GAS WELDING PROCESS, FLAME CHARACTERISTICS

ME 8351 Manufacturing Technology I
Unit -1 Casting and Joining Processes
II Year /III Semester
Mechanical Engineering

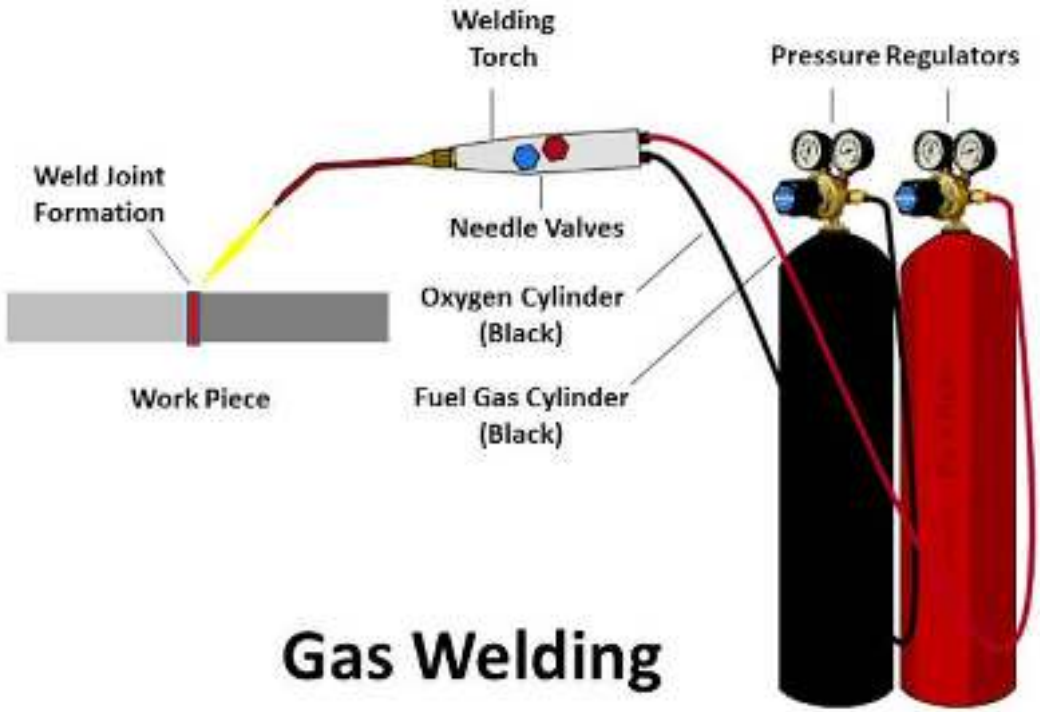
GAS WELDING PROCESS

- Gas Welding is a welding process utilizing heat of the flame from a welding torch.
- The torch mixes a fuel gas with Oxygen in the proper ratio and flow rate providing combustion process at a required temperature.
- The hot flame fuses the edges of the welded parts, which are joined together forming a weld after Solidification.

