## Experiment No. 1

## Statement:

Testing of different types of ferrous and non-ferrous Metals

## Desired Learning Objectives

2. This practical aim to identify different type of ferrous metals. Trainees should be able to identify different types of ferrous and non-ferrous metals through following methods: -

(a) By analyzing weight and color (visual method)

(b) By use of magnetic bar

(c) By echo test and analyzing sound

(d) By traces of spark test on wheel grinder machine

(e) By use of diluted caustic soda on Aluminum alloys

## Equipment / Material Required

3. The following materials are required during practical:

(a) Strips of different Metals (ferrous and non-ferrous metals)

(b) Magnet Bar

(c) Diluted solution of Caustic Soda

(d) Grinding Machine

(e) Goggles

(f) Apron

(g) Hand gripper tool

(h) Soldering rod with stand

(j) Soldering flux

(k) Wire of different types of metal

(l) Syringes

## Safety Precautions

4. During the practical trainees are to make sure following precautions: -

(b) Don't drop the sample on the floor.

(c) Don't taste or smell the chemicals.

(d) Use apron and goggles for wheel grinding machine.

## Procedure

5. The following procedure during practical are: -

(a) **Analyzing weight and color of metal.**

(i) Place all metals pieces in a plastic bin.

(ii) Clean the metal pieces.

(iii) Carry out buffing where necessary to see the actual lustrous color of metal.

(iv) Ferrous metal are of grey and stone colours.

(v) Non- ferrous are colourful ranging from white, silver to gold.

(vi) Compare the similar size strips of different metal.

(vii) Non-ferrous metal are lighter than ferrous metal.

**(b) Magnet Test method.**

(i) Place all ferrous/ non-ferrous metal pieces in a plastic bin.

(ii) Pick up a magnet bar.

(iii) Collect the pieces of metals with the help of magnet bar from plastic bin.

(iv) Metal pieces which stick with magnet bar are ferrous metals.

(v) Remaining metal pieces which do not stick with magnet bar are non-ferrous metals.

(c)**Melting Test of metal wires.**

(i) Iron rod.

(ii) Iron rod stands.

(iii) Wires of different metal; copper, nickel alloy, stainless steel and tin / lead.

(iv) Switch on the iron rod.

(v) Calculate time for each wire test by help of stop watch.

(vi) Put flux on the tip of wire.

(vii) Heat up the wire by contacting with soldering iron.

(viii) Note the time at which wire melt and calculate time elapsed as follow:-

(A) Copper Wire.
(B) Stainless Steel Wire.
(C) Nickel Alloy Wire.
(D) Lead / Tin Wire.

(ix) Compare the result; it is visible that non-ferrous metal has low meting point than ferrous metal.

(d) **Spark Test Method.**

(i) Spark test performed on bench grinder, Check it's the serviceability first.

(ii) Put on safety gears.

(iii) Place all the metal pieces and safety gears near bench grinder.

(iv) The Test surrounding area should be comparatively dark for clear observation of spark by trainees.

(v) Hold a metal piece firmly in hand (for large piece) or use hand gripping tool to hold the specimen.

(vi) Stand squarely in front of grinding wheel and put on the Grinding wheel

(vii) Gently touch the metal piece with grinding wheel and observe the spark.

(viii) The important spark characteristics are colour, volume, nature of spark and length.

(ix) The length of spark depends upon the pressure applied on the grinding wheel.

(x) Compare the test pieces with following figures and legends mentioned herewith and mark the metals.

