

SUBJECT - CHEMISTRY

page No - 01  
Date - 04.05.20

CLASS - BSc(Hons) PART-II

PAPER - III

GROUP - B

TOPIC - CHEMISTRY OF NICKEL (Ni)

Dr Hasi Mohan Prasad Singh

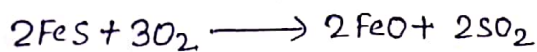
Department of Chemistry

Dr. L.K.V.D College Tarapur Samastipur

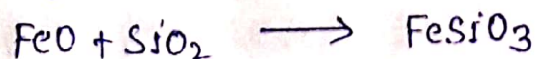
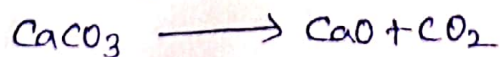
Nickel does not occur in free state in nature. The main ore of Nickel is Pentlandite ( $NiS, FeS$ ) About 5-8% of Nickel is present in garnierite a hydrated silicate of magnesium and Nickel.

Extraction: The extraction of Nickel from the Sulphide ore consists the following steps:

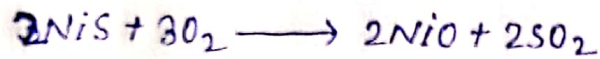
(i) Roasting: The powdered ore is roasted in heaps which are set alight by wood. The roasting continues for two to three months. In this period most of the iron sulphide oxidised to ferrous oxide while sulphides of copper and Nickel remain unaffected.



(ii) Smelting: The roasted ore is powdered and smelted with lime stone, silica and coke in a small blast furnace. During the smelting  $FeO$  reacts with silica to form ferrous silicate,  $CaO$  formed by the decomposition of lime stone also combines with silica to form calcium silicate. These two silicates form a fusible slag at the top of the molten mass. Any  $Fe_2O_3$  formed during the roasting is reduced with coke to form  $FeO$  and then ferrous silicates.



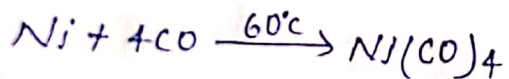
**Extraction of metal:** The Nickel obtained from Smelting is commonly extracted by Mond's process. In this process, the metal is roasted in special furnace having a basic lining. This lining stays of remaining iron as silicate while Nickel Sulphide is converted into Nickel oxide.



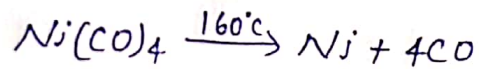
The Nickel oxide is then reduced with water gas to get impure. Finally divided Nickel along with other impurities.



This impure Nickel is heated to 6 hour and a current of CO is passed over it when volatile Nickel Carbonyl is formed.



Nickel Carbonyl is now passed over Nickel pellets heated at  $160^\circ C$  to get 98% pure Nickel.

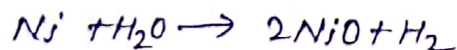
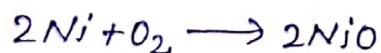


**Physical properties:**

It is a hard, white ferromagnetic metal. It has a hexagonal closed - packet structure.

**Chemical properties**

(i) When Nickel is heated in air or steam Nickel oxide is formed.



(ii) Nickel reacts with  $Cl_2$  at high temperature to form yellow Nickel chloride



**Uses:**

(i) Finally divided Nickel finds extensive use as catalyst i.e. in the conversion of vegetable oils into solid fats during the manufacture of a margarine.

(ii) It is used as alloy e.g.:

(a) Silver coinage (Cu-Zn-Ni) (b) Nichrome (Cr-Fe-Ni)