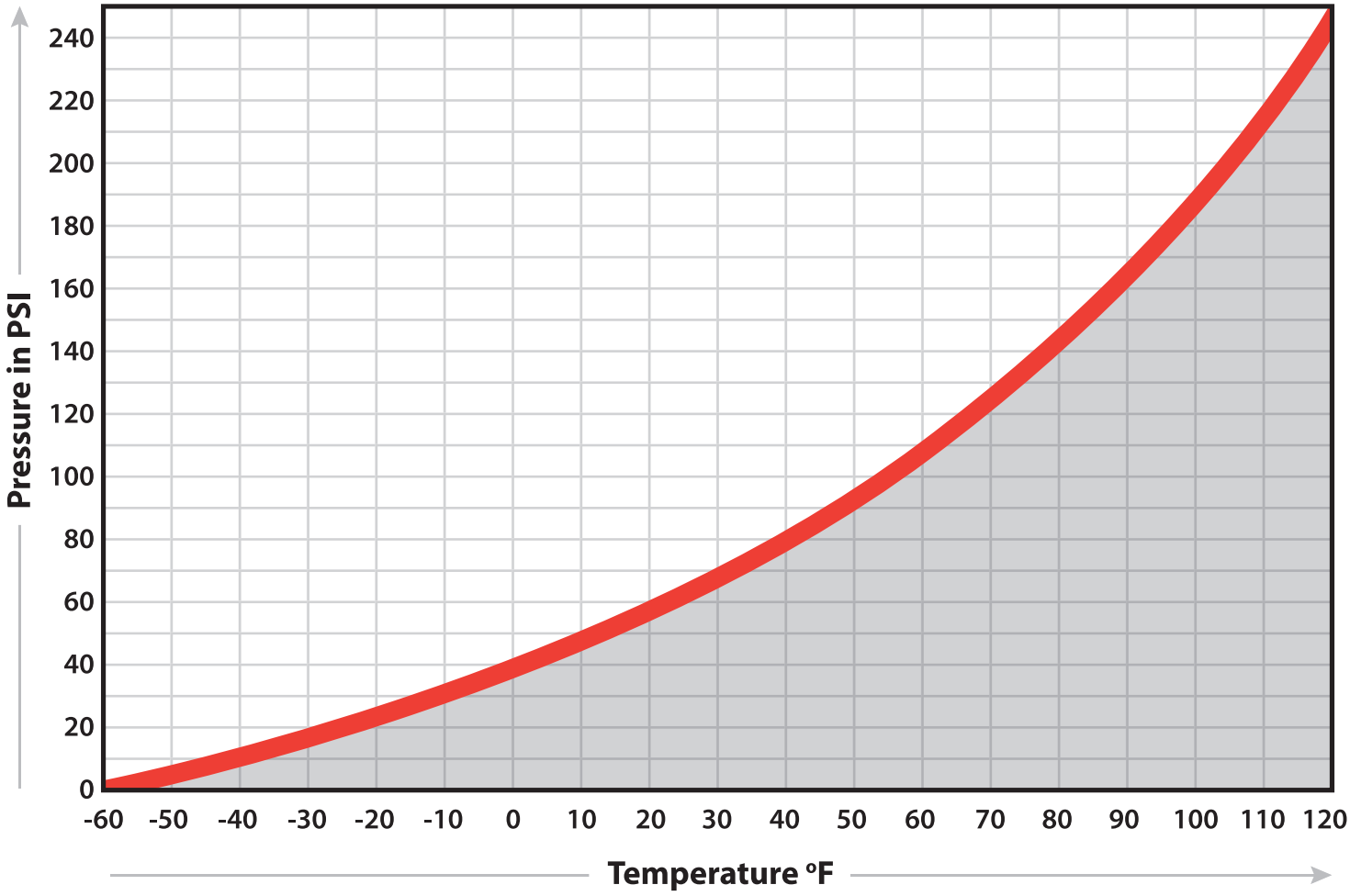
Labor Cost:	**$2,437.50**
Cutting Fuel Cost:	**$123.34**
Pre-Heat Oxygen Cost:	**$244.80**

