CHEMISTRY

BOOKS - NARENDRA AWASTHI

ELECTROCHEMISTRY

Exercise

1. A cell reaction would be spontaneous if the cell potential and $\triangle_r G$ are respectively:

    A. positive and negative

    B. negative,negative

    C. zero,zero

    D. positive,zero

Answer: a

2. give the symbol of the atom whose ground state corresponds to each of the following configuration : (2) 1s2 2s2 2p3

A.

B.

C.

D.

Answer: C

3. Calculate the oxidation number sulphur of (S2O4)-2

4. The electric charge required for electrode deposition of one gram-equivalent of a substance is :

A. one ampere per second

B. 96500 coulombs per second

C. one ampere for one hour

D. charge on one mole of electrons

Answer: D

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5. The amount of an ion liberated on an electrode during electrolysis does not depend upon:

A. conductance of the solution

B. current strength

C. time

D. electrochemical equivalent of the element

Answer: A

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6. How many electrons are there in one coulomb of electricity?

A. 6.023×10^{23}

B. `1.64xx10^(-24)

C. 6.24×10^{18}

D. 6.24xx10(-24)

Answer: C

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7. How many coulombs are provided by a current 0.010 mA in the calculator battery that can operate for 1000 hours?

A. 1

B. 10

C. 0.01

D. 36

Answer: D

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8. How many minutes are required to deliver 3.21×10^6 coulombs using a current of 500 A used in the commercial production of chlorine?

A. 8.3

B. 5.3×10^4

C. 6420

D. 107

9. Passage of a current for 548 seconds through a siver coulometer results in the deposition of 0.746g of silver.What is the current (in A)?

A. 1.22

B. 1.16

C. 1.07

D. 1

10. Electrolysis can be used to determine atomic masses. A current of 0.550 A deposits 0.55g of a certain metal in 100 minutes. Calculate the atomic mass of the metal if eq. mass=mole. Mass/3

A. 100

B. 45

C. 48.25

D. 144.75

Answer: C

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11. Beryllium occurs naturally in the form of beryl. The metal is produced from its ore by electrolysis after the ore has been converted to the oxide and then to the chloride.How many grams of Be(s) is deposited form a $BeCl_2$ solution by a current of 5.0 A that flows for 1.0 h? (Atomic weight:Be=9)

A. 0.84

B. 1.68

C. 1.42

D. 1.08

Answer: A

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12. How many minutes will it take to plate out 5.2g of cr from a $Cr_2(SO_4)_3$ solution using a current of 9.65 A ? (Atomic mass:Cr=52.0)

A. 200

B. 50

C. 100

D. 103

Answer: B

13. Calculate the current (in mA) required to deposite 0.195g of platinum metal in 5.0 hours from a solution of $[PtCl_6^{2-}$:(Atomic mass:Pt=195)

A. 310

B. 31

C. 21.44

D. 5.36

Answer: C

14. How many Faradays are required to reduce 0.25g of Nb (V) to the metal?

A. 2.7×10^{-3}

B. 1.3×10^{-2}

C. 2.7×10^{-2}

D. 7.8×10^{-3}

Answer: B

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15. One gm metal M^{3+} was discharged by the passage of 1.81×10^{23} electrons.What is the atomic mass of metal?

A. 33.35

B. 133.4

C. 66.7

D. None of these

Answer: D

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16. Total charge required to convert three moles of Mn_3O_4 to MnO_4^{c-2} in present of alkaline medium

A. 5F

B. 10F

C. 20F

D. None of these

Answer: C

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17. The electrolytic decomposition of dilute sulphuric acid with platinum electrode, cathodic reaction is :

A. reduction of H^+

B. oxidation of SO_4^{2-}

C. reduction SO_3^{2-}

D. oxidation of H_2O

Answer: A

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18. Which one of the following metals can not be obtained on electrolysis of aqueous solution of its salts?
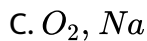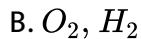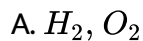
A. mg

B. Ag

C. Cu

D. Cr

Answer: A

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19. A solution of sodium sulphate in water is electrolysed using inert electrodes, The products at the cathode and anode are respectively.

A. H_2, O_2

B. O_2, H_2

C. O_2, Na

D. $H_2, S_2O_8^{2-}$
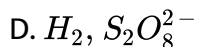
Answer: D

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20. give the symbol of the atom whose ground state corresponds to each of the following configuration : (3) 1s2 2s2 2p6 3s2 3p5

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21. when an aqueous solution of H_2SO_4 is electrolysed the product at anodes is :

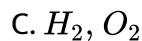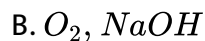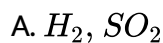A. H^-

B. OH^-

C. SO_4^{2-}

D. O_2

Answer: D

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22. An aqueous solution of Na_2SO_4 is electrolysed using Pt electrodes. The products at the cathode and anode are respectively:

A. H_2, SO_2

B. O_2, $NaOH$

C. H_2, O_2

D. O_2, SO_2

Answer: C

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23. List the value of n and I for the following orbitals : (1) 3s

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24. A dilute aqueous solution of $CuSo_4$ is electrolysed using platinum electrods. The products at the anode and cathode are:

A. O_2, H_2

B. H_2, O_2

C. O_2, Cu

D. $S_2O_8^{2-}$, H_2

Answer: C

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25. What is the molar mass of K2CO3.

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26. At what temperature have the celcius and fahrenheit reading the same numerical value?

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27. How much time is required for complete decomposition of 4 moles of water using 4 ampere?

A. $3.86 \times 10^5 \sec$

B. $1.93 \times 10^5 \sec$

C. 96500sec

D. 48250sec

Answer: B

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28. An aqueous solution containing $1M$ each of Au^{3+}, Cu^{2+}, Ag^+, Li^+ is being electrolysed by using inert electrodes. The value of standard potentials are :

$E^\circ_{Ag^+/Ag} = 0.80V$, $E^\circ_{Cu^+/Cu} = 0.34V$ and

$E^\circ_{Au^{+3}/Au} = 1.50$, $E^\circ_{Li^+/Li} = -3.03V$

will increasing voltage, the sequence of deposition of metals on the cathode will be :

A. Li, Cu, Ag, Au

B. Cu, Ag, Au

C. Au, Ag, Cu

D. Au, Ag, Cu, Li

Answer: C

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29. If 0.50L of a 0.60M $SnSo_4$ solution is electrolysed for a period of 30.0min using a current of 4.60 A. If inert electrods are used, what is the final concentration of Sn^{2+} remaining in the solution?[at.mass of Sn=119]

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30. A 100.0mL dilute solution of Ag^+ is electrolysed for 15.0 minutes with a current of 1.25mA and the silver is removed completely. What was the initial$[Ag^=]$?

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31. A 250.0 mL sample of a 0.20M Cr^{3+} is electrolysed with a current of 96.5 A. If the remaining $[Cr^{3+}]$ is 0.1 M, the duration of process is:

A. 25sec

B. 225sec

C. 150sec

D. 75sec

Answer: D

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32. Which have maximum number of unpaired electrons Br or Br-

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33. Which have maximum number of unpaired electrons Cu or F.

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34. How many number of unpaired electron in ground state of phosphorous?

35. How many grams of Cr are deposited in the electrolysis of solution of $Cr(NO_3)_3$ in the same time that it takes to deposite 0.54g of Ag in a silver coulometer arranged in series with the $Cr(NO_3)_3$ cell? (Atomic mass: Cr=52.0,Ag=108)

A. 0.0866

B. 0.0288

C. 0.173

D. 0.22

Answer: A

36. In the electolysis of a $CuSO_4$ solution, how many grams of Cu are plated out on the cathode in the time that it takes to liberate 5.6 litre of $O_2(g)$, measured at 1 atm and 273 K, at the node?

A. 31.75

B. 14.2

C. 4.32

D. None of these

Answer: A

37. Ammonium perchlorate, NH_4ClO_4 , used in the solid fuel in the booster rockets on the space shuttle, is prepared from sodium perchlorate, $NaClO_4$, which is produced commercially by the electrolysis

of a hot, stirred solution of sodium chloride. How many faradays are required to produce 1.0kg of sodium perchlorate?

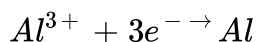$$NaCl + 4H_2O \rightarrow NaClO_4 + 4H_2$$
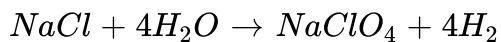
A. 40.3

B. 18.3

C. 31.6

D. 65.3

Answer: D

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38. In the commercial preparation of aluminum,aluminum oxide (Al_2O_3) is electrolysed at $1000°$ C. How many coulombs of electricity are required to give 54kg of aluminum ? Assume following reaction takes place at cathode:

$$Al^{3+} + 3e^- \rightarrow Al$$

A. 17.3×10^8

B. 3.21×10^7

C. 1.82×10^4

D. 57.6×10^7

Answer: D

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39. When molten lithium chloride (LiCl) is electrolysed, lithium metal is formed at the cathode. If current efficiency is 75% then how many grams of lithium are liberated when 1930 C charge pass through the cell? (Atomic mass of Li=7)

A. 0.105

B. 0.12

C. 0.28

D. 0.24

Answer: A

40. Beryllium occurs naturally in the form of beryl. The metal is produced from its ore by electrolysis after the ore has been converted to the oxide and then to the chloride.How many grams of Be(s) is deposited form a $BeCl_2$ solution by a current of 5.0 A that flows for 1.0 h? (Atomic weight:Be=9)

A. 2463

B. 460

C. 1800

D. 1231.6

Answer: A

41. $H_2(g)$ and $O_2(g)$, can be produced by the electrolysis of water. What total volume (in L) of O_2 and H_2 are produced at 1 atm and 273K when a current of 30 A is passed through a K_2SO_4 (aq) solution for 193 min?

