

- Q.1** Find the number of electrons involved in the electrodeposition of 63.5g of copper from a solution of copper sulphate is
- Q.2** A current 0.5 ampere when passed through AgNO_3 solution for 193 sec. deposited 0.108g of Ag
Find the equivalent weight of Ag
- Q.3** A certain metal salt solution is electrolysed in series with a silver coulometer. The weights of silver and the metal deposited are 0.5094g and 0.2653g. Calculate the valency of the metal if its atomic weight is nearly that of silver
- Q.4** 3A current was passed through an aqueous solution of an unknown salt of Pd for 1Hr. 2.977g of Pd^{n+} was deposited at cathode. Find n. (Given Atomic mass of Pd = 106.4)
- Q.5** How long a current of 2A has to be passed through a solution of AgNO_3 to coat a metal surface of 80cm^2 with 5 micrometer thick layer? Density of silver = 10.8g/cm^3 .

SOLUTION

(CHEMISTRY)

ELECTROCHEMISTRY

DPP – 11

CLASS – 12th

TOPIC – ELECTROLYSIS

Sol.1 63.5gm of Cu=1mol of Cu.

No. of equivalent = No. of moles \times valency

$$= 1 \times 2 = 2$$

1 mole of electron will deposit 1 equivalent

$$\text{Number of electron} = 2 \times 6.022 \times 10^{23}$$

$$= 12.044 \times 10^{23}.$$

Sol.2 Given: Current, $I = 0.5 \text{ A}$

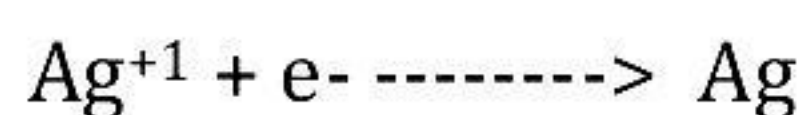
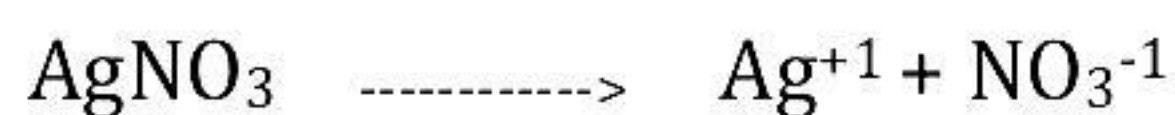
Time, $t = 193 \text{ s}$

Deposited Ag (W) = 0.108g

$Q = It$, where Q = quantity of electricity in Coloumb, I is current in amperes and time is in seconds.

$$\Rightarrow Q = 0.5 \text{ A} \times 193 \text{ s}$$

$$Q = 96.5 \text{ C}$$



Therefore, Number of electrons, $n = 1$

96.5 C of electricity deposits Ag = 0.108g

$$96500 \text{ C of electricity deposits Ag} = \frac{0.108}{96.5} \times 96500$$

$$= 108 \text{ g}$$

Therefore, equivalent weight is $E = \frac{108}{n}$

$$\Rightarrow E = 108 \text{ g}$$

Sol.3 Equivalent mass silver = $\frac{\text{molar mass}}{\text{valency}}$

$$\frac{107.8682}{1} = 107.8682$$

$$\text{Equivalent mass of silver} = \frac{\text{Molar mass}}{\text{Valency}} = \frac{107.8682}{x}$$

Now,

$$\frac{W_{\text{Ag}}}{W_x} = \frac{E_{\text{Ag}}}{E_x}$$

$$\frac{0.5094}{0.2653} = \frac{107.8682 \times X}{107.8682}$$

$$x = 1.92 \approx 2$$

thus, the valency of metal is 2

Sol.4 For reduction : $\text{pd}^{n+} + n\text{e}^- \longrightarrow \text{pd}$

$$\frac{W}{E_{\text{pd}}} = \frac{i \times t}{96500}$$

$$\frac{2.977}{106.4 / n} = \frac{3 \times 1 \times 60 \times 60}{96500}$$

$$\text{implies } n = 4$$

Sol.5 Volume of the layer coated = $(80 \times 10^{-4}) \times (2 \times 5 \times 10^{-6})$

$$= (80 \times 10^{-4}) (10 \times 10^{-6})$$

$$= 8 \times 10^{-8} \text{ m}^3 = 0.08 \text{ ml}$$

Let the density be dg/ml

$$\text{Amount of Ag deposited} = 0.08d$$

$$\text{No. of equivalents of Ag deposited} = \frac{0.08d}{108}$$

$$\frac{0.08d}{108} \times 96500 = 2 \times t$$

$$\Rightarrow t = 35.741d \text{ sec}$$