

# PHYSICAL CHEMISTRY

NEET

CRASH COURSE

ELECTROCHEMISTRY

**SMART ACHIEVERS**  
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**ELECTROCHEMISTRY**

- Q.1 The equation representing the process by which standard reduction potential of zinc can be defined is :
- (1)  $\text{Zn}^{2+}(\text{s}) + 2\text{e}^- \longrightarrow \text{Zn}$  (2)  $\text{Zn}(\text{g}) \longrightarrow \text{Zn}^{2+}(\text{g}) + 2\text{e}^-$   
 (3)  $\text{Zn}^{2+}(\text{g}) + 2\text{e}^- \longrightarrow \text{Zn}$  (4)  $\text{Zn}^{2+}(\text{aq.}) + 2\text{e}^- \longrightarrow \text{Zn}(\text{s})$
- Q.2 Which is not true for a standard hydrogen electrode ?
- (1) The hydrogen ion concentration is 1 M (2) Temperature is 25°C  
 (3) Pressure of hydrogen is 1 atmosphere  
 (4) It contains a metallic conductor which does not absorb hydrogen.
- Q.3 Which of the following statement is wrong about galvanic cell ?
- (1) cathode is positive charged (2) anode is negatively charged  
 (3) reduction takes place at the anode (4) reduction takes place at the cathode
- Q.4 The position of some metals in the electrochemical series in decreasing electropositive character is given as  $\text{Mg} > \text{Al} > \text{Zn} > \text{Cu} > \text{Ag}$ . What will happen if a copper spoon is used to stir a solution of aluminium nitrate?
- (1) The spoon will get coated with aluminium (2) An alloy of copper and aluminium is formed  
 (3) The solution becomes blue (4) There is no reaction
- Q.5 The metal that cannot be produced on reduction of its oxide by aluminium is :
- (1) K (2) Mn (3) Cr (4) Fe
- Q.6 Which of the following represents the potential of silver wire dipped in to 0.1 M  $\text{AgNO}_3$  solution at 25°C ?
- (1)  $E^\circ_{\text{red}}$  (2)  $(E^\circ_{\text{red}} + 0.059)$  (3)  $(E^\circ_{\text{OX}} - 0.059)$  (4)  $(E^\circ_{\text{red}} - 0.059)$
- Q.7 The reduction electrode potential  $E_s$  of 0.1 M solution of  $\text{M}^+$  ions ( $E^\circ_{\text{RP}} = -2.36 \text{ V}$ ) is :
- (1) -2.41 (2) +2.41 (3) -4.82 (4) None
- Q.8 The potential of hydrogen electrode ( $P_{\text{H}_2} = 1 \text{ atm}$ ;  $\text{C}_{\text{H}^+} = 0.1 \text{ M}$ ) at 25°C will be -
- (1) 0.00 V (2) -0.059 V (3) 0.118 V (4) 0.059 V
- Q.9 When two half-cells of electrode potential of  $E_1$  and  $E_2$  are combined to form a cell of electrode potential  $E_3$ , then (when  $n_1$ ,  $n_2$  and  $n_3$  are no. of electrons exchanged in first, second and combined half-cells) :
- (1)  $E_3 = E_2 - E_1$  (2)  $E_3 = \frac{E_1 n_1 + E_2 n_2}{n_3}$  (3)  $E_3 = \frac{E_1 n_1 - E_2 n_2}{n_3}$  (4)  $E_3 = E_1 + E_2$
- Q.10 Which represent a concentration cell ?
- (1)  $\text{PtH}_2 | \text{HCl} || \text{HCl} | \text{PtH}_2$  (2)  $\text{PtH}_2 | \text{HCl} || \text{Cl}_2 | \text{Pt}$   
 (3)  $\text{Zn} | \text{Zn}^{2+} || \text{Cu}^{2+} | \text{Cu}$  (4)  $\text{Fe} | \text{Fe}^{+2} || \text{Cu}^{2+} | \text{Cu}$
- Q.11 The electric charge for electrode deposition of one gram equivalent of a substance is :
- (1) one amp / sec (2) 96,500 C / sec (3) one amp / hour (4) 96,500 C
- Q.12 When one coulomb of electricity is passed through an electrolytic solution the mass deposited on the electrode is equal to :
- (1) equivalent weight (2) molecular weight (3) electrochemical equivalent (4) one gram

