



Romanoff International Supply Corporation  
9 Deforest Street  
Amityville, NY 11701  
USA  
800.221.7448 (Toll Free-USA Only)  
631.842.0028 (Fax)  
E-mail: Sales@romanoff.com

# HYDROFLUX WELDER INSTRUCTION MANUAL

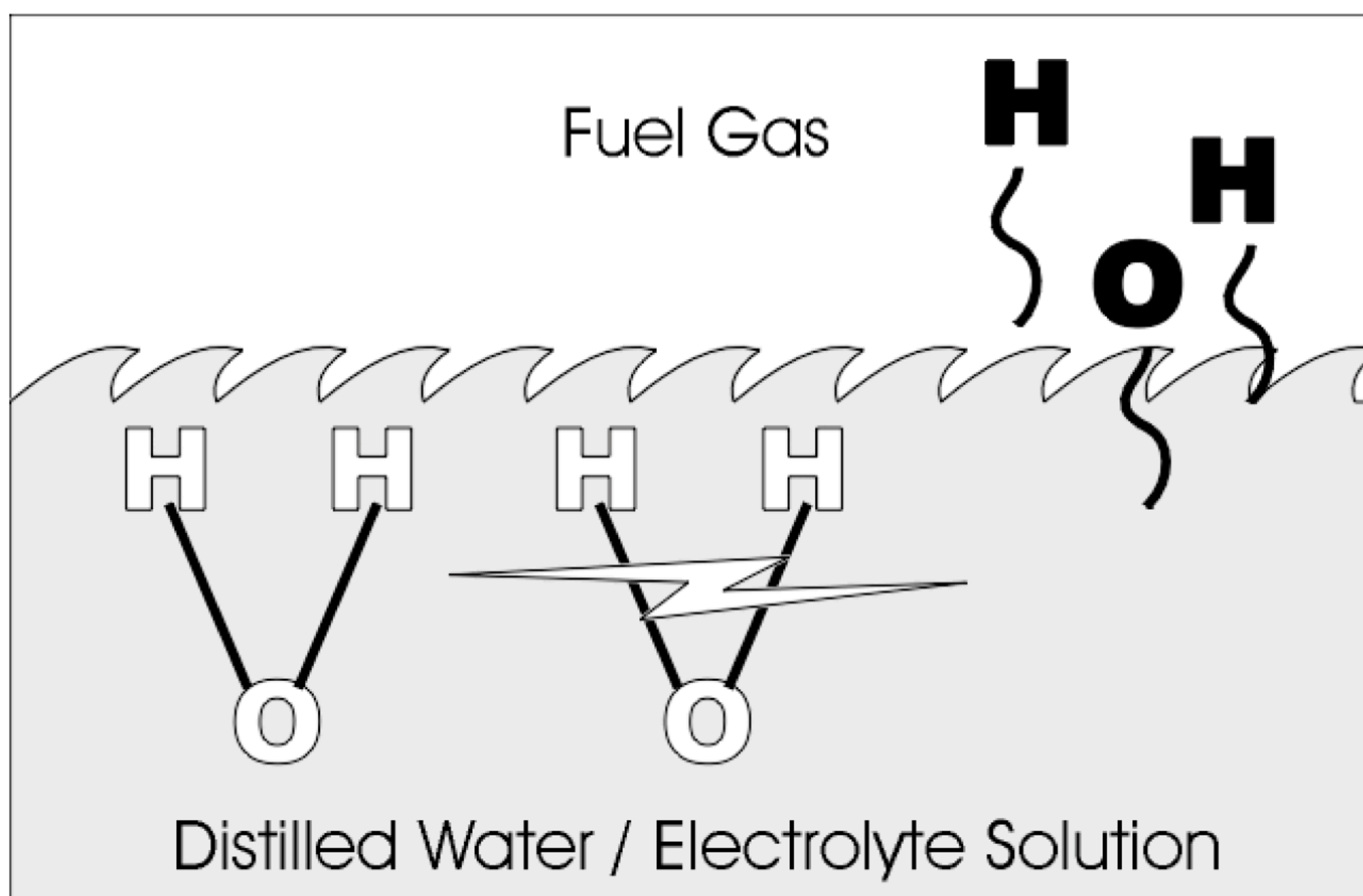
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## HOW THE HYDROFLUX WELDER WORKS