Total Cost to cut 15,000 feet: $2,805.64

CHEMTANE®

The Cutting Fuel For Cutting Cost

VP Curve for Chemtane 2 Blend



CHEMTANE®

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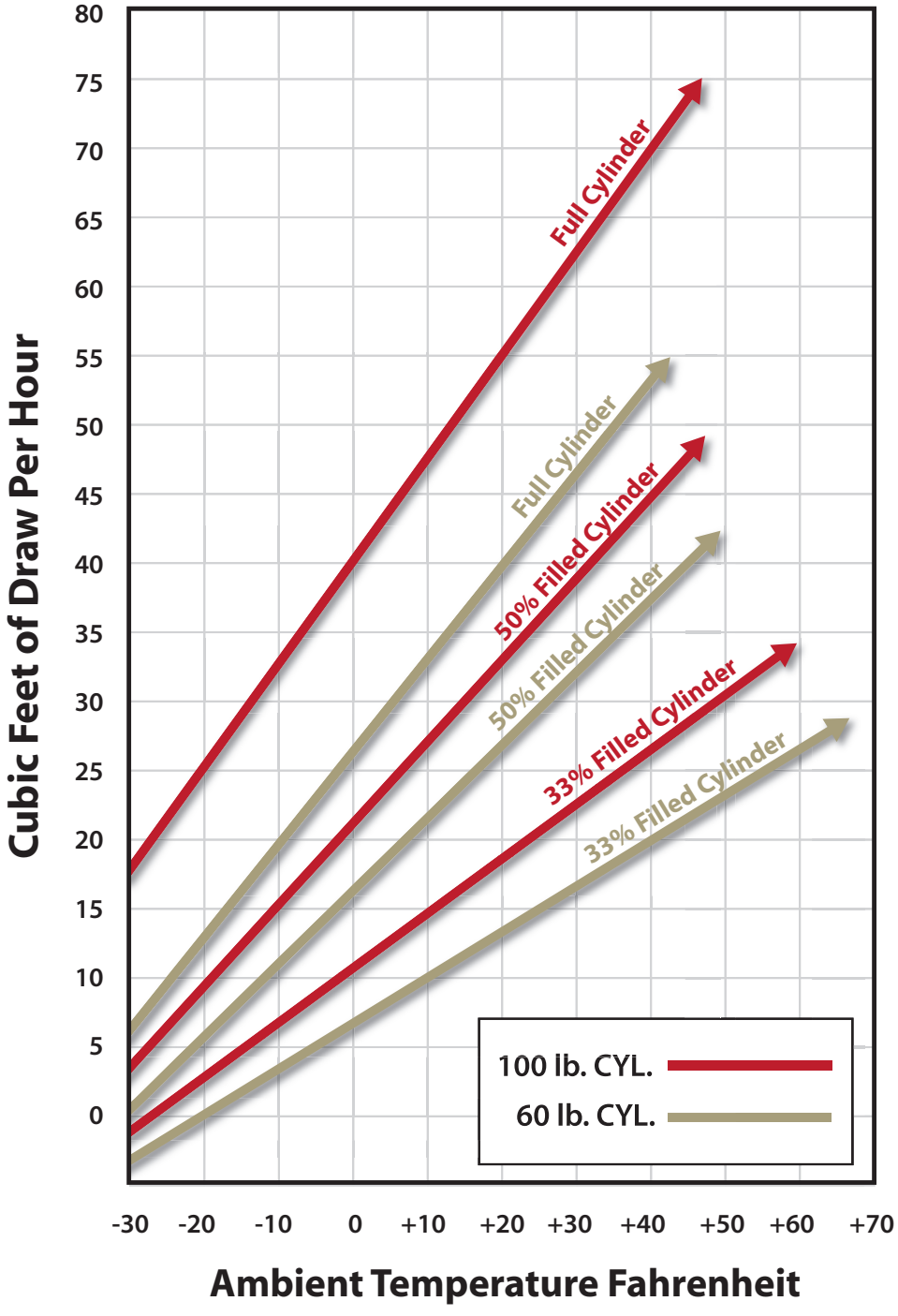
Chemtane 2 Withdrawal Rates

