Physical and Chemical properties of some conducting materials

Silver (Ag) Atomic weight = 108 Atomic No. = 47 Melting Point = 960.5 ^{0} C

Physical Properties:

1. Pure silver is lustrous (Luminous, Shining).
2. Silver is very ductile (able to be drawn into thread) and malleable (able to be beaten into shape).
3. Silver is a white metal capable of taking a high polish.
4. Silver is the best conductor of heat and electricity.

Chemical Properties:

1. Dry air has got no action on silver however be contaminated with H_2S, it blackens the surface of the metal.
2. Pure water has no action on pure silver.
3. Silver is practically un-attacked by HCl.
4. Alkaline have no action on silver.
5. The metal is attacked by H_2S producing a black stain on the surface of the metal. The stain may be easily removed by potassium cyanide (KCN)

Copper (Cu) Atomic weight = 63.5 Atomic N0. = 29 Melting point = 1083 ^{0} C

Physical Properties:

1. Copper possesses a peculiar red colour.
2. It is soft, malleable and ductile.
3. It is very tough.
4. Just below its melting point copper becomes brittle (easily broken).
5. It is very good conductor of heat and electricity.

Chemical Properties:

1. Action of air: Dry air has no action on the metal. When exposed to moist air it is covered with a brownish grey film of oxide or sulphide.
2. Action of water: Pure copper is not attacked by water.
3. Action of Acids: Copper dissolves in HNO_3 producing cupric nitrate and usually the oxide of nitrogen. Dilute HCl has no action on Cu and dil. H_2SO_4 has no action on it in absence of air. Conc. H_2SO_4 does not act upon the metal in cold but when heated copper sulphate, SO_2 and water are formed.

Gold (Au) Atomic weight = 197.2 Atomic No. = 79

Physical properties:

1. It is a shining yellow metal.
2. It is very soft and is the most malleable &ductile metal.
3. It can be beaten out into sheet called gold leaf.
4. Very thin gold leaves transmit green light.

Chemical Properties:

1. Gold is not attacked by air at any temperature.
2. Water has got no action on gold at any temperature.
3. No single acid (except Iodic acid & selenic acid) can dissolve gold.
4. Fused alkali attack the metal.
5. Gold is readily attacked by Cl, Br and Iodin.
6. It slowly dissolves in solution of alkaline cyanides in presence of air.
7. It also slowly dissolves in aqueous sulphides, thiosulphates, nitrates and easily decomposable by per helogen compounds.

Aluminium (Al) Atomic Weight = 27 Atomic No. = 13 Melting Point = 658 ^{0} C

Physical Properties:

1. It is a white metal with bluish tinge (to add a small amount of colour)
2. It is malleable, ductile and very light.
3. It possesses great toughness and tensile strength.
4. It is a good conductor of heat and electricity.

Chemical Properties:

1. Dry air has no action. Moist air produce a thin film of oxide which protects the metal from further action.
2. Aluminium foil or Aluminium powder decomposes water at 100 ^{0} C giving off H_2 and is slowly converted into $Al(OH)_3$.
3. Hcl reacts with the metal giving off H_2. Hot and conc. H_2SO_4 attacks Al with the liberation of SO_2. Dilute HNO_3 very slowly acts on Al producing Ammoni-nitrate.
4. Al rapidly dissolves in a hot solution of NaOH or KOH with the evaluation of Hydrogen and the formation of Aluminate.
5. When heated with Halogen, Al gives the Halides while heated in Nitrogen, it forms the Nitride.

Manganese (Mn) Atomic weight = 55 Atomic No. = 25 Melting Point = 1260^0 C

Physical properties:

1. It is a hard metal having a reddish or grayish tinge.
2. It is brittle.

Chemical Properties:

1. Manganese readily oxidizes in moist air, especially when it contains carbon.
2. It slowly decomposes water at ordinary temperature and more readily at higher temperature with the evolution of Hydrogen.
3. The metal is readily dissolved by HCl , H_2SO_4 and acetic acid with the evolution of Hydrogen. When heated strongly in nitrogen it gives Mn_5N_2, and Mn_3N_2 but heated in NH_3 it gives Mn_3N_2. It combines with carbon in the electric furnace to produce Manganese Carbide (Mn_3C).
   Manganin is used for resistance coils as its resistance is only slightly affected by temperature.