

Roll No. :  
Date :

Time -  
MM - 30

1. How much charge is required for the reduction of 1 mole of  $\text{Zn}^{2+}$  to Zn? 1
2. How much charge in Faraday is required for reduction of 1 mole of  $\text{Al}^{3+}$  to Al? 1
3. How many Faradays of charge are required to convert:  
1 mole of  $\text{MnO}_4^-$  to  $\text{Mn}^{2+}$  ion, 1
4. Calculate the time to deposit 1.27 g of copper at cathode when a current of 2 A was passed through the solution of  $\text{CuSO}_4$ . 2  
(Molar mass of Cu =  $63.5 \text{ g mol}^{-1}$ ,  $1 \text{ F} = 96500 \text{ C mol}^{-1}$ )
5. In the electrolysis of aqueous sodium bromide, there are two possible anodic reactions: 2  
 $2\text{H}_2\text{O}(\text{l}) \rightarrow \text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4\text{e}^-$ ,  $E^\circ = 1.23 \text{ V}$   
 $2\text{Br}^-(\text{aq}) \rightarrow \text{Br}_2(\text{g}) + 2\text{e}^-$ ,  $E^\circ = 1.08 \text{ V}$   
Which reaction occurs at anode and why?
6. Value of standard electrode potential for oxidation of  $\text{Cl}^-$  ions is more positive than water, even then in electrolysis of NaCl, why is  $\text{Cl}^-$  oxidised at anode instead of water? 2
7. The same quantity of electrical charge deposited 0.583 g of Ag when passed through  $\text{AgNO}_3$ ,  $\text{AuCl}_3$  solution. Calculate the weight of gold formed. (At. weight of Au =  $197 \text{ g mol}^{-1}$ ). 2
8. Calculate the volume of oxygen liberated at anode at STP in the electrolysis of  $\text{CuSO}_4$  solution when 1 ampere current is passed for 16 minute. 2  
 $2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + \text{O}_2 + 4\text{e}^-$  ( $1\text{F} = 96500 \text{ C}$ ).
9. An aqueous solution of copper sulphate,  $\text{CuSO}_4$  was electrolysed between platinum electrodes using a current of 0.1287 ampere for 50 minutes. (Atomic mass of Cu =  $63.5 \text{ g mol}^{-1}$ ) 3  
(a) Write the cathodic reaction.  
(b) Calculate:  
(i) Electric charge passed during electrolysis  
(ii) Mass of copper deposited at the cathode  
[Given:  $1\text{F} = 96,500 \text{ C mol}^{-1}$ ]
10. How long a current of 3 amperes has to be passed through a solution of silver nitrate to coat a metal surface of  $80 \text{ cm}^2$  with a 0.005 mm thick layer? Density of Ag is  $10.5 \text{ g cm}^{-3}$ . At. Wt. of Ag = 108.0 u. 3
11. How long will it take an electric current of 0.15 A to deposit all the copper from 500 mL of 0.15 M copper sulphate solution? 3
12. How many grams of sodium and chlorine can be obtained by electrolysis of molten NaCl with a current of 1 amp for 15 min. 3  
[ $\text{F} = 96500 \text{ C}$ , At mass of Na = 23, Cl = 35.5]  
(a) State Faraday's first law of electrolysis. How much charge in terms of Faraday is required for the reduction of 1 mol of  $\text{Cu}^{2+}$  to Cu? 5  
(b) Calculate emf of the following cell at 298 K:



[Given  $E^\circ_{\text{cell}} = + 2.71 \text{ V}$ ,  $1 \text{ F} = 96500 \text{ C mol}^{-1}$ ]