The HydroFlux Welder generates fuel gas by passing an electrical current through distilled water. To improve the electrical conductivity of the water, an electrolyte is added. The name of the electrolyte used in the HydroFlux Welder is Potassium Hydroxide.



*As the electrical current passes through the electrolyte solution, it breaks the bonds between the oxygen and hydrogen atoms of the water molecule and releases them as a mixed gas. The HydroFlux never separates the oxygen and hydrogen gasses. The torch flame burns a mixture of 1 part oxygen and 2 parts hydrogen. The temperature of this flame, without flux, is approximately 5600°F.*

After generation, the gas is passed through a filter that removes any residual moisture from it. Then it is “bubbled” through a flux solution. The flux solution contains methol alcohol and boric acid. As the gas passes through this solution, it picks up some of the alcohol and some of the boric acid in the gas. These chemicals are burned in the flame at the torch tip. The flux serves two purposes. It lowers the temperature of the flame to approximately 4850°F while increasing the BTU value of the flame. The boric acid is carried in the flame to the article being soldered. This helps protect the parts being soldered from excessive fire-scale. However, it is very important to note that the fluxing effect of the HydroFlux Welder is usually not sufficient to solder pieces without additional flux. It is always recommended that you use additional flux when soldering to obtain best results.

The HydroFlux Welder comes with 8 different needle tips. By changing the tip size, you can work on a wide variety of pieces and precisely control how much heat is applied to your work.