A. 20.16

B. 40.32

C. 60.48

D. 80.64

Answer: C

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42. The cost of 2Rs/kWh of operating an electric motor for 10hours takes 10amp at 110V is:
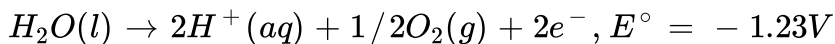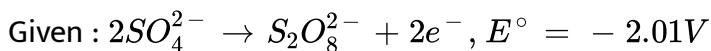
A. 79200 Rs

B. 22000Rs

C. 220Rs

D. 22Rs

Answer: D

43. A 1 M solution of H_2SO_4 is electrolysed. Select correct statement in respect of products obtain at anode and cathode respectively:

Given : $2SO_4^{2-} \rightarrow S_2O_8^{2-} + 2e^-$, $E^\circ = -2.01V$

$H_2O(l) \rightarrow 2H^+(aq) + 1/2O_2(g) + 2e^-$, $E^\circ = -1.23V$

A. concentration of H_2SO_4 remain constant, H_2, O_2

B. concentration of H_2SO_4 remain constant, O_2, H_2

C. concentration of H_2SO_4 remain constant, O_2, H_2

D. concentration of H_2SO_4 remain constant, $S_2O_8^{2-}$, H_2

Answer: B

44. Cadmium amalgam is prepared by electrolysis of a sodium of $CdCl_2$ using a mercury cathode. How long should a current of 4 A be passed in order to prepare 10% by mass Cd in Cd-Hg amalgam on cathode of 4.5 g Hg? (atomic mass of Cd=112)

A. 400sec

B. 215.40 sec

C. 861.6 sec

D. 4308.8 sec

Answer: D

45. Use of electrolysis is .

A. electrorefining

B. electroplating

C. both (a) and (b)

D. None of these

Answer: C

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46. When a solution of $AgNO_3$ (1 M) is electrolysed using platinum anode and copper cathode, what are the products obtained at two electrodes? Given : $E°_{cu^{2+}|cu} = +0.34V$, $E°_{H_2O|O_2,H^+} = -1.23V$

$E°_{H^+|H_2} = +0.0V$, $E°_{ag^+|Ag} = +0.8V$

A. $Cu \rightarrow Cu^{2+}$ at anode, $Ag^+ \rightarrow Ag$ at cathode

B. $H_2O \rightarrow O_2$ at anode, $Cu^{2+} \rightarrow Cu$ at cathode

C. $H_2O \rightarrow O_2$ at anode, $Ag^+ \rightarrow Ag$ at cathode

D. $NO_3^- \rightarrow NO_2$ at anode, $Ag^+ \rightarrow Ag$ at cathode

Answer: C

47. Which of the following statement is correct about Galvanic cell?

A. It converts chemical energy into electrical energy

B. It converts electrical energy into chemical energy.

C. It converts metal from its free state to the combined state.

D. It converts electrolyte into individual ions.

Answer: A

48. E° for $Cl_2(g) + 2e^- \rightarrow 2Cl^-$ (aq) is $1.36V$, E° for Cl^- (aq) $\rightarrow 1/2Cl_2(g) + e^-$ is:

A. $1.36V$

B. $-1.36V$

C. -0.68

D. $0.68V$

Answer: B

49. when two half-cells of electrode potential of E_1 and E_2 are combined

to form a half 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:

A. $E_3 = E_2 - E_1$

B. $E_3 = \dfrac{E_1 n_1 + E_2 n_2}{n_3}$

C. $E_3 = \dfrac{E_1 n_1 + E_2 n_2}{n_3^2}$

D. $E_3 = E_1 - E_2$

Answer: B

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50. The function of a salt bridge is to :

    A. maintain electrical neutrally of both half cells

    B. increases the cell potential at the positive electrode

    C. decrease the cell potential at the negative electrode

    D. eliminate the impurities present in the electrolyte

Answer: A

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51. Saturated solution of KNO_3 with agar-agar is used to make 'salt bridge' because:

A. size of K^+ is greater than that of NO_3^-

B. velocity of NO_3^- is greater than that of K^+

C. velocity of K^+ and NO_3^- are nearly the same

D. both velocity and size of K^+ and NO_3^- ions are nearly same

Answer: C

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52. What is salt bridge? give its functions.

A. a saturated solution of KCl and agar-agar

B. a saturated solution of KNO_3 and agar-agar

C. a saturated solution of NH_4NO_3 and agar-agar

D. all of these

Answer: D

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53. The nature of curve of E°_{cell} vs. log K_c is :

A. straight line

B. parabola

C. hyperbola

D. elliptical curve

Answer: A

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54. Consider the following equations for a cell reaction

$A + B \Leftrightarrow C + D, E^\circ = x\text{volt}, K_{eq} = K_1$

$2A + 2B \Leftrightarrow 2C + 2D, E^\circ = y\text{volt}, K_{eq} = K_2$ then:
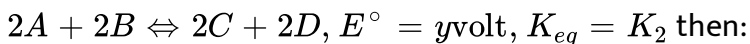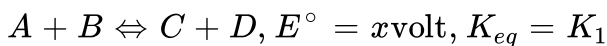
A. $x = y, k_1 + k_2$

B. $x = 2y, K_1 = 2K_2$

C. $x = y$, $K_2^2 = K_1$

D. $X^2 = y$, $K_1^2 = K_2$

Answer: C

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55. Which graph correctly correlates E_{cell} as a function of concentration for the cell

$$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s), E_{cell}^\circ = 1.56V$$
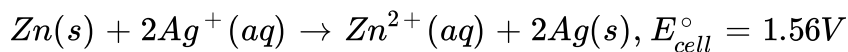
y-axis: E_{cell}, X-axis: $\log_{10} \dfrac{[Zn^{2+}]}{[Ag^+]^2}$

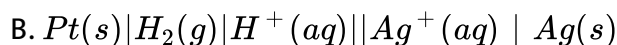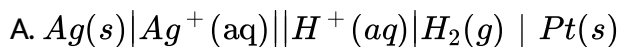

A.

B.

C.

D.
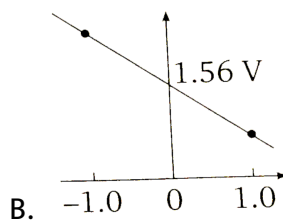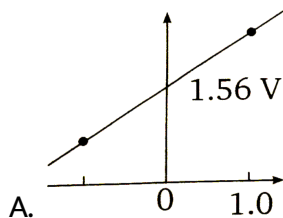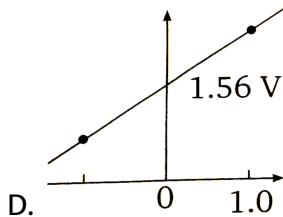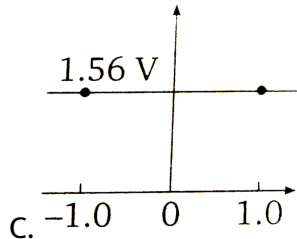
Answer: B

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56. The Nernst equation E=E°-RTlnQ in Q indicates that the Q will be

equal to equilibrium constant K_c when:

A. E=E°

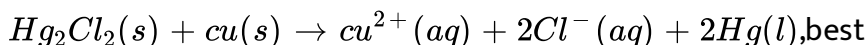B. RT/nF=1

C. E=zero

D. $E^\circ = 1$

Answer: C

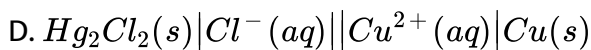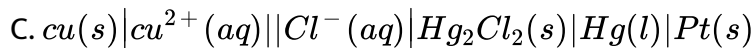57. The cell reaction $2Ag^+(aq) + H_2(g) \rightarrow 2H^+(aq) + 2Ag(s)$,best represented by :
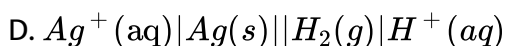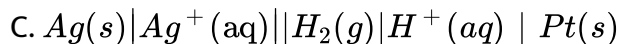
A. $Ag(s)|Ag^+(\text{aq})||H^+(aq)|H_2(g) \mid Pt(s)$

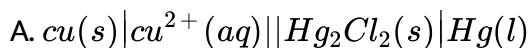B. $Pt(s)|H_2(g)|H^+(aq)||Ag^+(aq) \mid Ag(s)$

C. $Ag(s)|Ag^+(\text{aq})||H_2(g)|H^+(aq) \mid Pt(s)$

D. $Ag^+(aq)|Ag(s)||H_2(g)|H^+(aq)$

Answer: B

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58. The cell reaction

$Hg_2Cl_2(s) + cu(s) \rightarrow cu^{2+}(aq) + 2Cl^-(aq) + 2Hg(l)$,best

represented by :

A. $cu(s)\big|cu^{2+}(aq)||Hg_2Cl_2(s)\big|Hg(l)$

B. $cu(s)\big|cu^{2+}(aq)||Hg(l)\big|HgCl_2(s)$

C. $cu(s)\big|cu^{2+}(aq)||Cl^-(aq)\big|Hg_2Cl_2(s)\big|Hg(l)\big|Pt(s)$

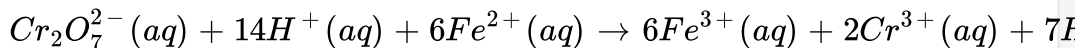D. $Hg_2Cl_2(s)\big|Cl^-(aq)||Cu^{2+}(aq)\big|Cu(s)$
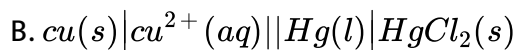
Answer: C

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59.   The   cell   reaction

$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6Fe^{2+}(aq) \rightarrow 6Fe^{3+}(aq) + 2Cr^{3+}(aq) + 7H$

is best represented by:

A. $Pt(s)\big|Fe^{2+}(aq), Fe^{3+}(aq)||Cr\_2O_7^{2-}(aq), Cr^{3+}(aq)\big|Pt(s)$

B. $Pt(s)\big|Cr_2O_7^{2-}(aq), Cr^{+3}(aq)||Fe^{3+}(aq), Fe^{+2}(aq)\big|Pt(s)$

C. $Fe^{2+}(aq)\big|Fe^{3+}(aq)||Cr_2O_7^{2-}(aq)\big|Cr^{3+}(aq)$

D. $Cr_2O_7^{2-}(aq)|Cr^{3+}(aq)||Fe^{3+}(aq)|Fe^{2+}(aq)$
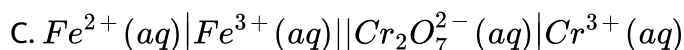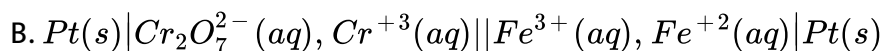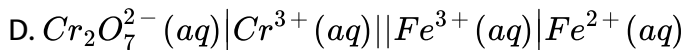
Answer: A

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60. Select the correct cell reaction of the cell

$Ag(s) \mid Ag^+(aq)||Cu^{2+}(aq)|Cu(s)$:

   A. $2Ag(s) + Cu(s) \rightarrow Cu^{+2}(aq) + 2Ag^+(aq)$

   B. $Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$

   C. $2Ag(s) + Cu^{2+}(aq) \rightarrow Cu(s)(aq) + 2Ag^+(aq)$

   D. $Cu^{2+}(aq) + 2Ag^+(aq) \rightarrow 2Ag(s) + Cu(s)$
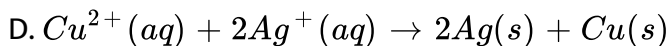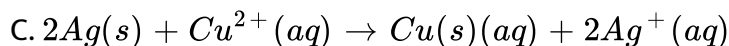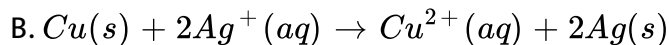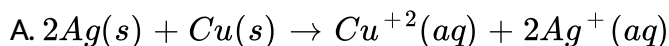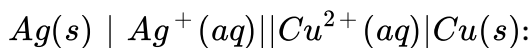
Answer: C

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61. Select the correct cell reaction of the cell $Pt(s)|Cl_2(g)|Cl^-(aq)||Ag^+(aq) \mid Ag(s)$:

A. $Cl_2(g) + Ag^+(aq) \rightarrow Ag(s) + 2Cl^-(aq)$

B. $Cl_2(g) + Ag(s) \rightarrow 2Cl^-(aq) + Ag^+(aq)$

C. $2Cl^-(aq) + 2Ag^+(aq) \rightarrow 2Ag(s) + Cl_2(g)$

D. $AgCl(s) \rightarrow Ag^+(aq) + Cl^-(aq)$
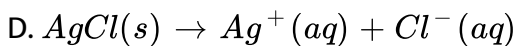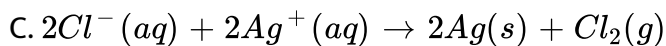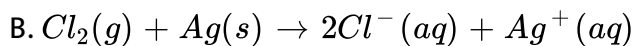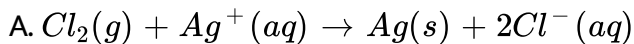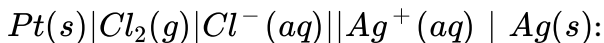
Answer: C

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62. Standard electrode potential of SHE at 298 K is :

A. 0.05V

B. 0.10V

C. 0.50V

D. 0.00V

Answer: D

---

63. The e.m.f of the following galvanic cell:

A. $Zn|zn^{2+}(1M)||Cu^{2+}(1M)|Cu$

B.

C.

D.

Answer: D

---
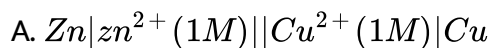
64. Based on the cell notation for a spontaneous reaction, at the anode:

$Ag(s)|AgCl(s)|Cl^-(aq)||Br^-(aq)|Br_2(l)|C(s)$
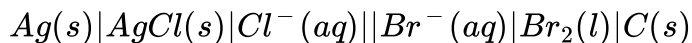
A. AgCl gets reduced

B. Ag gets oxidized

C. Br^- gets oxidized

D. Br_2 gets reduced

Answer: B

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65. Given the listed standard electrode potentials, what is E° for the cell:

$$4BiO^+(aq) + 3N_2H_5^+(aq) \rightarrow 4Bi(s)3N_2(g) + 4H_2O)l) + 7H^+(aq)$$

$$N_2(g) + 5H^+(aq) + 4e^- \rightarrow N_2H_5^+(aq), E^\circ = -0.23V$$

$$BiO^+(aq) + 2H^+(aq) + 3e^- \rightarrow Bi(s) + H_2O(l), E^\circ = +0.32V$$
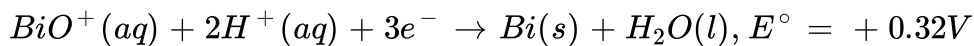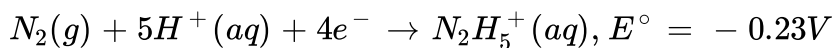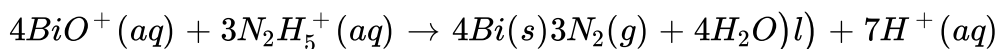
A. 0.55

B. 0.34

C. 1.88

D. 0.09

Answer: A

---

66. what is the standard electrode potential for the reduction of HClO?

$$HClO(aq) + H^+ (aq + 2e^- \rightarrow Cl^- (aq) + H_2O(l)$$

Given: $Cr^2(aq) \rightarrow Cr^{3+}(aq) + e^-, E^\circ = 0.41V$

$$HClO(aq) + H^+(aq) + 2Cr^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + H_2O(l), E^\circ = 1.80$$
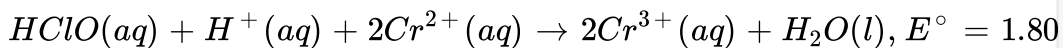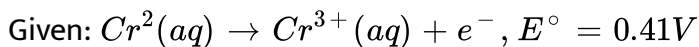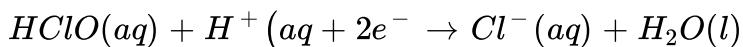
A. 1.39

B. 1.54

C. 1.22

D. 0.9

Answer: A

67. The E° for the following cell is +0.34 V.

$In(s) \mid In(OH)_3(aq) \mid\mid Sb_2^- (aq) \mid Sb(s)$.
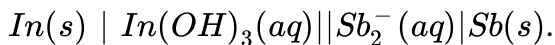
Using $E^\circ = -1.0V$ for the In $(OH)_3 \mid$ In, couple, calculate E° for the $Sb_2^- \mid Sb$ half-reaction:

A. -1.34

B. 0.66

C. 0.82

D. -0.66

Answer: D

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68. From the fllowing half-cell reactions and their standard potentials ,what is the smallest possible standard e.m.f for spontaneous reactions?

$PO_4^{3-} (aq) + 2H_2O(l) + 2e^- \rightarrow HPO_3^{2-} + 3OH^- (aq), E^\circ = -1.05V$

$PbO_2(s) + H_2O(l) + 2e^- \rightarrow PbO(s) + 2OH^- (aq), E^\circ = +0.28V$
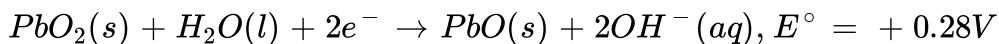
69. Determine which substance is the best reducing agent

    A. HPO_3^{2-}

    B. PO_4^{3-}

    C. IO^-

    D. IO_3^-
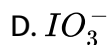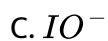
Answer: A

70. Determine which substance is the best reducing agent

    A. IO_3^-

    B. IO^-

    C. PbO

D. PO_4^{3-}
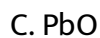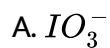
Answer: A

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71. Consider the following half-cell reaction and associated standerd half-cell potentials and determine the maximum voltage thatr can be obtained by combination resulting in spontenous process :

$AuBr_4^- (aq) + 3e^- \rightarrow Au(s) + 4BR^- (aq), E^\circ = -086V$

$Eu^{3+} (aq) + e^- \rightarrow Eu^{2+} (aq), E^\circ = -043V$

$Sn^{2+} (aq) + 2e^- \rightarrow Sn(s), E^\circ = -0.14V$

$IO^- (aq) + H_2O(l) + 2e^- \rightarrow I^- (aq) + 2OH^-, E^\circ = +0.49V$
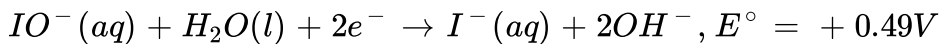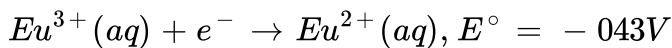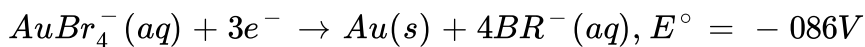
A. $+0.72$

B. $+1.54$

C. $+1.00$

D. $+1.35$

Answer: D

---

72. The position of some metals in the electrochemical series in dectreasing electropositeve character is given as $Mg > Al > Zn > Cu > Ag$. What will happen if a copper spoon is used to stir a solution of aluminimum nitrate ?

    A. The spoon gets coated with aluminium

    B. Aan alloy of aluminium and copper is formed

    C. No reaction occurs

    D. The solution starts turning blue

Answer: C

73. Write the name & symbol of the element with electronic configuration

1s2 2s2 2p6 3s2 3p6 4s2 3d5

A.

B.

C.

D.

Answer: B

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74. Based on the following information arrange four metals A, B, C and

D in order of decreasing ability to act as reducing agents :

(I) Only A,B, and C react with $1MHCl$ to give $H_2(g)$

(II) When C is added to solutions of the other metal ions, metallic B and

D are formed

(III) Metal C dows not reduced A^{n+}

A. $C > A > B > D$

B. $C > A > D > B$

C. $A > C > D > B$

D. $A > C > B > D$

Answer: D

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75. When an aqueous solution of $CuSO_4$ is sstirred with a silver spoon then :

A. Cu^+ will be formed

B. Ag^+ will be formed

C. Cu^{2+} will be deposited

D. None of these

Answer: D

76. Based on the followiong information arranges four metals A,B,C and D

in the order of decreasing ability to act as reducing agents :

(I) Only A,B and C react with 1 M HCl to give $H_2(g)$

(II) When C is added to solutions of the other metal ions, metallic B and D

are formed

(III) Metal C does not reduce A^{n+}.

A. $D > A > C > B$

B. $A > D > C > B$

C. $B > D > A > C$

D. $D > A > B > C$

Answer: D

77. In the reaction :

$$4Fe(s) + 3O_2(g) \rightarrow 4Fe^{3+}(aq) + 6O^{2-}(aq)$$
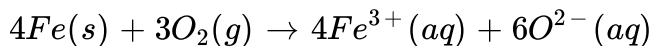
which of the following statement is incorrect ?

   A. It is a redox reduction

   B. Fe is reducing agent

   C. O_2 is an oxidizing agent

   D. Fe is reducing to Fe^{3+}

Answer: D

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78. Which of the following is displaced by Fe ?

   A. Ag

   B. Zn

   C. Na

D. All of these

Answer: A

---

79. The standerd potential at $25°$ for the following Half rection is given :

$Zn^{2+} + 2e^- \rightarrow Zn, E° = -0.762V$

$Mg^{2+} + 2e^- \rightarrow Mg, E° = -2.37V$
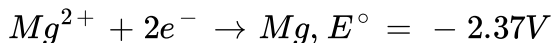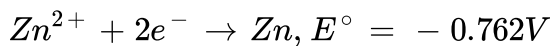
When Zinc dust is added to the solution of $MgCl_2$.

