STD 10 CHEMISTRY CHAPTER 4 PRODUCTION OF METALS

FIRST BELL CLASS 23 NOTES & WORKSHEET

INDUSTRIAL PRODUCTION OF IRON

To see class 23 click here

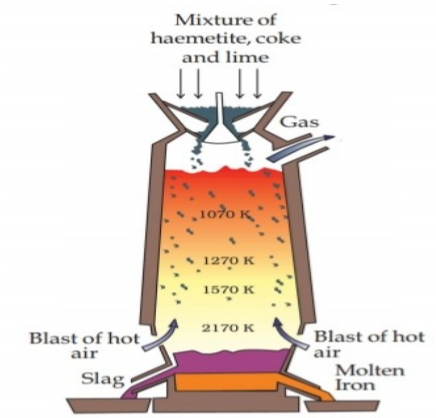
1. Which are the minerals of iron ?
Haematite , magnetite, Iron pyrites
2. Which are the ores of Iron ?
Haematite and magnetite
3. Which mineral of iron is known as 'fool's gold' ?
Iron pyrites is known as 'fool's gold' due to its yellow brazen colour.

A. CONCENTRATION OF HAEMATITE ORE

Haematite ore is subjected to hydraulic washing → **Magnetic separation** → **Roasting**

- Haematite ore is subjected to hydraulic washing → Low density impurities removed
- Magnetic separation → Non -magnetic impurities removed
- Roasting → S,As, P, water removed

B. EXTRACTION OF IRON FROM CONCENTRATED HAEMATITE BY USING BLAST FURNACE



Gangue – The impurities present along with ore are called gangue.
Flux – The compound added with ore to remove gangue are called flux.
Slag – The gangue reacts with flux forming a commpound called slag.

Gangue + Flux ⟶ Slag

If the gangue is acidic in nature, basic flux is to be used. If the gangue is basic in nature, acidic flux is to used.

To see the blast furnace video click here

Chemical reactions taking place inside the blast furnace

Haematite, limestone (Calcium carbonate), coke (Carbon) are fed into the blast furnace at the top and a blast of hot air is passed through the bottom of the furnace.

a. The oxygen present in the hot air combines with coke forming carbon dioxide and it is an exothermic reaction. This CO_2 combine again with coke by absorbing heat forming carbon monoxide.

$$C + O_2 \rightarrow CO_2 + \text{Heat}$$
$$CO_2 + C + \text{Heat} \rightarrow 2CO$$

b. The reduction of haematite into iron is done by this Carbon monoxide.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

c. The lime stone (Calcium carbonate) decomposes to calcium oxide and carbon dioxide at high temperature in the furnace .

$$CaCO_3 \rightarrow CaO + CO_2$$

This CaO act as basic flux and reacts with silica (SiO_2),the acidic gangue present in haematite forming calcium silicate (slag).

$$CaO + SiO_2 \longrightarrow CaSiO_3$$

Flux Gangue Slag

The molten iron obtained from the blast furnace is called pig iron.

Ore of Iron	**Haematite , Magnetite**
Raw materials used in blast furnace	**Haematite, Limestone, Coke**
Compound reducing haematite	**Carbon monoxide**
Equation for the reduction of haematite	$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
Gangue	**SiO_2 (Silica)**
Flux	**CaO (Calcium oxide)**
Slag	**$CaSiO_3$(Calcium silicate)**
Equation for the slag formation	$CaO + SiO_2 \longrightarrow CaSiO_3$

Worksheet

1. Analyse the following equations and answer the questions.

$$CO_2 + C + \text{Heat} \rightarrow 2CO$$
$$CaO + SiO_2 \longrightarrow CaSiO_3$$
$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$
$$C + O_2 \rightarrow CO_2 + \text{Heat}$$

a. Name the gangue present with haematite ore?
b. Which is the flux ?
c. Which is the slag formed? Write the equation for slag formation?
d. Which is the reducing agent used in the manufacturing of iron?
e. Which is the equation for the reduction of haematite ore?

2. What is pig iron?
3. Which are the minerals of iron?
4. Name the mineral of iron known as fool's gold?
5. Write the methods of concentration of ore used in the industrial production of iron?
6. Name the raw materials used in blast furnace?

Prepared by USHAKUMARY. S
Govt HSS Karunagappally