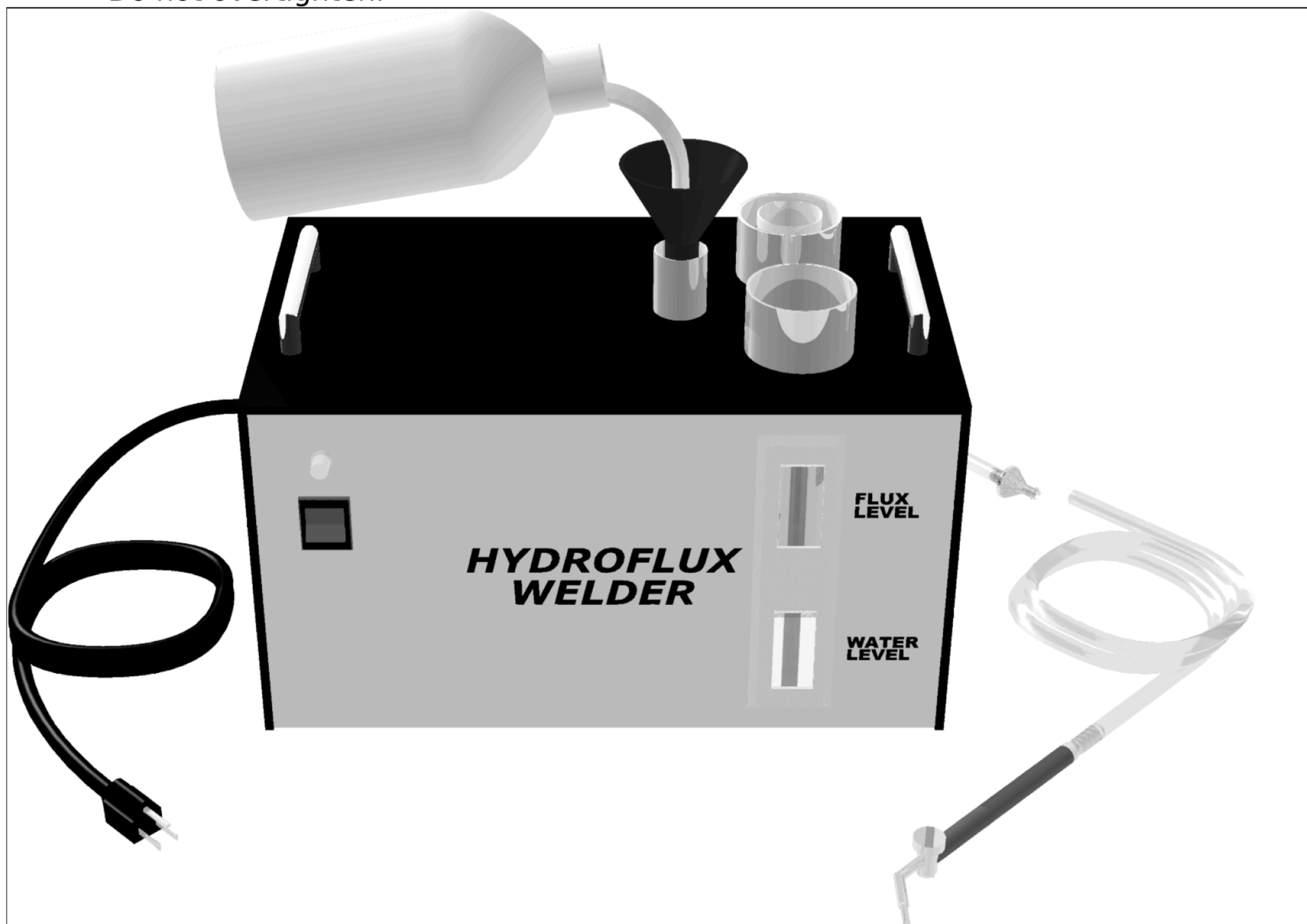


## 4. Adding the Electrolyte Solution

### **\*\*CAUTION\*\***

*The electrolyte is highly caustic and should always be handled using protective equipment such as rubber gloves and safety glasses or goggles, and protective clothing. When handling the electrolyte solution, be careful not to spill any. The electrolyte may damage any finished surfaces, clothing, etc. Electrolyte is highly corrosive to many metals, including copper, brass, zinc and aluminum, and reacts violently with acids. Electrolyte destroys human tissue on contact. It is odorless and colorless. Please refer to the Material Safety Data Sheet at the end of this manual for more specific health and safety information.*

- Put on **safety glasses, gloves** and **protective clothing**.
- Move, or cover up anything that may be damaged by spilled electrolyte.
- Check the drain plug on the side of the unit to make sure the plug is tight.
- Unscrew the cap from the electrolyte chamber (the small cap).
- Using a plastic funnel, slowly pour the solution into the *DISTILLED WATER CHAMBER*.
- Carefully wipe up any electrolyte spills with a clean paper towel.
- Pour the entire bottle of electrolyte into the *DISTILLED WATER CHAMBER*.
- After filling the chamber, rinse the funnel with clean water and dry.
- Do not use the funnel for any other application. Store the funnel for future use.
- Rinse the electrolyte bottle in clean water. Replace cap and dispose in garbage. **DO NOT REUSE ELECTROLYTE BOTTLE!**
- Replace the stainless steel cap on the *DISTILLED WATER CHAMBER*. Tighten until snug. Do not overtighten.