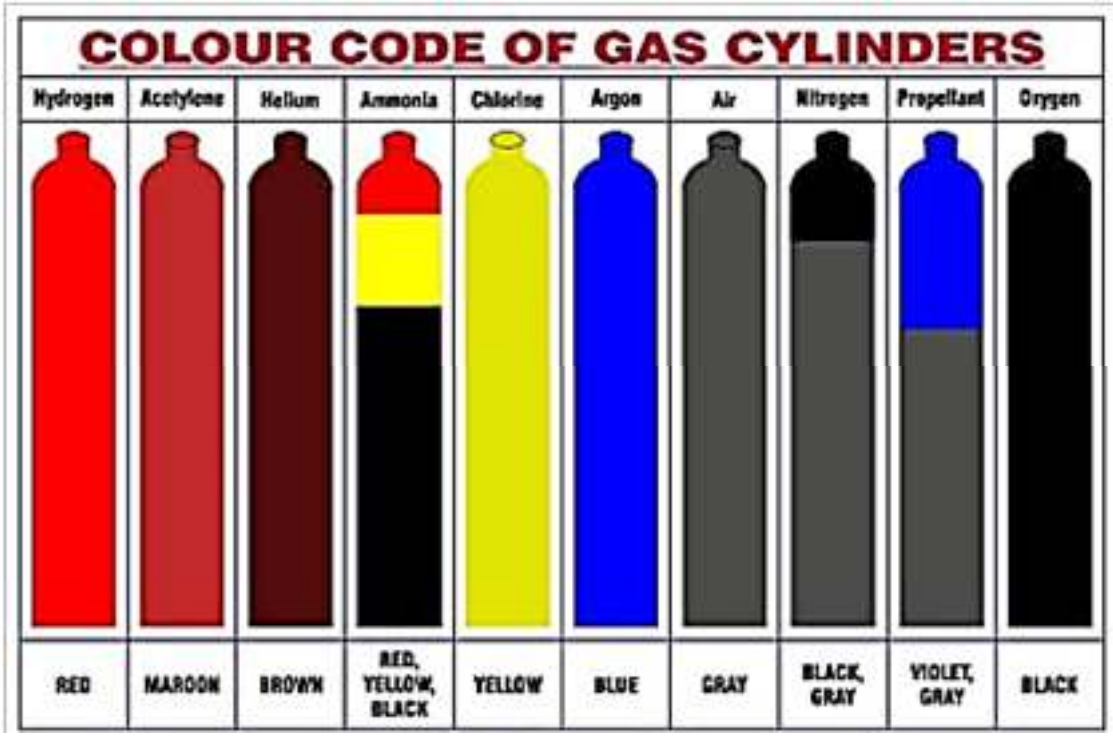
GAS WELDING EQUIPMENT

- Fuel gas cylinder with pressure regulator;
- Oxygen cylinder with pressure regulator;
- Welding torch;
- Blue oxygen hose;
- Red fuel gas hose;
- Trolley for transportation of the gas cylinders.

GAS WELDING EQUIPMENT



GAS CYLINDER COLOUR CODE



PRINCIPLE OF GAS WELDING

Oxyacetylene flame has a temperature of about 6000°F (3300°C). Combustion of acetylene proceeds in two stages:

1. Inner core of the flame. $C_2H_2 + O_2 = 2CO + H_2$

2. Outer envelope of the flame: $CO + H_2 + O_2 = CO_2 + H_2O$

WELDING TORCH

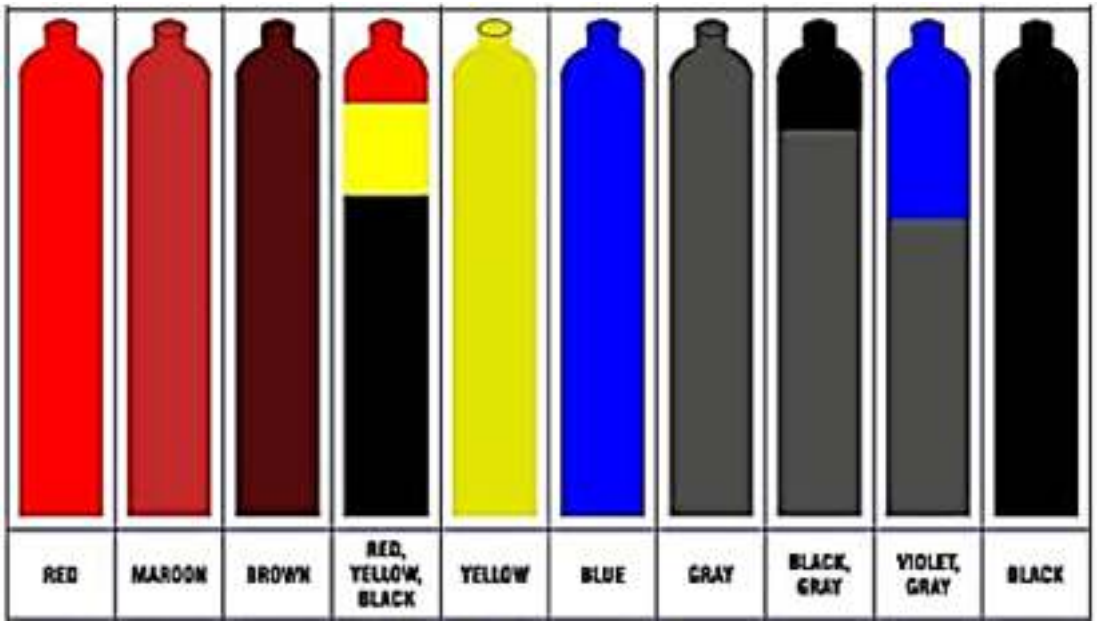
- Both the fuel gas and oxygen at suitable pressure fed through hoses to the welding torch.
- There are valves for each gas witch control the flow of gases inside the torch.
- Both gases mixed there and form a flammable mixture. These gases ignite to burn at the nozzle.

