

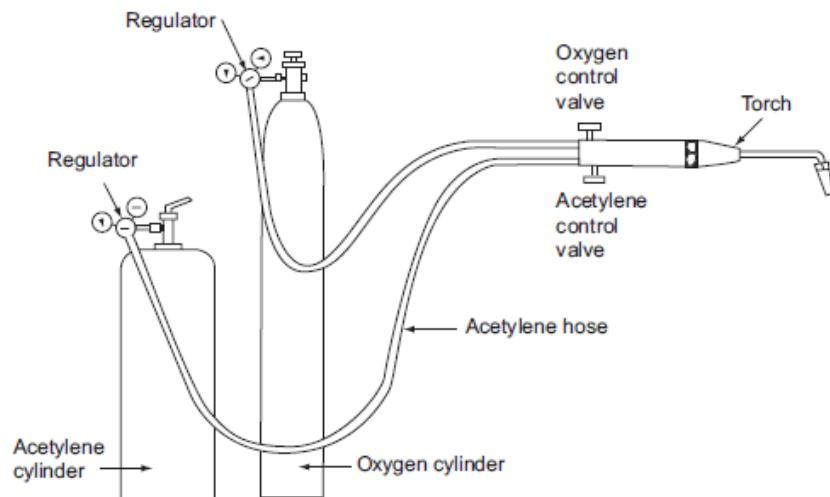
GAS WELDING

- As the name implies, gas welding also called as oxy-fuel gas welding (OFW), derives the heat from the **combustion of a fuel gas** such as acetylene in combination with oxygen.
- The process is a fusion welding process wherein the joint is completely melted to obtain the fusion. The heat produced by the combustion of gas is sufficient to melt any metal and as such is universally applicable.
- The fuel gas generally used is acetylene because of the high temperature generated in the flame. This process is called **oxy-acetylene welding (OAW)**.



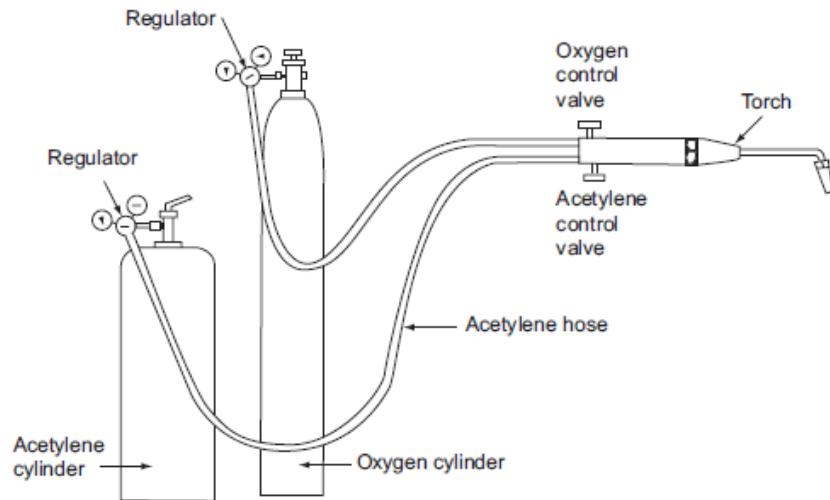
GAS WELDING

- A typical oxy-acetylene welding outfit contains the supply units for oxygen and acetylene with associated regulators and the torch which mixes the two gases before they are ignited.
- Free acetylene is highly explosive, if stored at a pressure more than 200 kPa, where it becomes very unstable and likely to explode. Hence, acetylene needs to be carefully stored in a strong cylinder, filled with 80 to 85% porous material such as calcium silicate and then filled with acetone.
- Acetylene would be released from acetone at a slow rate and thus would not form any pockets of high pressure acetylene.
- It is also possible to have an acetylene generator in the place of an acetylene cylinder. Acetylene is normally produced by a reaction between calcium carbide and water which is instantaneous.



GAS WELDING

- The oxygen and acetylene from the two cylinders are brought through separate hose pipes to the welding torch.
- In the torch the two gases are mixed and then flowed out through the nozzle at the torch tip.
- To light the flame, the acetylene valve on the torch is opened slightly and lighted with the help of a friction spark lighter.
- Then the acetylene valve is opened to get the required flow of acetylene. The oxygen valve is then slowly opened. The actual adjustment of the flame depends on the type of material to be joined.