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## Using The HydroFlux Welder

1. Make sure the valve on the handpiece is turned clockwise until it is completely off.
2. Choose a needle tip. The larger the tip, the greater the heat applied to the article being soldered.
3. To attach a tip, firmly press the tip onto the end of the torch handpiece and give a half turn. The friction will hold the tip firmly in place.
4. Check the level in the Distilled Water Chamber using the dipstick. The Distilled Water Level should be between the minimum and maximum mark on the dipstick. **\*IMPORTANT\* DO NOT RUN THE UNIT IF THERE IS INSUFFICIENT DISTILLED WATER!! SERIOUS DAMAGE TO THE HYDROFLUX WELDER WILL RESULT AND ALL WARRANTIES WILL BE VOID.** If needed, carefully add distilled water as needed to bring the level between the minimum and maximum marks. **DO NOT OVERFILL!**
5. If using the Flux Solution, check the level gauge on the front of the unit. Add flux as needed, but keep the level closer to the minimum mark.
6. Make sure that all the caps are snug
7. Turn the unit on. The power switch is on the upper left side of the front of the unit. The light should go on indicating that the unit is producing gas. After a few seconds, when the unit has built pressure, the light should go off.
8. Open the valve on the handpiece one full turn. Run without a flame for 30 seconds to bleed any entrapped air. Close the valve, wait 30 seconds and repeat. **\*CAUTION\*** do not bleed lines near an open flame - gas is present.
9. Open the valve one full turn. Using a "sparker" or other lighting device, carefully light the torch, making sure that it is facing away from you or any flammable surfaces. ***Never light the torch without a needle tip in place!!!*** If the torch does not light right away, try decreasing or increasing the pressure by closing or opening the valve on the handpiece. The flame should be bright green. Note: using a cigarette lighter to light the torch can be dangerous. There is a possibility that the lighter could explode if the flame from the torch comes too close to it. A sparker or other torch-lighting device is the safest means of lighting the HydroFlux.
10. Try changing tips. Turn the valve on the handpiece off using a smooth consistent motion. Do not close the valve slowly, as the flame may burn back into the tip. Occasionally, the torch may make a popping or snapping noise when it is extinguished. This is normal. Once the flame has shut off, remove the needle tip by twisting and gently pulling. Put on a new needle and light it as shown above. Notice that when a small tip (larger gauge) is on, the generator light cycles on and off much faster than when a large tip (smaller gauge) is on. This is because the large tips use more gas and the HydroFlux has to keep up with it.
11. When shutting the machine off, always extinguish the flame first by closing the valve on the handpiece, then turn off the power switch. **When the machine is off, open the handpiece to bleed any residual pressure from the system.** Be sure to close the handpiece when finished.





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## CHANGING THE ELECTROLYTE SOLUTION

Depending on your use, the electrolyte may last for up to 1 year. We recommend changing the electrolyte at least each year to keep the unit operating at peak performance. When changing the electrolyte, the flux solution and filter material also must be changed. You will know the electrolyte needs to be changed when:

1. The flame becomes weaker
2. The pressure drops
3. The unit does not generate any gas

You will need:	
Rubber gloves	Turkey baster or large syringe
Eye protection	1 quart of electrolyte*
Protection for your clothing	Clean filter material*
Drop cloth or safe work area	Fresh flux*
Plastic bucket	Replacement rear check valve*
Plastic funnel	Warm distilled water

*\*All replacement parts are available through the distributor from whom you purchased your HydroFlux Welder.*

### To change the electrolyte:

**\*\*CAUTION\*\*** The electrolyte is highly caustic and should always be handled using protective equipment such as rubber gloves and safety glasses or goggles. When handling the electrolyte solution, be careful not to spill any. The electrolyte may damage any finished surfaces, clothing, etc. Electrolyte is highly corrosive to many metals, including copper, brass, zinc and aluminum, and reacts violently with acids. Electrolyte destroys human tissue on contact. It is odorless and colorless.