A. $ZnCl_2$ is formed

B. Mg is percipitaed

C. Zn dissolved in the solution

D. No reaction take place

Answer: D

80. The element which can displace three other halogens from their compound is :

A. F

B. Cl

C. Br

D. I

Answer: A

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81. Using the standerd half-cell potential listed, calculate the equilibrium constant for the reaction :

$Co(s) + 2H^+(aq) \rightarrow Co^{2+}(aq) + H_2(g)$ at 298 K

$Co^{2+}(aq) + 2e^- \rightarrow Co(s) E^\circ = -0.277V$
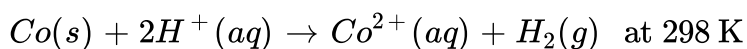
A. 2.3×10^9

B. 4.8×10^4

C. 4.8×10^7

D. 4.8×10^{11}

Answer: A

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82. The E° at 25° C for the following reaction is 0.22 V. Calculate the equilibrium constant at 25° C :

$$H_2(g) + 2AgCl(s) \rightarrow 2Ag(s) + 2HCl(aq)$$
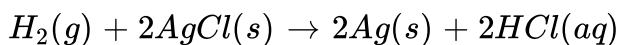
A. 2.8×10^7

B. 5.2×10^8

C. 5.2×10^6

D. 5.2×10^3

Answer: A

83. Electrode potential of the half Pt(s)|Hg(l)|$Hg_2Cl_2(s)$|$Cl^-(aq)$ can be incresed by :

A. Increasing $[Cl^-]$

B. decreasing $[Cl^-]$

C. Increasing $Hg_2Cl_2(s)$

D. decreasing $Hg(l)$

Answer: A

84. The equillibrium constant for thefollowing general reaction is 10^{30}. Calculate E° for the cell at 298 K.

$$2X_2(s) + 3Y^{2+}(aq) \rightarrow 2X_2^{3+}(aq) + 3Y(s)$$
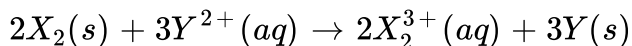
A. $+0.105V$

B. $+0.2955V$

C. 0.0985 V

D. -0.2955 V

Answer: B

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85. A solution containing H^+ and D^+ ions is in equilibrium with a mixture of H_2 and D_2 gases at $25°C$. If the partial pressures of both gases are 1.0 atm, find the ratio of $[H^+]/[D^+]:(Given:E\ D^+$ /(D)=-0.003V` and Ecell is =0.006V]

A. 1.23

B. 1.12

C. 0.11

D. 1

Answer: B

86. The $E°$ at $25°C$ for the following reaction is 0.55 V. Calculate the $\Delta G°$ in kJ/mol :

$$4BiO^+(aq) + 3N_2H_5^+ \rightarrow 4Bi(s) + 3N_2(g) + 4H_2O(l) + 7H^+$$
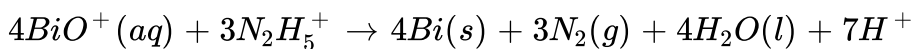
A. $- 637$

B. $- 424$

C. $- 106$

D. $- 318.5$

Answer: A

87. Use the following standard electrode potentials, calculate ΔG° in kJ/ mol for the indicated reaction :

$5Ce^{4+}(aq) + Mn^{2+}(aq) + 4H_2O(l) \rightarrow 5Ce^{3+}(aq) + MnO_4^-(aq) + 8H^+$

$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l), \ E^\circ = +1.51V$

$Ce^{4+}(aq) + e^= \rightarrow Ce^{3+}(aq) \qquad E^\circ = +1.61V$
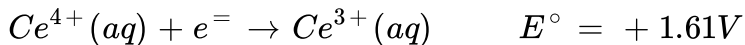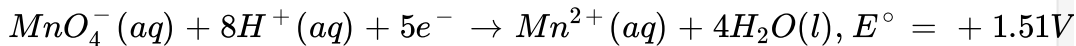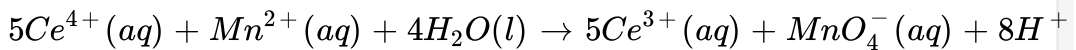
A. -9.65

B. -24.3

C. -48.25

D. -35.2

Answer: C

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88. Calculate the number of moles in the following : (1) 1.46g metric tones of Al.

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89. Consider the following equation for an electrochemical cell reaction. Which of the following changes in condition will increase the cell voltage ?

$$H_2(g) + PbCl_2(s) \rightarrow Pb(s) + 2HCl(aq)$$
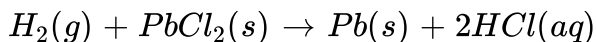
(I) addition of concentrated $HClO_4$ in the cell solution

(II), Increase the pressure of $H_2(g)$, (III)increase the amount of $Pb(s)$)

A. III

B. I and II

C. II and III

D. II

Answer: D

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90. Find the number of neutron and number of prorton if the element have number of electron 13 and mass number 27.

91. Calculate the mass of an atom of silver.

92. What is the mass of one atom of C(atomic mass 14)

93. Calculate the number of atoms in 34 mole of Cl.

94. For the electro chemical cell

$$Pt(s)\left|H_2(g)\right|_{1atm}\left|H^+(1M)\ \right|\ \left|Cu^{2+}(1M)\right|Cu(s),$$ which one of the
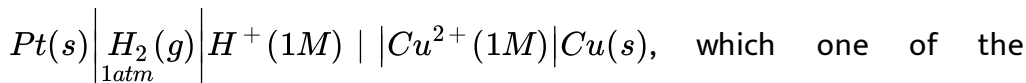
following statements are true ?

A. H^+ ions are formed at anode and Cu is deposited at cathode.

B. H_2 liberated at cathode and Cu is deposited at anode.

C. Oxidation occurs at cathode

D. Reduction occurs at anode

Answer: A

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95. If 11g of oxalic acid are dissolved in 500ml of solution(density =

1.1g/ml). What is the mass % of oxalic acid in solution?

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96. Identify the species undergoing oxidation and reduction.

a. $H_2S(g) + Cl_2(g)$ gives $2HCl(g) + S(s)$
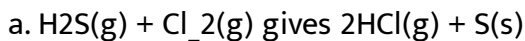
97. Calculate the number of moles in the following : (2) 7.9 mg of Ca

98. Calculate the number of atoms in 46g of He.

99. Calculate the total number of electrons present in 1.6g of methane.

100. Write oxidation number of Mn in MnO_2.

101. Given the folowing standerd electrode potentials, the K_{sp} for $PbBr_2$ is :

$$PbBr_2(s) + 2e^- \rightarrow Pb(s) + 2Br^-(aq), E^\circ = -0.248V$$

$$Pb^{2+}(aq) + 2e^- \rightarrow Pb(s), E^\circ = -0.126V$$
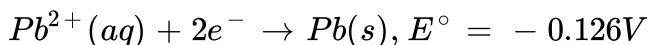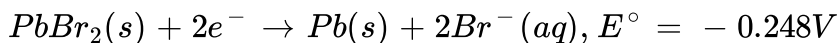
A. 7.3×10^{-5}

B. 4.9×10^{-14}

C. 5.2×10^{-6}

D. 2.3×10^{-13}

Answer: A

102. The standerd free energy change for the following reaction is -210kJ/mol. What is the standerd cell potential? Hydrogenperoxide converts in

to water and O2

A. $+0.752$

B. $+1.09$

C. $+0.420$

D. $+0.640$

Answer: B

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103. At equilibrium :

A. $E^{\circ}_{cell} = 0, \Delta G^{\circ} = 0$

B. $E^{\circ}_{cell} = 0, \Delta G = 0$

C. both are correct

D. none is correct

Answer: B

104. The E° at 25°C for the following reaction is 0.55 V. Calculate the ΔG° in kJ/mol :

$$4BiO^+(aq) + 3N_2H_5^+ \rightarrow 4Bi(s) + 3N_2(g) + 4H_2O(l) + 7H^+$$
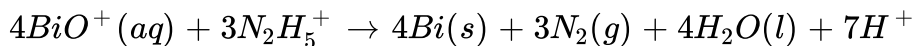
A. -140.94

B. -295

C. -212

D. -422.83

Answer: D

105. If $E^\circ_{Au^+ / Au}$ is 1.69 V and $E^\circ_{Au^{3+} / Au}$ is 1.40 V, then $E^\circ_{Au^+ / Au^{3+}}$ will be :

A. -0.9 v

B. -0.945 V

C. -1.255 V

D. None of these

Answer: D

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106. Consider the following standard electrode potentials and calculate the eqillibrium constant at $25°C$ for the indicated disproportional reaction :

$3Mn^{2+}(aq) \rightarrow Mn(s) + 2Mn^{3+}(aq)$

$Mn^{3+}(aq) + e^- \rightarrow Mn^{2+}(aq), E° = 1.51V$

$Mn^{2+}(aq) + 2e^- \rightarrow Mn(s), E° = -1.185V`$
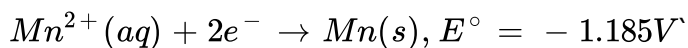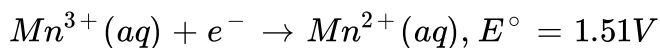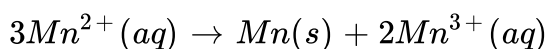
A. 1.2×10^{-43}

B. 2.4×10^{-73}

C. 6.3×10^{-92}

D. 1.5×10^{-62}

Answer: C

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---

107. Which one of the following is not solid fuel?

A. 0.1M HCl

B. 0.1 M H_2SO_4

C. 0.1 M NH_4OH

D. 0.01 M HCOOH

Answer: C

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108. $Ag|AgCl|Cl^-(C_2)||Cl^-(C_1)||AgCl | Ag$ for this cell ΔG is negative if :

A. $C_1 = C_2$

B. $C_1 > C_2$

C. $C_2 > C_1$

D. $Both(a)$ and (c)

Answer: C

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109. By how much is the oxidizing power of $Cr_2O_7^{2-}|Cr^{3+}$ couple decreased if the H^+ concentration is decreased from 1M to 10^{-3}M at $25°$ C?

