# CHEMISTRY

## BOOKS - DISHA CHEMISTRY (HINGLISH)

## ELECTROCHEMISTRY

**Chemistry**

**1.** A gas X at 1 atm is bubblcd through a soluution containing a mixture of $1MY^-$ and $1MZ^- at 25°C.$ If the rcduction potential tial of $Z > Y > X,$ then,
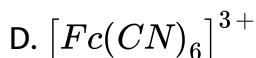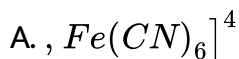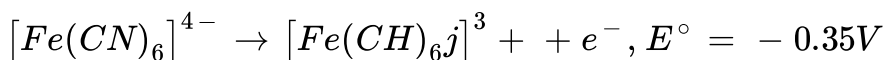
   A. Y will oxidize X and not Z

   B. Y will oxidize Z and not X

   C. Y will oxidize both X and Z

D. Y will reduce both X and Z

**Answer: A**

▶ View Text Solution

---

**2.** On the basis of the following $E^\circ$ values, the strongest oxidizing agent is :

$$[Fe(CN)_6]^{4-} \rightarrow [Fe(CH)_6j]^3 + + e^-, E^\circ = -0.35V$$

$$Fe^{32+} + e^-, \qquad E^\circ = -0.77V$$

A. , $Fe(CN)_6]^4$

B. $Fe^{2+}$

C. $Fe^{3+}$

D. $[Fc(CN)_6]^{3+}$

**Answer: C**

▶ View Text Solution

**3.** Resistance of a conductivity cell filed with a solution of an cleetrolyto of concentration $0.1M$ is $100\Omega$. The conductivity of this solution is $1.29 Sm^{-1}$. Resistance of the same cell when filled with $0.2M$ of the same solution is $520\Omega$. The molar coonductivity of $0.2M$ solution os electrolyte will be

A. $1.24 \times 10^{-4} Sm^2 mol^{-1}$

B. $12.4 \times 10^{-4} Sm^2 mol^{-1}$

C. $124 \times 10^{-4} Sm^2 mol^{-1}$

D. $1240 \times 10^{-4} Sm^2 mol^{-1}$

**Answer: B**

**4.** Fortbcclcctrochcmical cell,

$M|M^+||X^-|X, E^\circ_- (M^4/M) = 0.44$ and $E^\circ_- (X/X) = 0.33V.$

From this data one can deduce that

A. $M + X \rightarrow M^+ + X$ is the spontaneous reaction

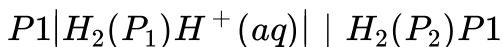B. $M^+ + X \rightarrow M + X$ is the spontaneous reaction

C. $E_{cell} = 0.77V$

D. $E_{cell} = 0.77V$

**Answer: B**

> ▶ **View Text Solution**

---

**5.** What will be the cmffor the given cell

$P1|H_2(P_1)H^+(aq)| | H_2(P_2)P1$

A. $\dfrac{RT}{F}\log_e \dfrac{P_1}{P_2}$

B. $\dfrac{RT}{2F}\log_e \dfrac{P_1}{P_2}$

C. $\dfrac{RT}{F}\log_e \dfrac{P_2}{P_1}$

D. None of these

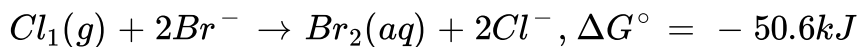**Answer: B**

▶ **View Text Solution**

**6.** What is the standard cell potential $E^\circ$ for an electrochemical cell

in which the following reaction takes place spontaneously ?

$Cl_1(g) + 2Br^- \rightarrow Br_2(aq) + 2Cl^-, \Delta G^\circ = -50.6kJ$

A. $1.2V$

B. $0.53V$

C. $0.26V$

D. $-0.53V$

**Answer: C**

**7.** The unit of equivalent conductivity is

    A. ohmcm

    B. $ohm^{-1}cm^2$(g equivalent)$^{-1}$

    C. ohm $cm^2$ (g equivalent)

    D. $Scm^{-2}$

**Answer: B**

**8.** The variation of equivalent conductance of strong electrolyte with

(concentration)$^{1/2}$ is represtnted by

A. 

B. 

C. 

D. 