1. Unplug the unit. Put on protective equipment.
2. Remove all caps.
3. Use the turkey baster to remove all flux and discard in accordance with all applicable regulations. Wipe the inside of the chamber dry.
4. Remove all dryer filter material and discard. If there is any moisture in the dryer chamber suction it out and wipe dry.
5. Place the plastic bucket under the drain plug. If possible, place the bucket close enough to avoid splashing. The electrolyte is a highly caustic material. See the MSDS at the end of this manual for safety and health precautions.
6. Raise the drain plug by tilting the unit. Open the drain plug with the wrench or pliers. Take care that the plug does not fall into the bucket. After a few turns with the wrench it should be only finger-tight. Remove the plug. It is **EXTREMELY IMPORTANT THAT YOU WEAR SAFETY GLASSES, GLOVES AND PROTECTION FOR YOUR CLOTHING DURING THIS STEP! ELECTROLYTE IS CAUSTIC AND WILL IMMEDIATELY DAMAGE YOUR SKIN.**
7. Lower the unit and allow the chamber to drain. The electrolyte should be a muddy-brown to black color. Tip the unit slightly to facilitate draining.





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**Solutions**

?	<b>WHEN I FIRST TURNED ON MY HYDROFLUX, IT SEEMED TO BE RUNNING HOT.</b>
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This is normal for a new unit or one that has not been used in some time. The components of the unit are going through a 'breaking in' period that should not affect the performance of the unit. If this condition persists for more than two weeks of normal use, please contact our technical sales department.

?	<b>THE HOSE TO THE HANDPIECE FILLS UP WITH LIQUID</b>
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This liquid is flux solution that has evaporated from the flux chamber and recondensed in the hose. It does not cause any serious problems, but it should be drained from the hose periodically. The handpiece hose can be drained by first extinguishing the flame at the handpiece, then disconnecting the hose either from the back of the handpiece, or at the check valve on the hose. The fluid can be drained from the open end of the hose. Once the hose has been drained and is dry, reconnect the tubing. Open the valve on the handpiece and let the gas run for a few moments. This will vent any air that got into the line during cleaning. You can then resume use.

This problem occurs most frequently when the HydroFlux is running hotter than normal. This causes the gas to pick up more flux solution, which condenses when it hits the cooler air outside the unit. The HydroFlux may run hot for several reasons:

1. The unit is new and is still 'breaking in', this condition may last for two weeks of use.
2. The unit is plugged into a circuit with fluctuating line voltage. Because of this the HydroFlux must work harder to generate gas, producing more heat. For best results the HydroFlux should be installed on a dedicated grounded 110 volt, 60 Hz electrical line, although this is not always practical in a small shop.
3. The electrolyte is old and needs to be changed, or has been diluted with too much distilled water when filling. Old or diluted electrolyte makes the HydroFlux work harder to generate gas, which builds up heat. If the electrolyte has been changed recently, then this is probably not the problem. If the distilled water has been overfilled, but the unit is still generating enough gas to produce a flame, you can burn off the excess distilled water.

?	<b>OVERFILLING THE DISTILLED WATER CHAMBER</b>
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If the distilled water chamber should accidentally be overfilled, it will be necessary to completely flush the HydroFlux Welder. Follow the directions given under Changing The Electrolyte.

Do not siphon excess liquid from the machine. Do not attempt to partially drain the machine. Go immediately to the flushing procedure.

?	<b>OVERFILLING THE FLUX CHAMBER</b>
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The most obvious symptom of this is liquid in the hose line that connects to the handpiece.



4. *Gas generator overheated and delivering water vapor to the torch tip.*

Turn unit off for a few minutes to allow it to cool. Check that the ventilation slots are not blocked. Check that the fan is still running.

?	<b>THE TORCH TIP IS SPITTING OR OVERHEATING</b>
---	---

*Spitting of liquid from a torch tip during operation is often, but not always, associated with overheating of the gas generator. Possible causes of such overheating are:*

1. Distilled water chamber overfilled with distilled water;
2. Too high a line voltage;
3. Contaminated electrolyte;
4. Corroded electrical connections inside the gas generating chamber;
5. High resistance short circuit inside gas generating chamber;
6. Operating environment too hot;
7. Fan failure;
8. Distilled water chamber excessively dirty; and/or
9. Power setting too high.