A. 0.001 V

B. 0.207 V

C. 0.441 V

D. 0.414 V

Answer: D

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110. The temperature coefficient of a cell whose operation is based on the

reaction

$Pb(s) + HgCl_2(aq) \rightarrow PbCl_2(aq) + Hg(l)$ is :
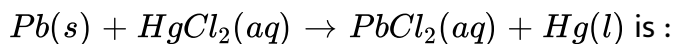
$\left(\dfrac{dE}{dT}\right)_P = 1.5 \times 10^{-4} VK^{-1}$ at 298 K

The change in entropy (in J/k mol) during the operation is :

A. 8627

B. 57.9

C. 28.95

D. 14.475

Answer: C

---

111. The thermodynamic efficiency of cell is given by

A. $\dfrac{\triangle H}{\triangle G}$

B. $\dfrac{nFE}{\triangle G}$

C. $\dfrac{nEF}{\triangle H}$

D. nFE°

Answer: C

---

112. calculate the value of equilibrium constant (K_f) for the reaction:

$$Zn^{2+}(aq) + 4OH^-(aq) \Leftrightarrow Zn(OH)_4^{2-}(aq)$$

Given: $Zn^{2+}(aq) + 2e^- \rightarrow Zn(s0, E^{\circ} = -0.76V$

$$Zn(OH)_4^{2-}(aq) + 2e^- \rightarrow Zn(s) + 4OH^-(aq), E^\circ = -1.36V$$
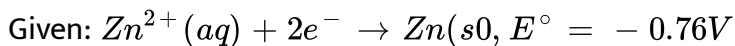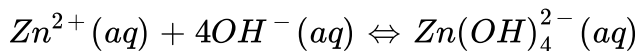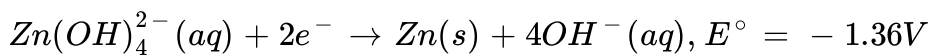
$$2.303\frac{RT}{F} = 0.06$$

A. 10^{10}

B. 2×10^{10}

C. 10^{20}

D. None of these

Answer: C

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113. Which of the following statement is false for fuel cell?

A. They are more efficient

B. They are free from pollution

C. They run till reactants are active

D. Fuel burned with O_2

Answer: D

---

114. When a lead storage battery is charged it acts as:

    A. a fuel cell

    B. an electrolytic cell

    C. a galvanic cell

    D. a concentration cell

Answer: B

---

115. The metal that forms a self-protecting film of oxide to prevent corrosion is:

A. Na

B. Al

C. Cu

D. Au

Answer: B

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116. Rusting of iron is catalyzed by which of the following?

A. Fe

B. Zn

C. O_2

D. H^+

Answer: D

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117. Which of the following is a highly corrosive salt?

A. Hg_2Cl_2

B. $HgCl_2$

C. $FeCl_2$

D. $PbCl_2$
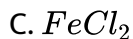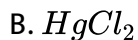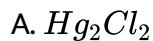
Answer: B

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118. In electrochemical corrosion of metals, the metal undergoing corrosion:

A. acts as anode

B. acts as cathode

C. undergoes reduction

D. None

Answer: A

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119. When an electric cell is charged, then:

A. voltage of cell increases

B. resistance of cell increases

C. eletrolyte of cell dilutes

D. None of these

Answer: A

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120. Electrolytic conduction is due to the movement of :

A. electrons

B. ions

C. atoms

D. electrons as well as ions

Answer: B

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121. Molten sodium chloride conducts electricity due to the presence of:

A. free electron

B. free ions

C. free molecules

D. atoms of sodium and chlorine

Answer: B

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122. Pure water does not conduct electricity because it :

A. is neutral

B. is readily decomposed

C. is almost totally unionized

D. has a low boiling point

Answer: C

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123. The relation among conductance (G), specific conductance (K) and cell constant (l/A) is :

A. $G = k\dfrac{l}{A}$

B. $G = k\dfrac{A}{l}$

C. $Gk = \dfrac{l}{A}$

D. G=kAL

Answer: B

---

124. If x is specific resistance of the electrolyte solution and y is the molarity of the solution then ^m is given by:

A. $\dfrac{1000X}{Y}$

B. $1000\dfrac{Y}{X}$

C. $\dfrac{1000}{XY}$

D. $\dfrac{XY}{1000}$

Answer: C

125. Equivalent conductivity can be expressed in terms of specific conductance (k) and concentration (N) in gram equivalent dm^{-3} as:

A. $k \times N$

B. $\dfrac{k \times 1000}{N}$

C. $\dfrac{k \times N}{1000}$

D. $k \times N \times 1000$

Answer: B

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126. Resistance of a decimolar solution between two electrodes 0.02 meter apart and 0.0004 m^2 in area was found to be 50 ohm. Specific conductance (k0 is :

A. $0.1 Sm^{-1}$

B. $1 Sm^{-}$

C. $10 Sm^{-1}$

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

Answer: B

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127. Resistance of 0.1 M KCl solution in a conductance cell is 300 ohm and conductivity is $0.013 Scm^{-1}$. The value of cell constant is :

A. $3.9 cm^{-1}$

B. $39 m^{-1}$

C. $3.9 m^{-1}$

D. None of these

Answer: A

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128. Ionisation constant of a weak acid (HA) in terms of A_m^∞ and A_m is:

A. $K_a = \dfrac{C\Lambda_m^\infty}{\Lambda_m - \Lambda^\infty}$

B. $K_a = \dfrac{C\Lambda_m^2}{\Lambda_m^\infty(\Lambda_m^\infty - \Lambda_m)}$

C. $K_a = \dfrac{C\Lambda(\Lambda_m^\infty)^2}{\Lambda_m^\infty(\Lambda_m^\infty - \Lambda_m)}$

D. None of these

Answer: B

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129. Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

A. its specific conductance increases

B. its equivalent conductivity decreases

C. its specific conductivity decreases and equivalent conductivity increases

D. Both specific and equivalent conductivity increases

Answer: C

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130. Molar conductivity of a solution of an electrolyte AB_3 is 150 $Scm^2 mol^{-1}$. If it ionises as $AB_3 \rightarrow A^{3+} + 3B^-$, its equivalent conductivity will be :

A. 150 (in $Scm^2 eq^{-1}$)

B. 75 (in $Scm^2 eq^{-1}$)

C. 50 (in $Scm^2 eq^{-1}$)

D. 80 (in $Scm^2 eq^{-1}$)

Answer: C

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131. Equivalent conductivity of $Fe_2(SO_4)_3$ is relative to molar conductivity by the expression :

A. $\Lambda_{eq} = \Lambda_m$

B. $\Lambda_{eq} = \Lambda_m/3$

C. $\Lambda_{eq} = 3\Lambda_m$

D. $\Lambda_{eq} = \Lambda_m/6$

Answer: D

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132. The limiting equivalent conductivity of $NaCl, KCl$ and KBr are 126.5, 150.0 and $151.5 Scm^2 eq^{-1}$, respectively. The limiting equivalent ionic conductance for Br^- is $78 Scm^2 eq^{-1}$. The limiting equivalent ionic conductance for Na^+ ions would be :

A. 128

B. 125

C. 49

D. 50

Answer: D

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133. The specific conductance of a saturated solution of silver bromide is $kScm^{-1}$. The limiting ionic conductivity of Ag^+ and Br^- ions are x and y respectively. The solubility of silver4 vromide in gL^{-1} is : (molar mass of AgBr=188)

A. $\dfrac{k \times 1000}{x - y}$

B. $\dfrac{k}{x + y} \times 188$

C. $\dfrac{k \times 1000 \times 188}{x + y}$

D. $\dfrac{x + y}{k} \times \dfrac{1000}{188}$

Answer: C

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134. The resistance of $0.1N$ solution of formic acid is $200 ohm$ and cell constant is $2.0 cm^{-1}$. The equivalent conductivity (in $Scm^2 eq^{-1}$) of $0.1N$ formic acid is :

A. 100

B. 10

C. 1

D. None of these

Answer: A

135. A conductance cell was filled with a 0.02 M KCl solution which has a specific conductance of $2.768 \times 10^{-3} ohm^{-1} cm^{-1}$. If its resistance is 82.4 ohm at $25°$ C the cell constant is:

A. $0.2182 cm^{-1}$

B. $0.2281 cm^{-1}$

C. $0.2821 cm^{-1}$

D. $0.2381 cm^{-1}$

Answer: B

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136. The equivalent conductance of Ba^{2+} and Cl^{c-} are $63.5 ohm^{-1} cm^2 eq^{-1}$ and $76 ohm^{-1} cm^2 eq^{-1}$, respectively, at infinite dilution . The equivalent conductance (in $oh^{-1} cm^2$) of $BaCl_2$ at infinite dilution will be

A. 203

B. 279

C. 101.5

D. 139.5

Answer: A

137. Unit of ionic mobility is :

A. $mV^{-1}s^{-1}$

B. $m^2V^{-2}s^{-1}$

C. $m^2V^{-1}s^{-1}$

D. $m^{-2}Vs^{-1}$

Answer: C

138. A_{AgCl}^{∞} can be obtained:

A. by extraplotation of the graph Λ and $\sqrt{C}$ to zero concentration

B. by known values of Λ^∞ of $AgNO_3$, HCl and HNO_3

C. both (a) and (b)

D. None of these

Answer: B

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139. The conductance of a salt solution (AB) measured by two parallel electodes of area $100cm^2$ separated by 10cm was found to be $0.0001\Omega^{-1}$. If volume enclosed between two electrode contain 0.1 mole of salt, what is the molar conductivity (Scm^2mol^{-1}) of salt at same concentration:

A. 10

B. 0.1

C. 1

D. None of these

Answer: B

---

140. The conductivity of a strong electrolyte:

A. increases on dilution

B. decrease on dilution

C. does not change with dilultion

D. depends upon density of electrolytes

Answer: B

---

141. Kohlrausch law can be used to find the molar conductivity of a weak electrolyte at `infinite dilution.

A. increase in degree of dissociation and decrease in ionic mobility

B. decrease in degree of dissociation and decrease in ionic mobility

C. increase in degree of dissociation and increase in ionic mobility

D. increase in degree of dissociation and increase in ionic mobility

Answer: C

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142. Strong electrolytes are those which:

A. conduct electricity

B. dissolve readily in water

C. dissolve into ions at high dilution

D. completely dissociation into ions

Answer: D

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143. The electric conduction of a salt solution in water depends on the :

A. size of its molecules

B. shape of its molecules

C. size of solvent molecules

D. extent of its ionization

Answer: D

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144. A graph was plotted between molar conductivity of various electrolytes (NaCl, HCl and NH_4OH) and $\sqrt{C}$ (in molL^{-1}) . Correct set is