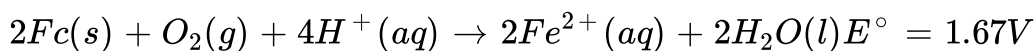**Answer: A**

▶ **View Text Solution**

---

**9.** Consider the following cell reaction:

$$2Fc(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l) \quad E^\circ = 1.67V$$

At $[Fe^{2+}] = 10^{-3}M$, $p(O_2) = 0.1$ atm and pH =3, the cell

poteintial at $25°C$ is

A. $1.47V$

B. $1.77V$

C. $1.87V$

D. $1.57V$

**Answer: D**

▶ View Text Solution

10. The electrical properties and their respective SI units are given below. Identify the wrongly matched pair.

A.
| Electrical property | SI unit |
|---|---|
| Specilic conductance | $Sm^{-1}$ |

B.
| Electrical property | SI unit |
|---|---|
| Conductance | $S$ |

C.
| Electrical property | SI unit |
|---|---|
| Equivalent conductance | $Sm^2 gequiv^{-1}$ |

D.
| Electrical property | SI unit |
|---|---|
| Cell constant | $m$ |

**Answer: D**

▶ View Text Solution

**11.** Limiting molar conductivity of $NH_4OH(i.e. \wedge_m^\circ (NH_4OH)$ is equal to:

A. $\wedge_{m(NH_4Cl)}^\circ + \wedge_{m(NaCl)}^\circ - \wedge_{m(NaOH)}^\circ$

B. $\wedge_{m(NaOH)}^\circ + \wedge_{m(NaCl)}^\circ - \wedge_{m(NH_4Cl)}$

C. $\wedge_{m(NH_4OH)}^\circ + \wedge_{m(NH_4Cl)}^\circ - \wedge_{m(HCl)}^\circ$

D. $\wedge_{m(NH_4Cl)}^\circ + \wedge_{m(NaOH)}^\circ - \wedge_{m(NaCl)}^\circ$

**Answer: D**

▶ **View Text Solution**

---

**12.** A lead storage battery containing $5.01.$ of $(IN)H_2SO_4$ solution is opcrated for $9.65 \times 10^5$ s with a stcady current jof 100 mA. Assuming volume of the soution remaining constant, normality of $H_2SO_4$ will

A. remain tmchanged

B. increases by 0.20

C. increase by unity

D. decrease by 0.40

**Answer: D**

▶ **View Text Solution**

---

**13.** The electrode potential $E_{(zn^2+ / ze)}$ of a zinc electrode at $25° C$

with an aqueous solution of $0.1 M ZnSO_4$ is

$\left[ E°_{(Zn^{2+} / Zn)} = -0.73V. \text{ Assume} \dfrac{2.30.0RT}{F} = 0.06 at 298K \right]$.

A. $+0.73$

B. $-0.79$

C. $0.82$
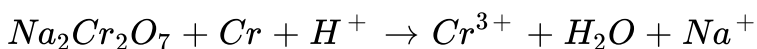
D. $-0.70$

**Answer: B**

**14.** A bettery is constructed of Cr and $Na_2Cr_2O_7$. The unbalanced chemical equation when such a battery discharges is following:

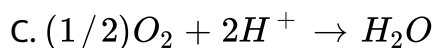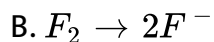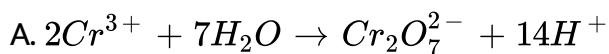$$Na_2Cr_2O_7 + Cr + H^+ \rightarrow Cr^{3+} + H_2O + Na^+$$

If one Faraday of electricity is passed through the battery during the charging, the number of moles of $Cr^{3+}$ removed from the solution is

A. $\dfrac{4}{3}$

B. $\dfrac{1}{3}$

C. $\dfrac{3}{3}$

D. $\dfrac{2}{3}$

**Answer: C**

15. Which of the fo llowing reaction is possible at anode?

A. $2Cr^{3+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$

B. $F_2 \rightarrow 2F^-$

C. $(1/2)O_2 + 2H^+ \rightarrow H_2O$

D. None of these

Answer: A

16. In a hydrogen-oxygen fuel cell, combustion of hydrogen occurs to

A. produce high purity water

B. create potential difference between two electrodes

C. generte heat

D. remove adsorbed oxygen from electron surfaces

**Answer: B**

**17.** $E^\circ$ of the cell,

$zn\left|Zn^{2+}(aq)\right|\left|Cu^{2+}(aq)\right|Cu$ is $1.10Vat25^\circ C$. The equilibrium

constant for the cell reaction

$Zn + Cu^{2+}(aq) \Leftrightarrow Cu + Zn^{2+}(aq)$ is of the order of

A. $10^{-37}$

B. $10^{37}$

C. $10^{-17}$

D. $10^{17}$

**Answer: B**

---

**18.** The correct order of $E^{\circ}_{m^{2+}/M}$ values of which gnegative sign for the four sucessive elements Cr, Mn, Fe and Co is