For 60 and 100 Pound Cylinders

Figures are approximate



CHEMTANE®

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Stability of Chemtane 2/Propane Blends Preclude Separation of Components

Abstract

Separation of Chemtane 2 components from Propane does not occur, because Chemtane 2 is a blend of hydrocarbons that are miscible with Propane. Miscible means that the compounds mix in all proportions and at all temperatures. Chemtane 2 components cannot be separated from Propane by simple distillation, because they do not evaporate individually. The individual components do not "freeze out" as solids. The blend of Chemtane 2/Propane is stable and does not require emulsifiers or any additives to maintain stability of the mixture.

Discussion

Chemtane 2, as described in the Safety Data Sheet (SDS), is a blend of hydrocarbons. The hydrocarbon molecules range from five to eight carbons in size. There are both linear and branched hydrocarbon molecules present. Chemtane 2 is fully miscible with Propane. The definition of miscible is capable of mixing in any ratio at all temperatures without separation into phases. Chemical compounds that are not miscible form two phases like oil and water, for example. Oil and water can form a single phase if compounds called emulsifiers are added. The blending of Chemtane 2 components and Propane do not require emulsifiers, because Propane and Chemtane 2 are miscible.

Miscible may also be taken to mean soluble. That is to say Chemtane 2 is soluble in Propane. An example, for illustration, would be to say that ethanol is soluble in water. Two miscible chemicals cannot be separated by normal physical means. They typically form an azeotrope (azeotrope means a liquid mixture characterized by a single constant boiling point). Therefore, the chemicals cannot even be fully separated by normal distillation. Chemtane 2 components in Propane are an azeotropic mixture.

Chemtane 2 is made of hydrocarbon compounds and Propane is a hydrocarbon. When the two are blended together the mixture is a stable blend. They will not separate into individual components when the temperature is lowered or with time. The rule of chemical compatibility is "like dissolves like." For example, oil and gasoline are both hydrocarbons and form a stable blend. Oil is a hydrocarbon, but water is not a hydrocarbon. Oil and water do not form a stable blend. If oil and water are shaken in a bottle the two would blend, somewhat. However, allowed to sit for an hour, the oil and water would separate into two distinct layers. Oil and water do not form a stable blended mixture. Chemtane 2 and Propane form a stable blended mixture.

Respectfully submitted to Chemtane Energy, LLC,

James L. Boucher
Chemist, Chemtane Energy, LLC
Analytical Chemistry; R & D

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The Cutting Fuel For Cutting Cost

Correct Flame Adjustment

When cutting steel with **Chemtane 2** fuel gas, you can obtain the highest quality and the most efficient cuts, when the flame is adjusted properly. This is made possible with the advancements in the quality of cutting tips and a revolutionary cutting fuel gas like **Chemtane 2**.

Following these steps below will help you in adjusting a cutting torch to create the proper flame for flame cutting.

1) Selecting the correct cutting tip for the job is recommended. Following the tip chart provided by the tip manufacture will ensure the correct tip for the job.

2) Setting the correct pressure on the regulators of both the oxygen and the **Chemtane 2** fuel gas is important in ensuring a quality cut. Again follow the tip chart provided by the tip manufacture to select proper oxygen and **Chemtane 2** fuel gas pressure.

3) After the above two steps have been completed, light the cutting torch by cutting on a small amount of **Chemtane 2** fuel gas and a smaller amount of oxygen. This will give you a starting flame from which you can adjust to a perfect cutting flame.

4) Adjust the flame by increasing the **Chemtane 2** fuel gas and oxygen simultaneously until you create a crown like flame close to the tip as seen in the picture below, labeled **Chemtane 2** flame. Normally there will be a slight whistle sound which is caused by the two piece cutting tip.

5) Continue to adjust the flame until you get a well defined flame.

6) When you are ready to make your cut, raise the end of the cutting tip between ¼" to 3/8" above the material being cut.

Chemtane 2 Flame

Acetylene Flame