:
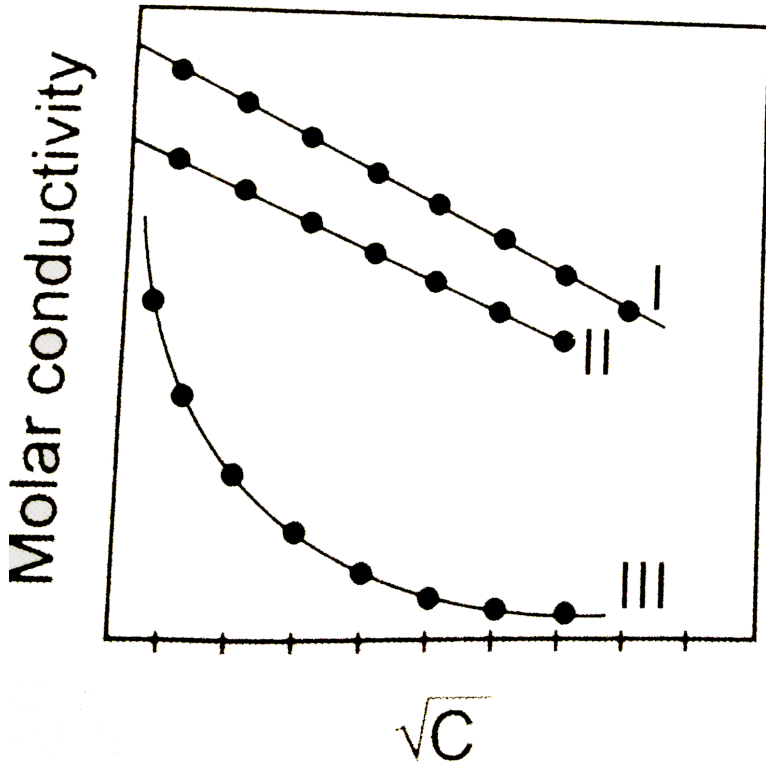
A. I(NaCl),II(HCl) , III(NH_4OH)

B. I(HCl),II(NaCl) , III(NH_4OH)

C. I(NH_4OH), II(NaCl), III(HCl)

D. I(NH_4OH), II(HCl) , III(NaCl)

Answer: B

145. Which of the following is arranged in increasing order of ionic mobility?

A. $I^- < Br^- < Cl^- < F^-$

B. $F^- < Cl^- < Br^- < I^-$

C. $F^- < I^- < Cl^- < Br^-$

D. $F^- < Cl^- < I^- < Br^-$
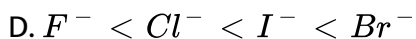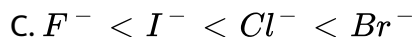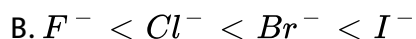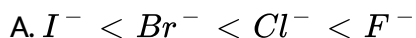
Answer: B

146. HNO_3(aq) is titrated with NaOH(aq) condutomatrically, graphical representation of the titration is :
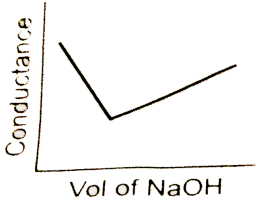
A.
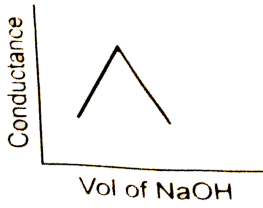
B.
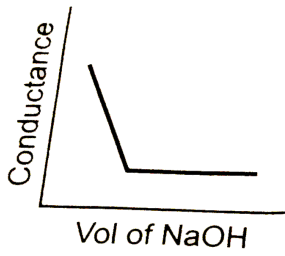
C.
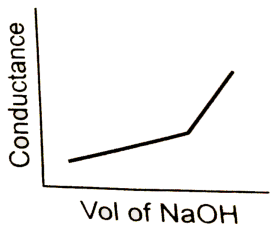
D.

Answer: A

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147. which of the following plots will obtained for a conductometric titration of strong acid against a weak base?

A.

B.

C.

D.
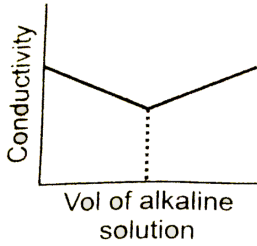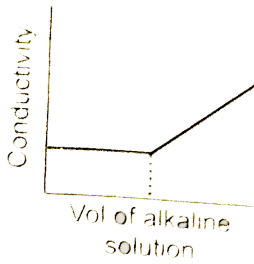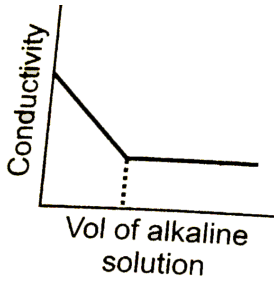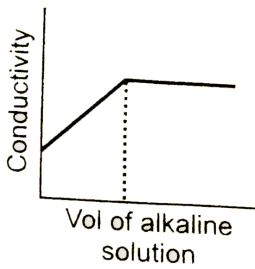
Answer: C

148. Conductometric titration curve of a equimolar mixture of HCl and acetic acid with NaOH(aq) is :

A.

B.

C.

Conductivity

Vol of NaOH

D.
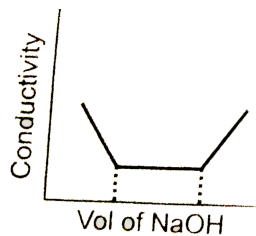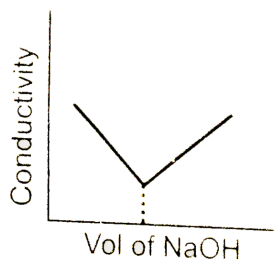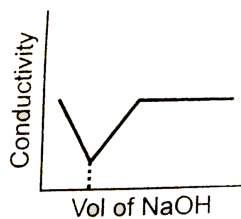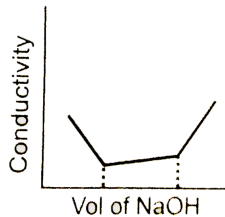
Answer: D

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149. In the Hall process, aluminium is produced by the electrolysis of molten Al_2O_3. How many second would it take to produce enough aluminium by the Hall process to make a case of 24 cans of auminium soft-drink, if each can uses 5.0g of Al, a current of 9650amp is employed and the current efficiency of the cell is 90%:

A. 203.2

B. 148.14

C. 333

D. 6.17

Answer: B

---

150. 108 g fairly concentrated solution of $AgNO_3$ is electrolysed by using 0.1 F charge the mass of resulting solution is

A. 94g

B. 11.6g

C. 96.4g

D. None of these

Answer: C

---

151. The electolysis of acetate solution produces ethane according to reaction:

$$2CH_3COO^- \rightarrow C_2H_6(g) + 2CO_2(g) + 2e^-$$
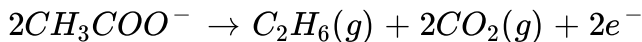
The current efficiency of the process is 80% . What volume of gases would be produced at $27°$ C and 740 torr, if the current of 0.5 amp is used though the solution for 96.45 min?

A. 6.0L

B. 0.60L

C. 1.365L

D. 0.91L

Answer: D

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152. A layer of chromium metal 0.25 mm thick is to be plated on an auto bumper with a total area of $032m^2$ from a solution cantaining CrO_4^{2-}? What current flow is required for this electroplating if the bumper is to be plated in 60s ? The density of chromium metal is $7.20g/cm^3$

A. 4.9×10^3A

B. 1.78×10^3A

C. 5.3×10^4A

D. 10.69×10^4A

Answer: D

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153. A fuel cell develops an electrical potential from the combustion of

butane at 1 bar and 298 K

$$C_4H_{10}(g) + 6.5O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l), \ \triangle_r G° = -2746kJ/mol$$
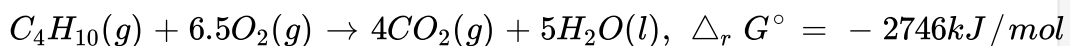
what is $E°$ of a cell?

A. 4.74V

B. 0.547V

C. 4.37V

D. 1.09V

Answer: D

154. The cell $Pt \mid H_2(g)$ (1bar)

$|H^+(aq), pH = x||Cl^-(1M)|Hg_2Cl_2|Hg|Pt$ has emf of 0.5755 V at $25°C$ the SOP of calomel electrode is $-0.28V$ then pH of the solution will be

A. 11

B. 4.5

C. 5.5

D. None of these

Answer: C

155. For a cell reaction

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l) \; \triangle_r \, S^\circ_{198} = -0.32KJ/k$. What is the value of $\triangle_f \, H^\circ_{298}(H_2O, l)$?

Given: $O_2(g) + 4H^+(aq) + 4e^- \rightarrow 2H_2O(l), E^\circ = 1.23V$

A. $-285.07kJ/mol$

B. $-570.14kJ/mol$

C. $285. \; kJ/mol$

D. None of these

Answer: A

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156. The standard reduction potential of normal calomel electrode and reduction potential of saturated calomel electrodes are 0.27 and 0.33 volt respectively. What is the concentration of Cl^- in saturated solution of KCL?

A. 0.1M

B. 0.01M

C. 0.001M

D. None

Answer: A

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157. Determine the potential of the following cell:

$Pt|H_2(g, 0.1\text{bar})|H^+\left(aq, 10^{-3}M||MnO_4^-\right)(aq), 0.1M)$

$Mn^{2+}(aq, 0.01M), H^+(aq, 0.01M) \mid Pt$
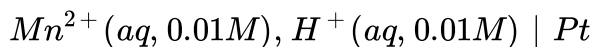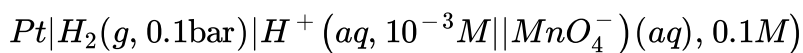
Given : $E^{\circ}_{MnO_4^- \mid Mn^{2+}} = 1.51V$

A. 1.54V

B. 1.48V

C. 1.84V

D. none of these

Answer: B

---

158. Select the correct cell reaction of the cell

$Pt(s)|Cl_2(g)|Cl^-(aq)||Ag^+(aq) \mid Ag(s)$:
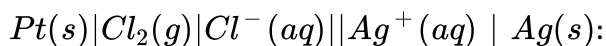
A. 0.051V

B. -0.051

C. 0.102V

D. 0.0255V

Answer: A

---

159. The chlorate ion can disproportinate in basic solution according to

reaction,
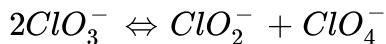
$$2ClO_3^- \Leftrightarrow ClO_2^- + ClO_4^-$$

what is the equilibrium concentration of perchlorate ions from a solution initially at 0.1 M in chlorate ions at 298 K?