A. $Mn > Cr > Fe > Co$

B. $Cr > Fe > Mn > Co$

C. $Fe > Mn > Cr > Co$

D. $Cr > Mn > Fe > Co$

**Answer: A**

**19.** For a spontaneous reaction the$\Delta G$) equilibrium constnat $(K)$ and $E^\circ_{Cell}$ eill be respectively

A. $-ve > 1, \ -ve$

B. $-ve, \ < 1, \ -ve$

C. $+ve, \ > 1, \ -ve$

D. $-ve, 1, \ +ve$

**Answer: D**

▶ View Text Solution

**20.** If the $E^\circ_{cell}$ for a given reaction has a negative value, then which of the following gives the correct relationships for the values of $\Delta G^\circ$ and $K_{eq}$,

A. $\Delta G^\circ > 0, k_{aq} > 1$

B. $\Delta G^\circ < 0, K_{eq} > 1$

C. $\Delta G^\circ < 0, K_{eq} < 1$

D. $\Delta G^\circ > 0, K_{aq} < 1$

**Answer: D**

▶ **View Text Solution**

---

**21.** Wltich or the roilowing expressions correctlY represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$, Given that $\wedge^\circ_{Al^{3+}}$ and $\wedge^\circ_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

A. $\dfrac{1}{3} \wedge^\circ_{Al^{3+}} + \dfrac{1}{2} \wedge^\circ_{SO_4^{2-}}$

B. $2 \wedge^\circ_{Al^{3+}} + 3 \wedge^\circ_{SO_4^{2-}}$

C. $\wedge^\circ_{Al^{3+}} + \wedge^\circ_{SO_4^{2-}}$

D. $\left( \wedge^\circ_{Al^3} + \wedge^\circ_{SO_4^{2-}} \right) \times 6$

**Answer: C**

---

**22.** Given: $E^{\circ}_{Cr^{3+}/Cr} = 1.33V$, $E^{\circ}_{Cl/Cl^-} = 1.36V$

CIBased on the data given above, strongest oxidising agent will be :

A. $Cl$

B. $Cr^{3+}$

C. $Mn^+$

D. $MnO_4^-$

**Answer: D**

**23.** The standard electrode potentials $\left(E^{\circ}_{M^+/M}\right)$ of four metals A,B,C and D are $-1.2v,\ 0.6V,\ 0.85V$ and $-0.76$ V, respectively. The sequence of deposition of metals on applying potential is:

A. A,C,B,D

B. B,D,C,A

C. C,B,D,A

D. D,A,B,C

**Answer: C**

> ▶ **View Text Solution**

---

**24.** Which of the fo llowing statements is correct?

A. Oxidation numberofoxygen in $KO_2$ is +1

B. The specific conductance of an electrolyte solution decreases with increase in dilution

C. $Sn^{2+}$ oxidises $Fe^{3+}$

D. $Zn/ZnSO_4$ is a refcrence electrode

**Answer: B**

▶ **View Text Solution**

**25.** Molar ionic conductivities of a two-bivalent electrolytes $x^{2+}$ and $y^{2-}$ are 57 and 73 respectively. The molar conductivity of the solution formed by them will be

A. 130 S $cm^2 mol^{-1}$

B. $65 S cm^2 mol^{-1}$

C. $260 S cm^2 mol^{-1}$

D. $1875 S cm^2 mol^{-1}$

**Answer: A**

---

**26.** Thecell, $Zn|Zn^{2+}(1M)||Cu^{2+}(1M)|Cu(E_{cell}^{\circ} = 1.10V)$ was allowed to be completely discharged at 298 K. The relative concentration of $Zn^{2+}$ to $Cu^{2+}$ $\left(\dfrac{[Zn^{2+}]}{[Cu^{2+}]}\right)$ is

A. $9.65 \times 10^4$

B. antilog $(24.08)$

C. $37.3$

D. $10^{37.3}$

**Answer: D**

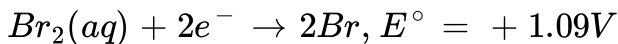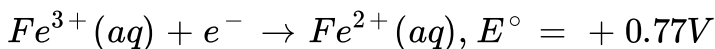**27.** Which of the following statements is true for an electrochemical cell?