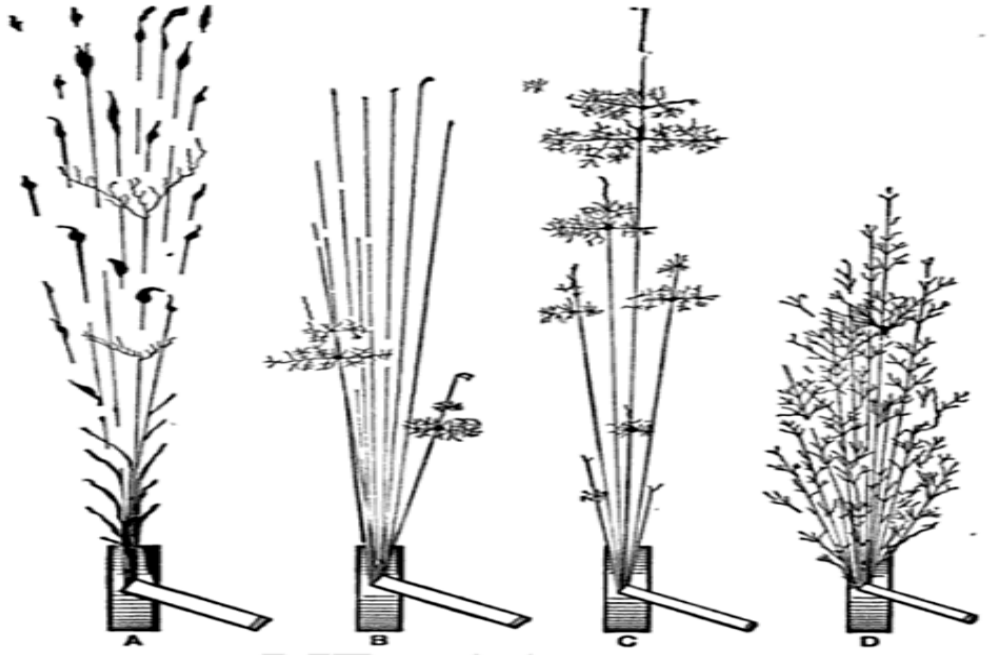


FIG. 6.1.1

(A) Wrought iron.

(B) Mild steel.

(C) Steel with 0.5 to 0.85% carbon.

(D) High-carbon tool steel.

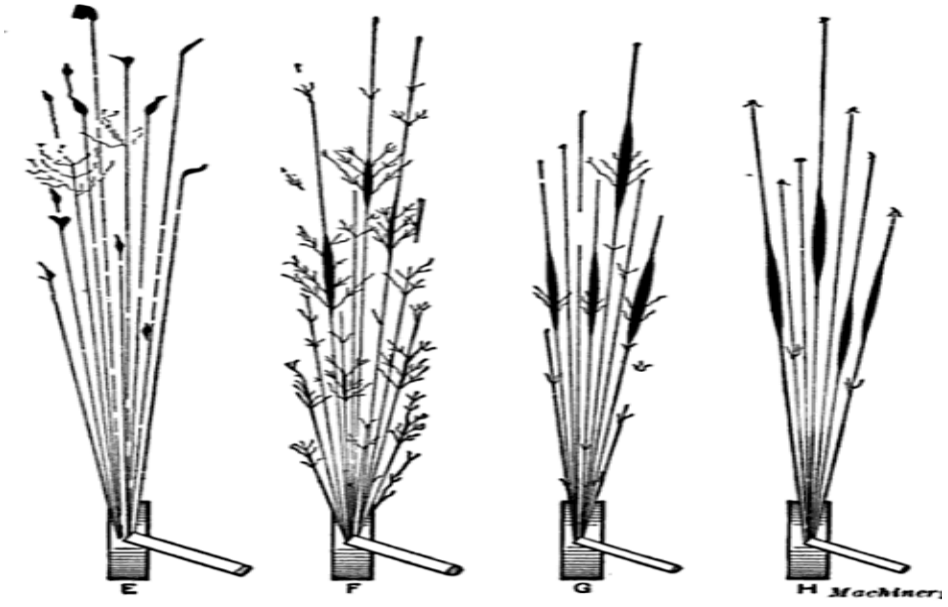

FIG 6.1.2

(E) High-speed steel

(F) Manganese steel

(G) Mushet steel

(H) Special magnet steel

**(e) Diluted Caustic Soda Method.**

(i) Make a diluted solution of caustic soda by mixing caustic soda powder with distilled water in a jar.

(ii) Stir the diluted solution.

(iii) Collect diluted caustic soda with help of a syringe.

(iv) Drop one drop on different metal pieces.

(v) Allow for three minutes soaking time, then Wipe off the drop with rag.

(vi) Diluted soda will leave a black spot on Cladding Aluminum.

(vii) Diluted soda will leave a white spot on Aluminum alloy.

(viii) No spot on other metals.

**Conclusion:**

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