Given: $E^\circ_{ClO_4^-|ClO_3^-} = 0.36V$ and $E^\circ_{ClO_3^-|ClO_2^-} = 0.33V$ at $298K$

A. 0.019 M

B. 0.024M

C. 0.1M

D. 0.19M

Answer: A

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160. A cell diagram shown below contains of one litre of buffer solution of $HA(PK_a = 4)$ and NaA in both compartments. What is the cell e.m.f?

HA (aq, 0.1 M)
and
NaA (aq, 1M)

H$_2$(g) : 1bar

H$_2$(g) :1bar

HA (aq, 1 M)
and
NaA (aq, 1 M)
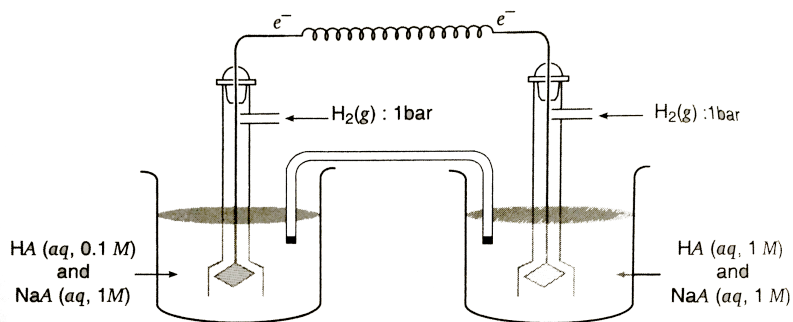
A. 0.03V

B. 0.06V

C. -0.06V

D. None of these

Answer: B

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161. Given the cell:

$$Cd(s)|Cd(OH)_2(s)|NaOH(aq, 0.01M)|H_2(g, 1\text{bar})|Pt(s)$$
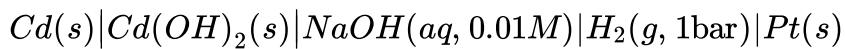
with $E_{cell} = 0.0V$. if $E^{\circ}_{Cd^{2+}|Cd} = -0.39V$, then K_{sp} of $Cd(OH_2)$ is:

A. 0.1

B. 10^{-13}

C. 10^{-15}

D. None of these

Answer: C

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162. calculate the e.m.f (in V) of the cell:

$Pt|H_2(g)|BOH(Aq)||HA(Aq)|H_2(g)|Pt,$
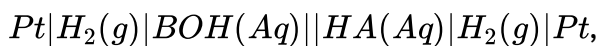
0.1bar 1M 0.1M 1bar

Given : $K_a(HA) = 10^{-7}, K_b(BOH) = 10^{-6}$

A. 0.39V

B. 0.36V

C. 0.93V

D. None of these

Answer: A

163. Calculate the potential of a half cell having reaction :
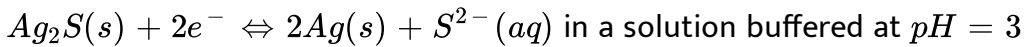
$Ag_2S(s) + 2e^- \Leftrightarrow 2Ag(s) + S^{2-}(aq)$ in a solution buffered at $pH = 3$

and which is also saturated with 0.1 MH_2S(aq): [Given:

$K_{sp}(Ag_2S) = 10^{-49}$, $K_{a1} = 10^{-8} \cdot K_{a2} = 1.1X10^{-13}$] E=(Ag^+//

Ag^+2) =0.8

A. 1.18

B. 0.19

C. -0.19V

D. none of these

Answer: C

164. Why does the conductivity of a solution decrease with dilution?

A. 0.0055

B. 0.11

C. 110

D. None of these

Answer: C

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165. Write formula for the following compound gold (III) chloride.

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166. Given the following molar conductivity at $25°$ C:, HCl,426 $\Omega^{-1}cm^2mol^{-1}$, NaCl, $126\Omega^{-1}cm^2mol^{-1}$, NaC(sodium crotonate), $83\Omega^{-1}cm^2mol^{-1}$. What is the dissciation constant of crotonic acid,if the

conductivity of a 0.001 M crotonic acid solution is $3.83 \times 10^{-5}\Omega^{-1}cm^{-1}$?

A. 10^{-5}

B. 1.11×10^{-5}

C. 1.11×10^{-4}

D. 0.01

Answer: B

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167. The ionic conductivity of Ba^{2+} and Cl^- at infinite dilution are 127 and 76 $ohm^{-1}cm^2eq^{-1}$ respectively. The equivalent conductivity of $BaCl_2$ at infinity dilultion (in $ohm^{-1}cm^2eq^{-1}$) would be :

A. $\dfrac{500x}{(x_1 + x_2 - x_3)^2}$

B. $\dfrac{10^6 x^2}{(x_1 + x_2 - 2x_3)^3}$

C. $\dfrac{2.5 \times 10^5 x^2}{(x_1 + x_2 - 2x_3)^2}$

D. $\dfrac{0.25x^2}{(x_1 + x_2 - 2x_3)^2}$

Answer: C

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168. State and explain Kohlrausch's law. How would you determine the molar conductance of a weak electrolyte at infinite dilution?

A. 1.52×10^{-5}S

B. 1.52 S

C. 1.52×10^{-3}S

D. 1.52×10^{-4}S

Answer: B

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169. Three electrolytic cells X,Y,Z containing solution of NaCl, $AgNO_3$ and $CuSO_4$ respectively are connected in series combination. During electrolysis 21.6gm of silver deposits at cathode in cell Y. Which is incorrect statement.

A. 6.35 gm copper deposits at cathode in cell z

B. 2.24 litre Cl_2 is liberated(at 1atm and 273 K) at anode in cell X

C. 2.24 litre O_2 is liberated(at 1atm and 273 K) at anode in cell Y

D. 2.24 litre H_2 is liberated(at 1atm and 273 K) at anode in cell X

Answer: C

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170. During electrolysis of H_2SO_4(aq) with high charge density, $H_2S_2O_8$ formed as by product. In such electrolysis 22.4L $H_2(g)$ and 8.4 L $O_2(g)$ liberated at 1 atm and 273 K at electrode. The moles of $H_2S_2O_8$ formed is

:

a) 0.25

b) 0.5

c) 0.75

d) 1

A. 0.25

B. 0.5

C. 0.75

D. 1

Answer: A

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171.

$Zn(s)\big|Zn(CN)_4^{2-}\,(0.5M),\,CN^-\,(0.01)\big|\big|Cu(NH_3)_4^{2+}\,(0.5M),\,NH_3(1M)\big|C$
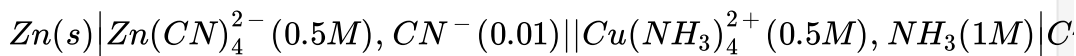
Given: $K_f \text{of} Zn(CN)_4^{-2} = 10^{16}$, $K_f \text{of} Cu(NH_3)_4^{2+} = 10^{12}$,

$E^\circ_{Zn|Zn^{2+}} = 0.76V$, $E^\circ_{Cu^{+2}|Cu} = 0.34V$, $\dfrac{2.303RT}{F} = 0.06$

The emf of above cell is :

A. 1.22V

B. 1.10V

C. 0.98V

D. None of these

Answer: C

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172. write formula for the following compound Tin (IV)oxide.

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173. write formula for the following compound nickel (II) sulphate.

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174. Calculate molar mass of formaldehyde.

175. The molar conductivity of 0.04 M solution of $MgCl_2$ is 200 Scm^3mol^{-1} at 298 k. A cell with electrodes that are $2.0cm^2$ in surface area and 0.50cm apart is filled with $MgCl_2$ solution

How much current will flow when the potential difference between the two electrodes is 5.0V?

A. 156.25V

B. 0.16A

C. 160A

D. None of these

Answer: B

176. In a hydrogen oxyge fuel cell, electricity is produced. In this process $H_2(g)$ is oxided at anode and $O_2(g)$ reduced at cathode

Given: Cathode $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

Anode $H_2(g) + 2OH^-(aq) \rightarrow 2H_2O(l) + 2e^-$

4.48 litre H_2 at 1atm and 273 k oxidised in 9650 sec.

The current produced is (in amp):

A. 1A

B. 2A

C. 4A

D. 8A

Answer: C

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177. In a hydrogen oxyge fuel cell, electricity is produced. In this process $H_2(g)$ is oxided at anode and $O_2(g)$ reduced at cathode

Given: Cathode $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

Anode $H_2(g) + 2OH^-(aq) \rightarrow 2H_2O(l) + 2e^-$
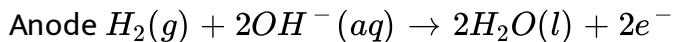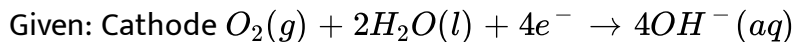
4.48 litre H_2 at 1atm and 273 k oxidised in 9650 sec.

The current produced is (in amp):

A. 7.2g

B. 3.6g

C. 1.8g

D. 0.9g

Answer: B

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178. In a hydrogen oxyge fuel cell, electricity is produced. In this process

$H_2(g)$ is oxided at anode and $O_2(g)$ reduced at cathode

Given: Cathode $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

Anode $H_2(g) + 2OH^-(aq) \rightarrow 2H_2O(l) + 2e^-$
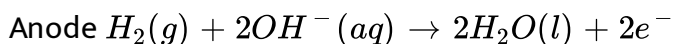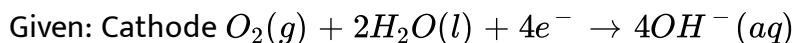
4.48 litre H_2 at 1atm and 273 k oxidised in 9650 sec.

The current produced is (in amp):

A. 1

B. 2

C. 3

D. 4

Answer: B

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179. Given the following molar conductivity at $25°$ C:, HCl,426 $\Omega^{-1}cm^2 mol^{-1}$, NaCl, $126\Omega^{-1}cm^2 mol^{-1}$, NaC(sodium crotonate), $83\Omega^{-1}cm^2 mol^{-1}$. What is the dissciation constant of crotonic acid,if the conductivity of a 0.001 M crotonic acid solution is $3.83 \times 10^{-5}\Omega^{-1}cm^{-1}$?