A. Reduction occurs at $H_2$ electrode

B. $H_2$ is cathode and Cu is anode

C. $H_2$ is anode and Cu is cathode

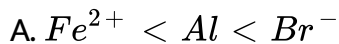D. Oxidation occurs at Cu electrode

**Answer: C**

▶ **View Text Solution**

**28.** Given

$$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq), E^\circ = +0.77V$$

$$Al^{3+}(aq) + 3e^- \rightarrow Al(s), E^\circ = -1.66V$$

$$Br_2(aq) + 2e^- \rightarrow 2Br, E^\circ = +1.09V$$

Considering the electrode potentials, which of the following represents the correct order of reducing power?

A. $Fe^{2+} < Al < Br^-$

B. $Br^- < Fe^{2+} < Al$

C. $Al < Br < Fe^{2+}$

D. $Al < Fe^{2+} < Br$

**Answer: D**

> ▶ **View Text Solution**

---

**29.** Standard free energies of formation (in kJ/mol) at 298 K are $-237.2$, $-394.4$ and $-8.2$ for $H_2O(l)$, $CO_2(g)$ and pentance (g) respectively. The value $E^\circ_{cell}$ for the pentance-oxygen fuel cell is:

A. $1.968V$

B. $2.0968V$

C. $1.0968V$

D. $0.0968V$

**Answer: C**

---

**30.** Given $E^{\circ}_{Cr^{3+}/Cr} = -0.72V$, $E^{\circ}_{Fe^{2+}/Fe} = -0.42V$. The potential for the cell

$Cr|Cr^{3l}(0.1M)||Fr^{2l}(0.01M)|Fe$ is

A. $0.26V$

B. $0.336V$

C. $-0.339V$

D. $0.26V$

**Answer: D**

**31.** Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 rnilli ampere current. The time required to liberate 0.01 mole of $H_2$ gas at the cathode is

(1 Faraday $= 96500Cmol^{-1}$)

A. $9.65 \times 10^4$ sec
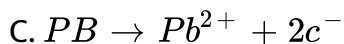
B. $19.3XX10^4$ sec

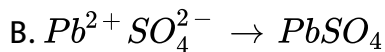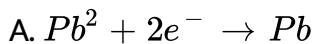C. $28.\ 95 \times 10^4$ sec

D. $38.6 \times 10^4$ sec

**Answer: B**

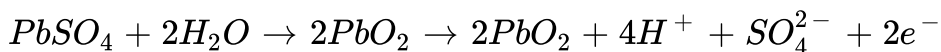> ▶ View Text Solution

**32.** Which of the following reaction occurs at the cathode during the charging oflead storage battery?

A. $Pb^2 + 2e^- \rightarrow Pb$

B. $Pb^{2+} SO_4^{2-} \rightarrow PbSO_4$

C. $PB \rightarrow Pb^{2+} + 2c^-$

D.

$$PbSO_4 + 2H_2O \rightarrow 2PbO_2 \rightarrow 2PbO_2 + 4H^+ + SO_4^{2-} + 2e^-$$

**Answer: D**

▶ **View Text Solution**

**33.** Conductanceof $0.1MKCl$ (condiuctivity = X $ohm^{-1}cm^{-1}$) filled

in a condictivity cell is Y $ohm^{-1}$. If the conductance of 0.1 Mno OH

filled in the csamecell is Z $ohm^{-1}$, them olar conductance of NaOH

will be

A. $10^3 \dfrac{XZ}{Y}$

B. $10^4 \dfrac{XZ}{Y}$

C. $10\dfrac{XZ}{Y}$

D. $0.1\dfrac{XZ}{Y}$

**Answer: B**

▶ View Text Solution

**34.** How much charge is required, when 1 mole of $Cr_2O_7^{2-}$ reduce to form I mole of $Cr^{3+}$ ?

A. 6F

B. 3F

C. 1F

D. 2F

**Answer: B**

▶ View Text Solution

**35.** In electrolysis of dilute $H_2SO_4$ using platinum electrodes

A. $H_2$ is evolved at cathode

B. $NH_2$ is produced at anode

C. $Cl_2$ is obtained at cathode

D. $O_2$ is produced

**Answer: A**

▶ **View Text Solution**

**36.** The resistance of 0.1 N solution of a salt is found to be $2.5 \times 10^3 ohm$. The equivalent conductance of the solution is (cell constnat $= 1.15cm^{-1}$)

