



Blue Print (As per PU Board)

Topic	1 mark questions	2 marks questions	3 marks questions	5 marks questions	Total Marks
General Principles & Process of Isolation of Elements	1	-	1	1	4

One mark questions

- Name the process usually employed for the purification of Nickel
Answer: Mond's process or vapour phase
- Name the refining method used to produce semiconductors
Answer: Zone refining
- Write the composition of 'copper matte'
Answer: Cu_2S and FeS
- What is the role of cryolite in the metallurgy of Aluminium?
Answer: It lowers the melting point of the mix and brings conductivity.

Two marks questions

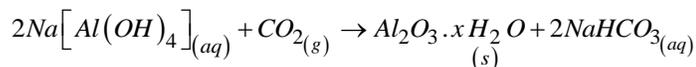
- At temperatures above 1073 K coke can be used to reduce FeO to Fe . How can you justify this reduction using Ellingham diagram?
Answer: As per Ellingham diagram at temperatures greater than 1073K, ΔG of $(C, CO) < \Delta G$ of (Fe, FeO) . (1 mark)
Hence coke can reduce FeO to Fe (1 mark)
- Why is an external emf of more than 2.2 V required for the extraction of Cl_2 from brine?
Answer: $\Delta G^\circ = -nFE^\circ$, ΔG° value for this reaction is $+422 kJ$ $\therefore E^\circ$ comes out to be $-2.2V$ and hence an external emf of greater than 2.2V is required.
- Copper can be extracted by hydrometallurgy but not zinc. Explain.
Answer: Copper is less reactive than hydrogen, hence can be extracted by hydrometallurgy, whereas Zn is more reactive than H, hence cannot.
- How is 'cast iron' different from pig iron?
Answer:

	Cast Iron		Pig Iron
(1)	It contains low percentage of carbon and other impurities	(1)	It contains more percentage of C and other impurities like S, P, Si etc.
(2)	It is malleable and ductile	(2)	It is brittle

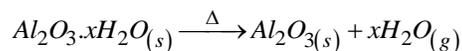
Three marks questions

- Describe the three steps involved in the leaching of bauxite to get pure alumina (equations not expected)
Answer: (i) Bauxite is concentrated by digesting the powdered ore in a conc. $NaOH$ solution at $473 - 573 K$ and 35 bar pressure. Al_2O_3 is leached as sodium aluminate. (1 mark)
$$Al_2O_3 + 2NaOH_{(aq)} + 3H_2O_{(l)} \rightarrow 2Na[Al(OH)_4]_{(aq)}$$

(s)
(ii) Aluminate solution is neutralised by passing CO_2 . Hydrated Al_2O_3 is precipitated by seeding. (1 mark)

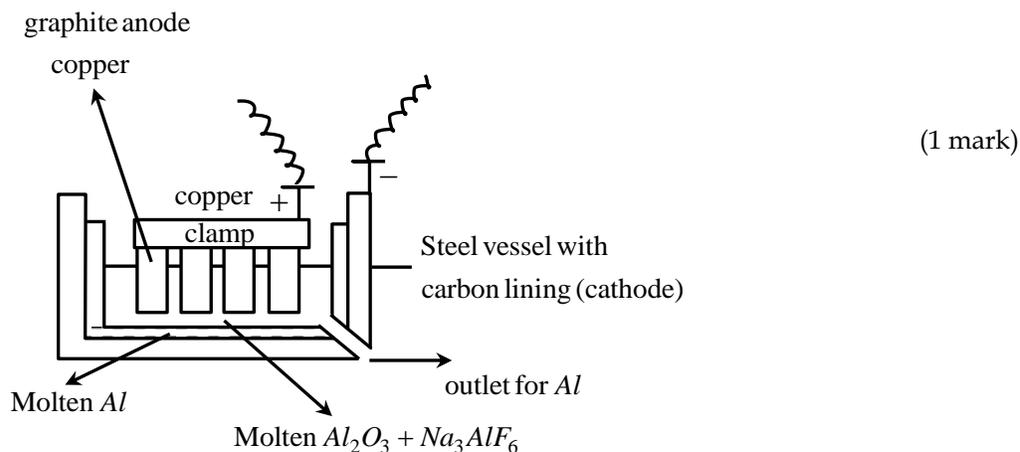


(iii) Hydrated Al_2O_3 is filtered, dried and heated to get pure Al_2O_3 (1 mark)

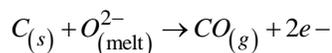


10. Draw labelled diagram of Hall-Heroult electrolytic cell for the extraction of Aluminium. Write anode and cathode reactions.

Answer:



Anode reactions:



Cathode reactions:



(physical states carry no value point)

11. (a) Name the reducing agent used in the extraction of zine from zinc oxide. Give the equation

(b) What is the principle involved in zone refining of metals?

Answer: (a) Coke (carbon) (1 mark)



(b) The impurities are more soluble in the melt than in the solid state of the metal. (1 mark)

12. Differentiate between roasting and calcination with examples.

Answer: **Calcination:** It is a process in which ore is heated in absence of air so as to remove volatile impurities, moisture etc. It is used to convert carbonate ore into oxide. (1 mark)



Roasting: It is a process in which sulphide ore is heated in presence of oxygen to convert into oxide, liberating sulphur dioxide.