The first thing to check is the filter chamber. Spitting indicates that excess liquid is in the line. Check the filter to see if it has become moist and replace if necessary. The gas generator will generally run pretty hot and a temperature of 160°F on the chamber surface is not unusual. This temperature can be achieved when the gas generator runs continuously at or near full load conditions. At this temperature the gas generator can be expected to deliver some water vapor into the lines along with the oxyhydrogen gas. However, the filter and flux booster will tend to trap this water vapor before it reaches the torch tip. If the filter is wet and is unable to trap all the moisture, it will pass into the flux chamber. The blue flux supplied by the factory will change in color from blue to pink when it has trapped significant quantities of water vapor. The change in color indicates that the flux has become excessively contaminated and that the solution should be cleaned out and replenished with new, clean flux.

When electrolyte in the gas generator becomes even slightly contaminated, especially with flux solution, significant quantities of liquid and water vapor will be emitted from the gas generator at chamber temperatures even lower than 160°F, and the flux chamber will require more frequent cleaning in order to serve effectively as a contaminant trap. Under certain conditions of electrolyte contamination, the chamber temperature can also rise above 160°F, giving a doubly severe boiling condition inside the gas generator cell and the gas generator should then have its electrolyte changed or be returned to the factory for servicing and generator tank clean-out.

Once spitting has occurred, all gas lines and filter elements become wet and will continue to emit liquid through the system until they run themselves dry or until they are dried out by being removed and cleaned. Such removal and cleaning is only a temporary corrective measure unless the cause of the vapor emission from the generator tank is also eliminated.

Corrective measures for each of the above are described elsewhere in this manual under appropriate headings. A thorough study of the manual should be made to gain an overall understanding of the various causes and their respective corrective measures.





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MATERIAL SAFETY DATA SHEET  
**POTASSIUM HYDROXIDE**

I. PRODUCT IDENTIFICATION

<u>CHEMICAL NAME</u>	Potassium Hydroxide	<u>SYNONYMS</u>	Caustic Potash, Flake
<u>PRODUCT NAME</u>	Potassium Hydroxide	<u>CAS NUMBER</u>	1310-58-3
<u>CHEMICAL FAMILY</u>	Alkaline Hydroxides	<u>FORMULA</u>	K O H

II. HAZARDOUS INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>	<u>CONCENTRATION</u>	
				<u>SOLID</u>	<u>LIQUID</u>
Potassium Hydroxide	1310-58-3	2 mg/cm <sup>3</sup>	2 mg/cm <sup>3</sup>	85-100 %	12.5-15.0%
Potassium Carbonate	584-8-7	None Known	None Known	0-1.5 %	0-0.25 %
Sodium Hydroxide	1310-73-2	2 mg/cm <sup>3</sup>	2 mg/cm <sup>3</sup>	0-0.5 %	0-0.10%
Water	7732-18-5	None Known	None Known	0-15%	85-90%

III. PHYSICAL PROPERTIES

<u>PHYSICAL FORM</u>	Solid Flake, or Liquid	<u>VISCOSITY</u>	No Data Available
<u>COLOR</u>	White Flake/ Clear liquid	<u>SOLUBILITY IN WATER</u>	53% at 20°C (68°F)
<u>ODOR</u>	None	<u>SPECIFIC GRAVITY</u>	No Data Available
<u>MOL. WEIGHT</u>	56.10	<u>BULK DENSITY</u>	2.04 (g/cc)
<u>pH</u>	@ 25°C Not Applicable	<u>VAPOR PRESSURE</u>	No Data Available
<u>BOILING POINT</u>	1320°C (2408°F)	<u>EVAPORATION RATE</u>	No Data Available
<u>MELTING POINT</u>	360-380°C (680-716°F)	<u>% VOLATILE</u>	No Data Available