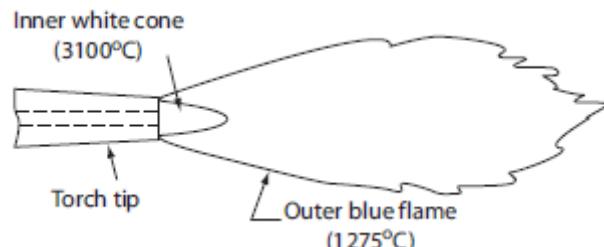


GAS WELDING

- In all the oxy-fuel gas welding processes, the combustion takes place in two stages.
- The first reaction takes place when the fuel gas such as acetylene and oxygen mixture burn releasing intense heat. This is present as a small white cone.
- For the oxy-acetylene welding, the following reaction takes place in this zone.



- The carbon monoxide (CO) and hydrogen produced in the first stage further combine with the atmospheric oxygen and give rise to the outer bluish flame, with the following reaction.



GAS WELDING – TYPES OF FLAMES

- A certain amount of oxygen is required for complete combustion of fuel gases. When the oxygen supply varies, the flame appearance obtained would also vary.
- **Neutral Flame:** In neutral flame all the acetylene present is completely burned and thus all the available heat in the acetylene is released. Thus, this is the most desirable flame to be used in oxy-acetylene welding.

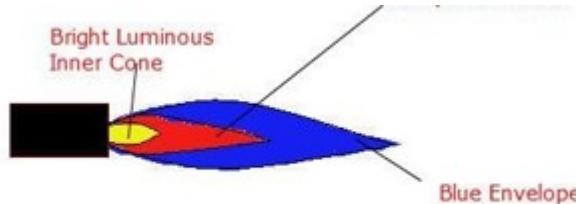


GAS WELDING – TYPES OF FLAMES

Reducing (Carburising) Flame: When less oxygen is provided, part of the combustible matter is left as it is and it results in a **reducing or carburising** flame.

This flame is similar to the neutral flame, only with the addition of a third phase in between the outer blue flame and the inner white cone. It is called '**intermediate flame feather**' which is reddish in colour. The length of the flame feather is an indication of the excess acetylene present.

The carburising flame is not suggested for general use. However, since this flame provides a strong reducing atmosphere in the welding zone, it is useful for those materials which are readily oxidised, for example, oxygen free copper alloys. It is also used for high carbon steels, cast irons and hard surfacing with high speed steel and cemented carbides.



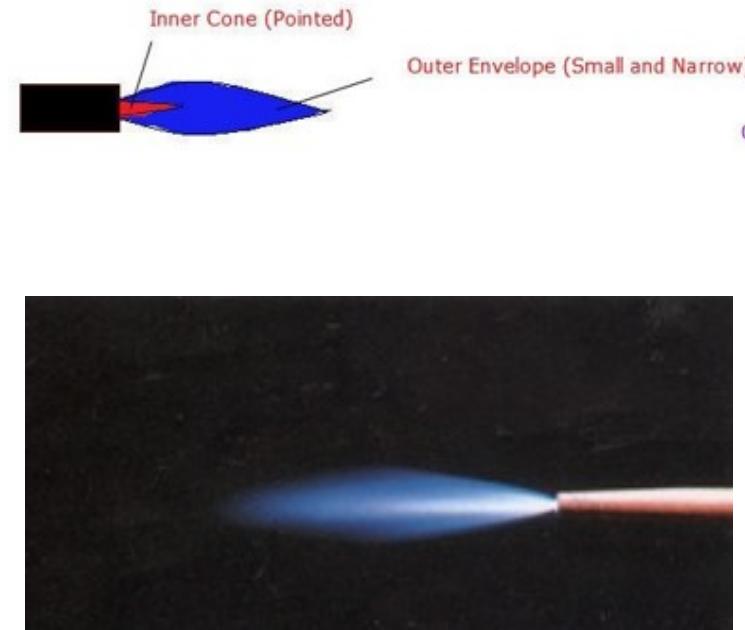
GAS WELDING – TYPES OF FLAMES

Oxidising Flame: When oxygen is in excess, it is called the **oxidising flame**.

The flame is similar to the neutral flame with the exception that the inner white cone is somewhat small, giving rise to higher tip temperatures (3300°C).

There is an excess amount of oxygen present in the flame which badly oxidises the weld metal.

This flame would be useful for welding some non-ferrous alloys such as copper base alloys and zinc base alloys.



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