PRESSURE REGULATOR

- Both oxygen and fuel gases are filled in cylinder at high pressure.
- These gases cannot be used at this high pressure for welding work so a pressure regulator is used between flow.
- It supplies oxygen at pressure about 70 – 130 kN / m^2 and gas at 7 – 103 kN / m^2 to the welding torch.

ASSESSMENT-1

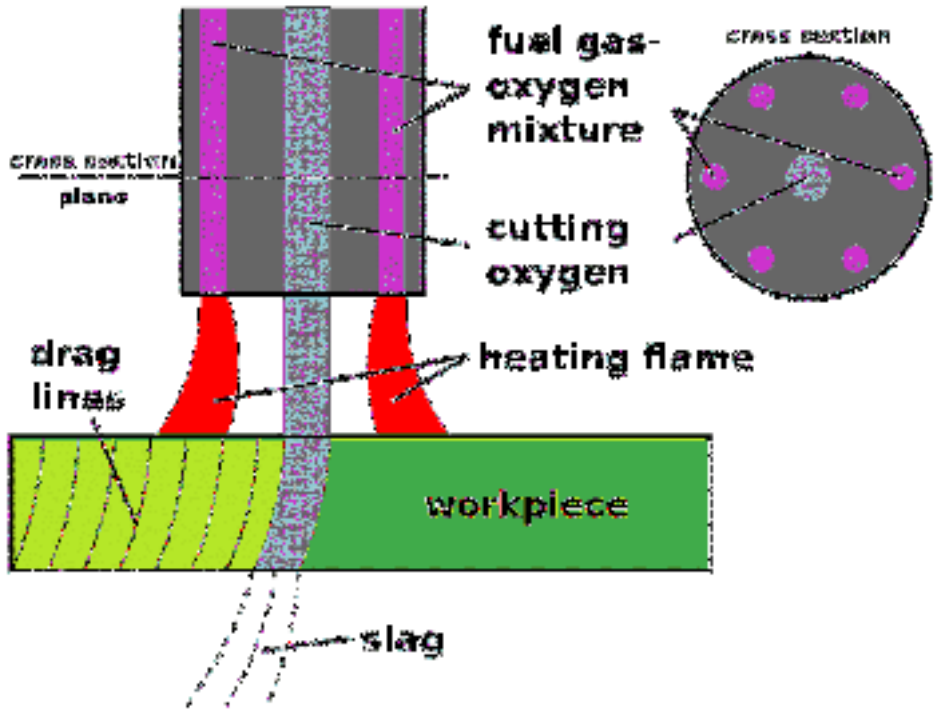
Identify the types of gas filled in each cylinder



WELDING GOGGLES AND GLOVES

WORKING PRINCIPLE OF GAS WELDING

- The metal pieces to be welded together are heated to required temperature to melt and then a filler is added to the melted metal in order to create a strong connection. The oxygen and the fuel is mixed to create a flame which then can be directed along the metal to create the desired effect.
- The torch is moved by hand to help control the process and final result.



FLAME CHARACTERISTICS

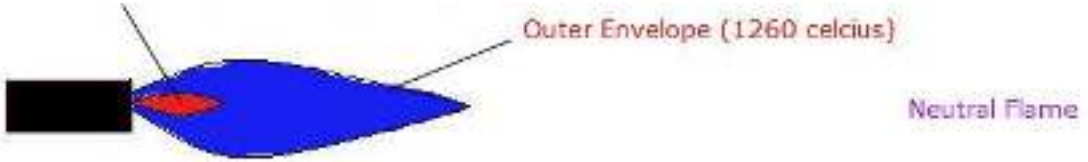
NEUTRAL FLAME

- The neutral flame has a one-to-one ratio of acetylene and oxygen.
- It obtains additional oxygen from the air and provides complete combustion.
- The neutral flame has a clear, well-defined, or luminous cone indicating that combustion is complete.
- There are two clearly defined zones in the neutral flame. The inner zone consists of a luminous cone that is bluish-white. Surrounding this is a light blue flame envelope or sheath.
- In the neutral flame, the temperature at the inner cone tip is approximately 5850°F (3232°C), while at the end of the outer sheath or envelope the temperature drops to approximately 2300°F (1260°C).