IV. FIRE AND EXPLOSION DATA

<u>FLASH POINT</u>	Not Applicable	<u>UPPER EXPLOSIVE LIMIT</u>	Not Applicable
<u>TEST CUP METHOD</u>	Not Applicable	<u>LOWER EXPLOSIVE LIMIT</u>	Not Applicable
<u>FLAMMABLE</u>	No	<u>AUTO-IGNITION TEMP</u>	Not Applicable
<u>COMBUSTIBLE</u>	No	<u>EXTINGUISHING MEDIA</u>	All Extinguishing Media

SPECIAL FIREFIGHTING PROCEDURES Wear self-contained breathing apparatus

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not combustible by itself. Contact with water can generate sufficient heat to ignite combustible materials. Contact with some metals can generate flammable hydrogen gas.

V. HUMAN HEALTH DATA

ROUTE(S) OF ENTRY Eyes, Skin, Inhalation and Ingestion

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

<u>INHALATION</u>	May cause severe burns or deep ulcerations of respiratory tract. Inhalation of high concentrations can result in permanent lung damage.
<u>INGESTION</u>	Irritation and/or burns may occur to entire gastrointestinal tract, characterized by nausea, vomiting,





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SPILL OR LEAK RESPONSE

Utilize recommended protective clothing and equipment. Sweep up spill/leak and place in clean, dry containers. Avoid dispersing dust into air.

WASTE DISPOSAL

Check Federal, State, and local environmental regulations. Prevent wash water from entering ground water. Hazardous concentrations in air may be found in local spill area. This product may represent an explosion hazard if liquefied and in contact with some metals. Remove all sources of ignition.

X. SPECIAL PRECAUTIONS AND STORAGE DATA

STORAGE TEMPERATURE

No data available.

SHELF LIFE

No limitation if tightly sealed.

SPECIAL SENSITIVITY

No data available.

HANDLING & STORAGE

Maintain safe housekeeping practices.

PRECAUTIONS

Do not store above 54°C (130°F)

XI. SHIPPING INFORMATION

D.O.T. SHIPPING NAME

Potassium Hydroxide, Solid

HAZARD CLASS

8

U.N. NUMBER

1,813

PACKING GROUP

II

LABELS

Corrosive

R Q ENTRY REQUIRED

Yes

XII. ANIMAL TOXICITY DATA

ORAL LD 50

365 mg/jg (RAT)

DERMAL LD 50

>2 g/kg (RABBIT)

INHALATION LD 50

No data available

SKIN EFFECTS

Causes burns

SENSITIZATION

No data available

EYE EFFECTS

Causes burns

OTHER TOXICITY

SUBCHRONIC TOXICITY

No data available

CHRONIC TOXICITY

No data available

AQUATIC TOXICITY

Rating: 2 (TLM96: 100-10ppm)

OTHER TOXICITY DATA

(TLM96: 100-10ppm): Trout 50ppm; Bluegills 56ppm; Lepomis Pallidus (minnows) 28ppm

XIII. FEDERAL REGULATORY INFORMATION

OSHA STATUS

Hazardous

TSCA STATUS

Listed on TSCA inventory

CERCLA RQ

1000 Lbs

RCRA STATUS

Not hazardous waste in purchased form





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MATERIAL SAFETY DATA SHEET  
METHYL ALCOHOL FLUX SOLUTION

I. PRODUCT IDENTIFICATION

<u>CHEMICAL NAME</u>	Methanol	<u>CHEMICAL FAMILY</u>	Alcohols
<u>COMMON SYNONYMS</u>	Methyl Alcohol; Wood Alcohol; Carbinol; Methylol; Wood Spirit		
<u>FORMULA</u>	CH <sub>3</sub> OH	<u>FORMULA WEIGHT</u>	32.04
<u>CAS No.</u>	67-56-1	<u>NIOSH/RTECS No.</u>	PC1400000
<u>PRODUCT USE:</u>	Rectifying Solution		