- Q.13 An ion is reduced to the element when it absorbs  $6 \times 10^{20}$  electrons. The number of equivalents of the ion is:  
 (1) 0.10 (2) 0.01 (3) 0.001 (4) 0.0001
- Q.14 Electrolysis can be used to determine atomic masses. A current of 0.550 A deposits 0.55 g of a certain metal in 100 minutes. Calculate the atomic mass of the metal if  $n = 3$  :  
 (1) 100 (2) 45.0 (3) 48.25 (4) 144.75
- Q.15 When a lead storage battery is discharged  
 (1)  $\text{PbSO}_4$  is formed (2) Pb is formed (3)  $\text{SO}_2$  is consumed (4)  $\text{H}_2\text{SO}_4$  is formed
- Q.16 108 g fairly concentrate solution of  $\text{AgNO}_3$  is electrolyzed using 0.1 F of electricity. The weight or resulting solution is :  
 (1) 94 g (2) 11.6 g (3) 96.4 g (4) None
- Q.17 The ionization constant of a weak electrolyte is  $25 \times 10^{-6}$  while the equivalent conductance of its 0.01 M solution is  $19.6 \text{ S cm}^2 \text{ eq}^{-1}$ . The equivalent conductance of the electrolyte at infinite dilution (in  $\text{S cm}^2 \text{ eq}^{-1}$ ) will be  
 (1) 250 (2) 196 (3) 392 (4) 384
- Q.18 The specific conductance of a N/10 KCl at  $25^\circ\text{C}$  is  $0.0112 \text{ ohm}^{-1} \text{ cm}^{-1}$ . The resistance of cell containing solution at the same temperature was found to be 55 ohms. The cell constant will be  
 (1)  $6.16 \text{ cm}^{-1}$  (2)  $0.616 \text{ cm}^{-1}$  (3)  $0.0616 \text{ cm}^{-1}$  (4)  $616 \text{ cm}^{-1}$
- Q.19 If the specific resistance of a solution of concentration C g equivalent litre $^{-1}$  is R, then its equivalent conductance is :  
 (1)  $\frac{100R}{C}$  (2)  $\frac{RC}{1000}$  (3)  $\frac{1000}{RC}$  (4)  $\frac{C}{1000R}$
- Q.20 The specific conductance of a 0.01 M solution of KCl is  $0.0014 \text{ ohm}^{-1} \text{ cm}^{-1}$  at  $25^\circ\text{C}$ , Its equivalent conductance ( $\text{cm}^2 \text{ ohm}^{-1} \text{ equiv}^{-1}$ ) is :  
 (1) 140 (2) 14 (3) 1.4 (4) 0.14
- Q.21 Standard electrode potentials of three metals A, B and C are +0.5 V, -3.0 V and -1.2 V respectively. The reducing power of these metals is in the order :  
 (1)  $B > C > A$  (2)  $A > B > C$  (3)  $C > B > A$  (4)  $A > C > B$
- Q.22 The limiting molar conductivities  $\Lambda^\circ$  for NaCl, KBr and KCl are 126, 152 and  $150 \text{ S cm}^2 \text{ mol}^{-1}$  respectively. The value of  $\Lambda^\circ$  for NaBr is :  
 (1)  $128 \text{ S cm}^2 \text{ mol}^{-1}$  (2)  $176 \text{ S cm}^2 \text{ mol}^{-1}$  (3)  $278 \text{ S cm}^2 \text{ mol}^{-1}$  (4)  $302 \text{ S cm}^2 \text{ mol}^{-1}$
- Q.23 Given:  $E^\circ_{\text{Fe}^{3+}/\text{Fe}} = -0.036 \text{ V}$ ,  $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.439 \text{ V}$   
 The value of standard electrode potential for the change,  $\text{Fe}^{3+}_{(\text{aq})} + e^- \longrightarrow \text{Fe}^{2+}_{(\text{aq})}$  will be :  
 (1) 0.385V (2) 0.770V (3) -0.270V (4) -0.072V
- Q.24 From the following  $E^\circ$  values of half cells  
 (i)  $\text{A}^{3-} \rightarrow \text{A}^{2-} + e^-$ ;  $E^\circ = 1.5 \text{ V}$  (ii)  $\text{B}^+ + e^- \rightarrow \text{B}$ ;  $E^\circ = 0.5 \text{ V}$   
 (iii)  $\text{C}^{2+} + e^- \rightarrow \text{C}^+$ ;  $E^\circ = 0.5 \text{ V}$  (iv)  $\text{D} \rightarrow \text{D}^{2+} + 2e^-$ ;  $E^\circ = -1.15 \text{ V}$   
 What combination of two half cells would result in a cell with the largest potential ?  
 (1) (i) and (iii) (2) (i) and (iv) (3) (ii) and (iv) (4) (iii) and (iv)

- Q.25 The potential of a hydrogen electrode at pH = 1 is  
 (1) 0.059 volt (2) 0.00 volt (3) -0.059 volt (4) 0.59 volt
- Q.26  $E^\circ$  for the reaction  $\text{Fe} + \text{Zn}^{2+} \rightarrow \text{Zn} + \text{Fe}^{2+}$  is -0.35V. The given cell reaction is :  
 (1) feasible (2) not feasible (3) in equilibrium (4) can't say anything

**ASSERTION & REASON**

**Directions :** Each of these questions contains an Assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

- (1) If both assertion and reason are true and reason is the correct explanation of assertion.  
 (2) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 (3) If Assertion is true but reason is false.  
 (4) If both assertion and reason are false.

- Q.27 **Assertion :**  $E^\circ_{\text{cell}}$  is negative for electrolytic cell.  
**Reason :**  $\Delta G^\circ$  is +ve for electrolytic cell.
- Q.28 **Assertion :** 1 coulomb electricity deposits 1 g-equivalent of a substance.  
**Reason :** 1 faraday is charge on 1 mole of electricity.
- Q.29 **Assertion :** Lead storage battery is a galvanic cell without salt bridge.  
**Reason :** A secondary cell is rechargeable cell.
- Q.30 **Assertion :** Molar conductivity increases with decreases in concentration for weak electrolytes.  
**Reason :** No. of ions per unit volume decreases due to dilution.
- Q.30 **Assertion :** When 2 faraday of electricity is passed through 0.1 M  $\text{H}_2\text{SO}_4$  (aq), 11.2 litre  $\text{O}_2$  evolved at STP.  
**Reason :** Molecular weight of oxygen is 32.

**ANSWER KEY**

Q.1	4	Q.2	4	Q.3	3	Q.4	2	Q.5	1	Q.6	4	Q.7	1
Q.8	2	Q.9	2	Q.10	1	Q.11	4	Q.12	3	Q.13	3	Q.14	3
Q.15	1	Q.16	3	Q.17	3	Q.18	3	Q.19	3	Q.20	1	Q.21	1
Q.22	1	Q.23	2	Q.24	2	Q.25	3	Q.26	2	Q.27	1	Q.28	4
Q.29	2	Q.30	1	Q.30	2								

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