ಎಸ್ಎಸ್ಎಲ್ಸಿ–ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ

SCIENCE

METALS AND NON-METALS

14. Which one of the method in column I is suitable for the extraction of each of the metals given in column II?

Column I	*Column II*
Electrolytic reduction	**Aluminium**
	Zinc
Reduction with carbon	**Sodium**
	Iron
Reduction with Aluminium	**Manganese**
	Tin

Ans:- Electrolytic reduction - Sodium, Aluminium
Reduction with carbon - Iron, Zinc, Tin
Reduction with aluminium - manganese.

15. What is smelting?

Ans:- The roasted or calcined ore is mixed with coke and heated in a furnace to obtain free metal. The process of reducing the oxide with coke is called smelting. Carbon or carbon monoxide [at high temperature] reduce the oxide to the free metal. ***Eg:-*** $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

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

Lead, zinc, iron and in tin are extracted by this process.

16. A strip of impure silver metal is given. Describe briefly the apparatus that would be used to refine it. Write equations for the reactions involved in the process.

Ans:- Silver nitrate solution is taken in a electrolytic cell. The strip of impure silver is made anode and a strip of pure silver is made cathode. When anode and cathode are connected through electric circuit, the following reaction takes place:

$$\text{At cathode}: Ag^+ \xrightarrow{+e} Ag$$

$$\text{At anode}: Ag \xrightarrow{-e} Ag^+$$

Thus, slowly pure silver from anode is removed and obtained as pure mass at cathode.

17. An ore gives carbon dioxide on treatment with dilute acid. What steps would you take to convert such concentrated ore into free metal?

Ans:- The ore gives CO_2 on treatment with dilute acid, therefore, it is a carbonate ore [e.g., limestone]. The ore after concentration is converted into free metal by -

i] Calcination, ii] Smelting or Reduction

Process of refining metals is "Electrolytic Process".

18. Name the chemical substances used to join railway tracks. Write the chemical equation of the thermit reaction. State the characteristic of this reactions due to which it is used for joining railway tracks.

Ans:- Fe_2O_3 on heating with aluminum gets reduced to metal, iron and lot of heat is evolved which melts iron. The molten iron is filled in the space between railway tracks or cracked parts of machines. This reaction is known as the thermit reaction.

$Fe_2O_3\,(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3 + heat$

19. Why is extraction of metal always a reduction process?

Ans:- Because a metal in the combined state has positive valency and a positive ion gets converted into atom or metal on addition of electron(s). Thus, by definition it is a reduction process. $M^{n+} + ne^- \rightarrow M$

20. Why are sodium and aluminum extracted electrolytically?

Ans:- Sodium and aluminum are reactive metals and carbon or other reducing agents cannot reduce their compounds to free metals. Therefore, they are extracted electrolytically.

21. Why is copper oxide reduced by carbon but CaO cannot be reduced?

Ans:- Carbon can reduce the oxide of copper which is less reactive than carbon. On the other hand, CaO cannot be reduced by carbon as calcium itself is more reactive and is thus a better reducing agent than carbon itself.

22. Why is aluminium extracted from alumina by electrolytic reduction and not by reducing with carbon?

Ans:- Aluminum is more reactive than carbon and it has more affinity for oxygen, therefore, alumina cannot be reduced with carbon but is extracted by electrolytic reduction.

23. Give two points of differences between an ore and a mineral.

Ans:- Differences between an ore and a mineral are -

Mineral	*Ore*
1. The naturally occurring substance in which metal and its compounds are found.	A mineral from which metal can be extracted profitably and conveniently.
2. All the minerals cannot be used to extract metals.	All the ores can be used to extract metals.

24. Why is calcium used for removing traces of moisture from alcohol in preference to sodium?

Ans:- Both calcium and sodium react with water and can be used to remove traces of moisture from any substance. But sodium also reacts with alcohol to form sodium ethoxide and hydrogen and thus cannot be used to remove moisture from alcohol. On the other hand, calcium does not react with alcohol and thus can be used to remove traces of moisture from it.

25. Differentiate between roasting and calcinations.

Ans:-

Calcination	*Roasting*
1. The ore is heated in absence of air.	The ore is heated in the presence of air.
2. It is used for carbonate ores.	It is used for sulphide ores.

26. A few drops of sulphuric acid are added into water before electrolysis. Why?

Ans:- A few drops of sulphuric acid is added to water to make it conducting and a clear solution of salt is formed.

27. a] What is meant by metallurgy?

b] State two steps associated with extraction of copper from its ore.

c] How is impure copper purified by electrolytic refining? Draw a labelled diagram to illustrate it.

Ans:- a] Metallurgy involves various processes starting with the treatment of ore to getting metal in the pure form.

b] Copper occurs as sulphide [Cu_2S]. Steps involved are:

[i] Enrichment of ore: Impurities such as soil, sand etc. called gangue are removed.

ii] Reduction of oxide to metal. The sulphide ore is first converted to oxide.

$$2\,Cu_2S(s) + 3\,O_2\,(g) \xrightarrow{heat} 2\,Cu_2O(s) + 2\,SO_2\,(g)$$

$$2\,Cu_2O + Cu_2S(s) \xrightarrow{heat} 6\,Cu(s) + So_2\,(g)$$