II. HAZARDOUS INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>	<u>CONCENTRATION</u>
Methanol	67-56-1	200 ppm	200 ppm	90-100 %
Boric Acid	10043-35-3	None Established	None Established	0-10 %
Blue Coloring	None Known	None Established	None Established	.05-.5 %

III. PHYSICAL PROPERTIES

<u>PHYSICAL FORM</u>	Liquid	<u>SPECIFIC GRAVITY</u>	0.79 (H <sub>2</sub> O=1)
<u>COLOR &amp; ODOR</u>	Blue, Pungent Odor	<u>VAPOR DENSITY</u>	1.11 (air=1)
<u>BOILING POINT</u>	65°C (149°F)	<u>VAPOR PRESSURE</u>	(mmHg): 96@20°C
<u>MELTING POINT</u>	-98°C (-144°F)	<u>EVAPORATION RATE</u>	4.6 (butyl acetate =1)
<u>SOLUBILITY IN WATER</u>	100%	<u>% VOLATILE</u>	100 %

IV. FIRE AND EXPLOSION DATA

<u>FLASH POINT</u>	12°C (54°F)	<u>UPPER EXPLOSIVE LIMIT</u>	36.0 %
<u>TEST CUP METHOD</u>	Closed Cup	<u>LOWER EXPLOSIVE LIMIT</u>	6.0 %
<u>FLAMMABLE</u>	Yes	<u>AUTO-IGNITION TEMP</u>	463°C (867°F)
<u>COMBUSTIBLE</u>	Yes	<u>EXTINGUISHING MEDIA</u>	All Extinguishing Media
<u>SPECIAL FIREFIGHTING PROCEDURES</u>	Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in a positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.		
<u>UNUSUAL FIRE AND EXPLOSION HAZARDS</u>	Vapors may flow along surfaces to distant ignition sources and flash back. Closed containers exposed to heat may explode. Contact with strong oxidizers may cause fire. Burns with a clear, almost invisible flame.		
<u>TOXIC GASSES PRODUCED</u>	Carbon Monoxide, Carbon Dioxide, Formaldehyde		
<u>EXPLOSION DATA- SENSITIVITY TO MECHANICAL IMPACT</u>	None Identified	<u>EXPLOSION DATA- SENSITIVITY TO STATIC DISCHARGE</u>	Yes

V. HUMAN HEALTH DATA

ROUTE(S) OF ENTRY Eyes, Skin, Inhalation and Ingestion

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

<u>INHALATION</u>	Inhalation is harmful and may be fatal. Headache, nausea, vomiting, dizziness, narcosis, respiratory failure, low blood pressure, and central nervous system depression may occur.
<u>INGESTION</u>	Ingestion is harmful and may be fatal. Blindness, headache, nausea, vomiting,





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well-ventilated, flammable liquid storage area.  
PRECAUTIONS Bond and ground containers when transferring liquid

XI. SHIPPING INFORMATION

D.O.T. SHIPPING NAME Methanol  
HAZARD CLASS 3  
U.N. NUMBER UN1230, Reportable Quantity: 5000 Lbs.  
PACKING GROUP II  
LABELS 3 Flammable Liquid

XII. ANIMAL TOXICITY DATA

ORAL LD 50 5628 mg/k (RAT)  
INTRAPERITONEAL LD 50 9540 mg/k (RAT)  
SUBCUTANEOUS LD 50 9800 mg/kg (MOUSE)  
SKIN LD 50 20 g/kg (RABBIT)

XIII. FEDERAL REGULATORY INFORMATION

OSHA STATUS Hazardous  
TSCA STATUS Listed on TSCA inventory  
CERCLA RQ 5000 Lbs  
RCRA STATUS Not hazardous waste in purchased form

SARA TITLE III

S302 EHS RQ None established  
S302 EHS TPQ None established  
S313 TOXIC CHEMICALS Yes, Methanol  
S311/312 HAZARD CATEGORIES Acute: Yes, Chronic: Yes, Flammability: Yes, Pressure: No, Reactivity: No