NEUTRAL FLAME

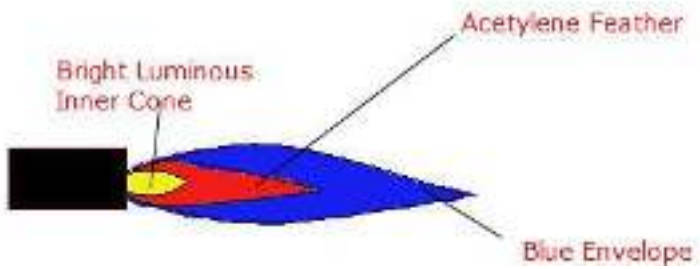
Neutural welding flames are commonly used to weld:

- Mild steel
- Stainless steel
- Cast Iron
- Copper
- Aluminum



CARBURIZING FLAME

- The carburizing flame has excess acetylene, the inner cone has a feathery edge extending beyond it.
- Reducing or carburizing welding flames are obtained when slightly less than one volume of oxygen is mixed with one volume of acetylene.
- This type of flare burns with a coarse rushing sound. It has a temperature of approximately 5700°F (3149°C) at the inner cone tips.
- A carburizing flame is advantageous for welding high carbon steel and nonferrous alloys such as nickel



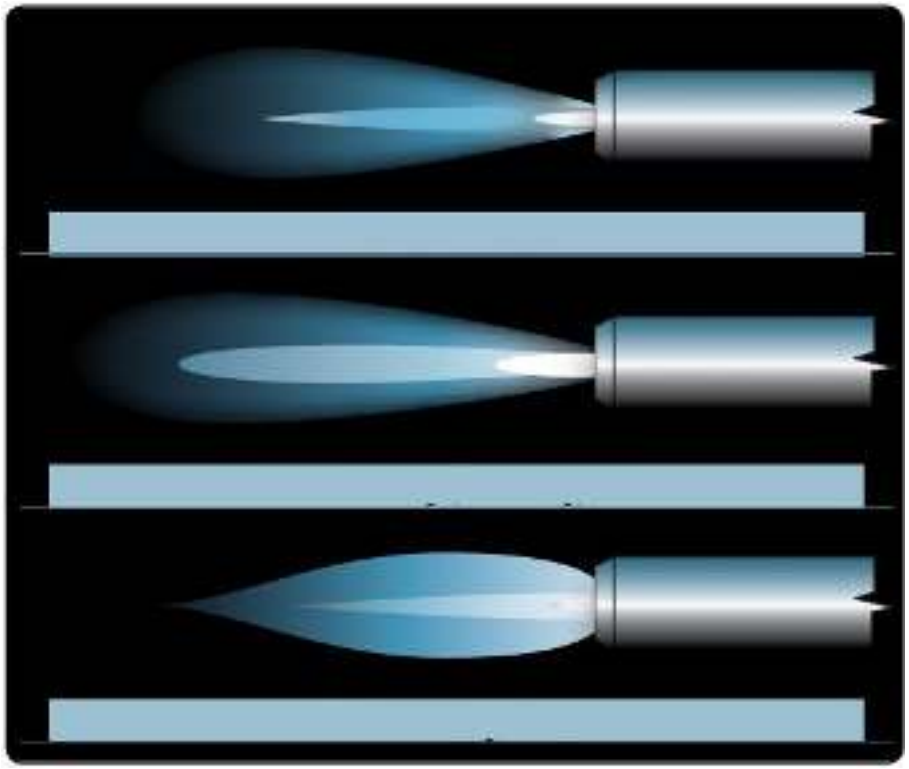
Carburizing or Reducing Flame

OXIDIZING FLAME

- Oxidizing welding flames are produced when slightly more than one volume of oxygen is mixed with one volume of acetylene.
- An oxidizing flame can also be recognized by its distinct hissing sound. The temperature of this flame is approximately 6300°F (3482°C) at the inner cone tip.
- Oxidizing welding flames are commonly used to weld these metals:
  - zinc
  - copper
  - manganese steel
  - cast iron

ASSESSMENT-2

Identify the types flame



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2. Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2014