A. $4.6$

B. 5.6

C. 6.6

D. 7.6

**Answer: A**

▶ **View Text Solution**

---

**37.** The highest electrical conductivity of the following aqueous solutions is of

A. 0.1 M difluoroacetic acid

B. 0.1 M fluoroacetic acid

C. 0.1 M chloroacetic acid

D. 0.1 Maceticacid

**Answer: A**

**38.** When during electrolysis of a solution of $AgNO_3$ 9650 coulombs of charge pass through the electroplating bath, the mass of silver deposited on the cathode will be

A. $10.8g$

B. $21.6g$

C. $108g$

D. $1.08g$

**Answer: A**

**39.** The reduction potential ofhydrogen half-cell will be negative if:

A. $p(H_2) = 1$ atm and $[H^+] = 2.0M$

B. $p(H_2) = 1$ atmand $[H^+] = 1.01M$

C. $p(H_2) = 2$ atm and $[H^2] = 1.0M$

D. $p(H_3) = 2$ atm and $[H^+] = 2.0M$

**Answer: C**

▶ View Text Solution

**40.** When electric current is passed through acidified water, 1 12 mL of hydrogen gas at STP collected at the cathode in 965 seconds. The current passed in amperes is

A. $1.0$

B. $0.5$

C. $0.1$

D. $2.0$

**Answer: A**

**41.** An electrolytic cell contains a solution of $Ag_2SO_4$ and platinum electrodes. A current is passed until $1.6g$ of $O_2$ has been liberated at anode. The amount of silver deposited at cathode would be

A. $107.88g$

B. $1.6g$

C. $0.8g$

D. $21.60g$

**Answer: D**

**42.** Which of the following pair(s) is/are incorrectly matched?

(i) R (resistance) -ohm ($\Omega$)

(ii) $\rho$ (resistivity)-ohm metre ($\Omega m$)

(iii) G (conductance)- seim ens or ohm (S)

(iv) k (conducjtivity)-scimens $metre^{-1}(SM^{-1})$

   A. $(i), (ii)$ and $(ii)$

   B. $(ii)$ and $(iii)$

   C. $(i), (ii)$ and $(iv)$

   D. $(iii)$ only

**Answer: D**

▶ View Text Solution

---

**43.** One Faraday of electricity is passed through molten $Al_2O_3$, aqueous solution of $CuSO_4$ and molten NaCl taken in three

different electrolytic cells connected in series. The mole ratio of Al, Cu and Na deposited at the respective cathode is

A. $2:3:6$

B. $6:2:3$

C. $6:3:2$

D. $1:2:3$

**Answer: A**

▶ View Text Solution

---

**44.** If $\rho$ pis the resistance in ohm of a centimeter cube, generally called the specific resistance of the substance constituting the conductor, the resistance r of the layer containing "a" cubes is given by

A. $\dfrac{1}{r} = \dfrac{1}{\rho} + \dfrac{1}{\rho} + \ldots$

B. $\dfrac{1}{r} = \dfrac{1}{\rho a} + \dfrac{1}{\rho a} + \ldots$

C. $r = a/\rho$

D. $r = \rho + \rho + \ldots$

**Answer: A**

▶ **View Text Solution**

---

45. Which of the following statements is wrong ?

A. Electrolysis of an aqueous sodium hydroxide solution liberates

$H_2$ gas at the cathode and $O_2$ gas at the anode.

B. Electolysis of dil $H_2SO_4$ liberates $H_2(g)$ at cathode  and $O_2$

(g) at the anode

C. $\Delta G^\circ = nFE^\circ f$ or a spontancous reaction

D. $E = E^\circ - \dfrac{0.059}{n}\log Q,$ where Q= reaction quotient.

**Answer: C**

▶ View Text Solution