DPP-05

SOLUTIONS

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1. AgCl and Na_2CO_3 AgCl and Na_2CO_3 fusion forms Ag(Silver).

The following reaction is obtained,

$4AgCl + 2Na_2CO_3 \rightarrow 4Ag + 4NaCl + 2CO_2 + O_2 4AgCl + 2Na_2CO_3 \rightarrow 4Ag + 4NaCl + 2CO_2 + O_2$

This reaction occurred between $850-900\circ C$.

Hence, silver (Ag)is the by-product of that reaction

2. A solution of sodium sulphate in water is electrolysed using inert electrodes. The products at the cathode and anode are H_2, O_2 respectively. Hydrogen ions having lower discharge (or higher reduction) potential than sodium ions will be liberated at the cathode.

$$2H^+ + 2e^- \rightarrow H_2 \uparrow$$

Hydroxide ions having a lower discharge potential than sulphate ions, will be liberated at anode.

$$4OH^- \rightarrow 2H_2O + O_2 + 4e^-$$

3. Correct option is D)

S_1 = True. In thermite welding, aluminium acts as a reducing agent. Aluminium is used in thermite welding of broken iron parts. The reduction of ferric oxide by aluminium is highly exothermic and therefore, the iron formed will be in the molten state.

S_2 = False. Magnesium is obtained by electrolysis of molten $MgCl_2$ not aqueous.

S_3 = True. Extraction of Pb is possible by carbon reduction of PbO in smelting.

S_4 = False. The bauxite is purified by the Bayer Process

Hence option D TFTF is correct answer.

4. Oxides of highly reactive metals can't be reduced b Carbon.

Among the following pairs, the pair which consists of more reactive oxides are CaO_2 & K_2O

5. The correct option is C (III), (I) and (II)

(I) $\underset{\text{(impure)}}{Ni} + 4CO \xrightarrow{50^\circ C} [Ni(CO_4)] \xrightarrow{230^\circ C} \underset{\text{(volatile)}}{Ni} + 4CO \uparrow$

(II) $Cu_2S + \frac{3}{2}O_2 \xrightarrow{\Delta} Cu_2O + SO_2$

$Cu_2S + 2Cu_2O \xrightarrow[\text{temp.}]{\text{high}} 6Cu + SO_2$

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(III) $MgCl_2\ (s) \xrightarrow{\text{electrolysis}} Mg^{2+}(aq) + 2Cl^-(aq)$

At cathode: $Mg^{2+}(aq) + 2e^- \rightarrow Mg(s)$

At anode: $2Cl^-(aq) \rightarrow Cl_2(g) + 2e^-$

6. Nitriding is process of heating steel in presence of NH_3 and producing hard coating of Iron Nitride on the surface of steel.

Annealing is process of heating steel to redness and then cooling it very slowly

Tempering is process of heating quenched steel to a temperature well below redness and then cooling it slowly

Quenching is process of heating steel to redness and then cooling it suddenly by plunging it into water or oil

7. → Many metals are purified by electrolytic refining method.

→ In this method impure sample is taken as anode as impurity goes into solution and pure copper is taken as cathode, as pure metal from sample deposits on cathode.

8. Correct options are B) , C) and D)

(B) The oxide ore is reduced by the carbon monoxide according to the reaction : $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

Thus option B is correct and option A is incorrect.

(C) Major silica impurities are removed as calcium silicate slag by addition of a fluxing agent limestone $CaO + SiO_2 \rightarrow CaSiO_3$

Thus option C is correct.

(D) The silicate slag is used in manufacturing cement.

Thus option D is correct.

9. Correct option is (A)

Graphite is a good conductor of current due to sp_2 hybridisation having mobile pi-electrons while diamond does not have free electrons so it cannot be used as an anode.

10. The conversion Auriferous rock → Au occurs during leaching.

The conversion Hematite containing siderite and magnetite → Fe occurs during roasting and smelting.

The conversion Bauxite → Al occurs during leaching and electrolytic reduction.

The conversion galena → for self reduction only froth floatation is used as partial roasting is done for self reduction.