A. 1.45×10^{-7}

B. 1.45×10^{-5}

C. 1.45×10^{-9}

D. None of these

Answer: A

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180. If the e.m.f of a galvanic cell is neagative, it implies that:

A. the cell reaction is spontaneous

B. the cell reaction is non-spontaneous

C. the cell reaction is exothermic

D. the cell is working in reverse direction

Answer: A::B

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181. write formula for the following compound iron (III) sulphate.

182. If the half-cell reaction $A + e^- \rightarrow A^-$ has a large negative reduction potentials, it follows that:

A. A is readly reduced

B. A is readily oxidised

C. A^- is readily reduced

D. A^- is readily oxidised

Answer: D

183. Which of the following statements is correct? If $E^\circ_{Cu^{2+} \mid Cu} = 0.34V$, $E^\circ_{Sn^{2+} \mid Sn} = -0.136V$ and $E^\circ_{H^+ \mid H_2} = -0.0V$

A. Cu^{2+} ions can be reduced by $H_2(g)$

B. cu can be oxidised

C. Sn^{2+} ions can be reduced by H_2

D. Sn can be oxidized by Cu^{2+}

Answer: A::D

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184. The oxidation potential of hydrogen half-cell will be negative if:

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

B. $p(H_2) = 1atm$ and $[H^+] = 2M$

C. $p(H_2) = 0.2atm$ and $[H^+] = 1M$

D. $p(H_2) = 0.2atm$ and $[H^+] = 0.2M$

Answer: B::C

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185. Oxygen and hydrogen gas are produced at the anode and cathode during the electrolysis of fairly concentrated aqueous solution of :

A. Dilute H_2SO_4 with Pt electrodes

B. Fused NaOH with inert electrodes

C. Dilute H_2SO_4 with Cu electrodes

D. Concentrated aq. NaCl with Pt electrodes

Answer: A::B

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186. Write formula for the following compound chromium (III) oxide.

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187. The amount of an ion liberated on an electrode during electrolysis does not depend upon:

A. K_2SO_4

B. $AgNO_3$

C. H_2SO_4

D. NaOH
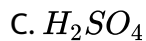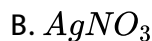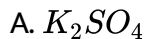
Answer: A::C::D

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188. During the purification of copper by electrolysis:

A. the anode used is made of copper ore

B. pure copper is deposited on the cathode

C. the impurities such as Ag, Au present in solution as ions

D. concentration of $CuSO_4$ solution remains constant during dissolution of Cu

Answer: A::B::D

189. When a lead storage battery is discharged:

A. SO_2 is evolved

B. lead sulphate is produced at both electrodes

C. sulphuric acid is consumed

D. water is formed

Answer: B::C::D

190. Which of the following is a volt?

A. It may gain weight during reaction

B. Electrons flow to it through the external circuit

C. It is where oxidation occurs

D. it receives electrons from ions in solution

Answer: A::B

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191. In an electrochemical process, a salt bridge is used:

A. to maintain electrical neutrality in each solution

B. to complete the external circuit so that current can flow for long

time

C. to mix the solution of anodic and cathodic compartment

D. to supply voltage

Answer: A

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192. In a galvanic cell,

A. nFE°

B. RT In K

C. $T . \triangle S^\circ - \triangle H^\circ$

D. zero

Answer: B::D

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193. Out of Fe^{2+} and Fe^{3+}, Fe^{3+} has more number of unpaired electrons.

A. the concentration of Fe^{3+} increases

B. the concentration of Fe^{3+} decreases

C. the mass of Fe increases

D. the concentration of Fe^{2+} decreases

Answer: B

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194. Which of the following statement is correct about Galvanic cell?

A. A reaction is spontaneous from left to right if $E_{cell} > 0$

B. A reaction occurs from right to left if $E_{cell} < 0$

C. If the system is at equilibrium no net reaction occurs

D. E_{cell} is temperature-independent

Answer: A::B::C

---

195. Which of the following concentration terms is/are affected by a change in temperature ?

A. $Pt|H_2(g)|HCl|H_2(G)\ |\ Pt$
   $\quad\ \underset{P_1}{}\qquad\qquad\underset{P_2}{}$

B. $Cd,\ (Hg)|\ \underset{(C)}{C}\ d^{2+}|(Hg),Cd$
   $\quad\ \underset{(a_1)}{}\qquad\qquad\underset{a_2}{}$

C. $Zn(s)|\underset{c_1}{Zn^{2+}}||\underset{c_2}{Cu^{2+}}|Cu$

D. $Ag|AgCl|\underset{c_1}{Cl^-}(aq)||\underset{c_2}{Br^-}(aq)|AgBr|Ag$

Answer: A::B::D

---

196. In electrolyte concentration cell:

A. A the electrode material and the solution in both half-cells are composed of the same substances

B. B only the concentrations of solutions of ther same substances is different

C. C $E^\circ_{cell} = 0$

D. D the Nernst equations reduces to $E_{cell} = -\left(\dfrac{0.0591}{n}\right)$ log Q at $25^\circ C$

Answer: A::B::C::D

197. The standard electrode of a metal ion $(Ag \mid Ag^\oplus)$ and metal – insoluble salt anion $(Ag|AgCl|Cl^{c-})$ are related as

A. $E^\circ_{Ag^+|Ag} = E^\circ_{Cl^-|AgCl|Ag} + \dfrac{RT}{F} InK_{sp}$

B. $E^\circ_{Cl^-|AgCl|Ag} = E^\circ_{Ag^+|Ag} + \dfrac{RT}{F} InK_{sp}$

C. $E^\circ_{Cl^-|AgCl|Ag} = E^\circ_{Ag^+|Ag} - \dfrac{RT}{F} In \dfrac{[Cl^-]}{K_{sp}}$

D. $E^\circ_{Cl^-|AgCl|Ag} = E^\circ_{Ag^+|Ag} - \dfrac{RT}{F} In \dfrac{[Cl^-]}{K_{sp}}$

Answer: B

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198. which one of the following is correctly matched?

A. SI units of conductivity is Sm^{-1}

B. SI units of molar conductivity is $Scm^2 mol^{-1}$

C. SI unit of conductance is S^{-1}

D. All of these

Answer: A

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199. Which of the following statements is/are correct?

A. The conductance of one cm^3 (or 1 $unit^3$) of a solution is called specific conductance

B. Specific conductance increases while molar conductivity decreases on progressive dilution

C. The limiting equivalent conductivity of weak electrolyte cannot be determined exactly by extraplotation of the plot of $bid \wedge_{eq}$ against $\sqrt{c}$

D. The conductance of metals is due to the movement of free electrons

Answer: A::C::D

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200. For the electro chemical cell

$$Pt(s)\left|\begin{array}{c}H_2\,(g)\\1atm\end{array}\right|H^+(1M) \mid \mid Cu^{2+}(1M)\mid Cu(s),$$ which one of the following statements are true ?

A. $C_1 > C_2$ and $P_1 = P_2$

B. $P_1 > P_2$ and $C_1 = C_2$

C.

D. $P_1 < P_2$ and $C_1 = C_2$

Answer: A::B

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201. Which of the following statements is/are correct?

A. Blue colour intensity decreases during electrolysis

B. Blue colour intensity remains constant if Cu-electrode used.

C. pH of solution is 8 after electrolysis.

D.

Answer: A::B::D

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202. write the oxidation number of iron Fe in FeO

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203. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of column-II

Column–I (Property)	Column–II (Unit)
(A) Conductance	(P) Sm^{-1}
(B) Conductivity	(Q) $S^{-1}m$
(C) Molar conductivity	(R) $Sm^2 mol^{-1}$
(D) Resistivity	(S) S

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204. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of column-II

Column–I	Column–II
(A) $Pt|Fe^{3+}, Fe^{2+}$	(P) Metal-metal ion half-cell
(B) $Pt|H_2|H^+$	(Q) Gas-gas ion half-cell
(C) $Pt|Hg|Hg_2^{2+}$	(R) Oxidation-reduction half-cell
(D) $Pb|PbSO_4|SO_4^{2-}$	(S) Metal-sparingly soluble salt half-cell

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205. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of column-II

Column-I	Column-II
(A) Galvanic cell	(P) Used in space craft
(B) Electrolytic cell	(Q) No transformation of electrical energy into chemical energy
(C) Dead battery	
(D) Fuel cell	(R) Cell reaction is spontaneous
	(S) Cell reaction is non-spontaneous

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206. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of column-II

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207. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of column-II

Column–I	**Column–II**
(A) $Pt|Fe^{3+}, Fe^{2+}$	(P) Metal-metal ion half-cell
(B) $Pt|H_2|H^+$	(Q) Gas-gas ion half-cell
(C) $Pt|Hg|Hg_2^{2+}$	(R) Oxidation-reduction half-cell
(D) $Pb|PbSO_4|SO_4^{2-}$	(S) Metal-sparingly soluble salt half-cell

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208. STATEMENT -1: E°_{cell} is negative for electrolytic cell.

STATEMENT-2: $\triangle G^\circ$ is +ve for electrolyte cell

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

209. each question constain STATEMENT-1(Assertion) and STATEMENT - 2 (reason). examine the statement carefully and work the correct answer accoridng to the instructions given below :

STATEMENT-1: Dispersed phase particles of colloidal solution cannot pass through ultra -filter paper.

STATEMENT-2: The size of colloidal particles are larger than the size of true solution particles.

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-2

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

210. STATEMENT-1: Copper is dissolved at anode and deposited at cathode when Cu electrodes are used and electrolyte is 1 M $CuSO_4$ (aq) solution.

STATEMENT-2: atomic mass of Cu is 29

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

---

211. STATEMENT-1: 1 coulomb charge deposits 1 g-equivalent of a substance.

STATEMENT-2: 1 faraday is charge is charge on 1 mole of electrons.

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

212. At What pH oxidation potential of water is -0.81V ? E' =-1.23 V

A. If both the statements are TRUE and STATEMENTS-2 is the correct

explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the

correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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213. Calculate the molar mass of limestone.

A.

B.

C.

D.

Answer: C

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214. Each question contains STATEMENTS-1 (Assertion) and STATEMENT -2

(Reason).

Examine the statements carefully and mark the correct answer according

to the instructions given below:

STATEMENT-1: Rate of disintegration of thorium increases with the

increase in moles of thorium.

STATEMENT-2: Rate of disintegration does not depend upon temperature,

pressure

A. If both the statements are TRUE and STATEMENTS-1 is the correct

explantion of STATEMENTS-2

B. If both the statements are TRUE but STATEMENTS-1 is NOT the correct explanation of STATEMENTS-2

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

215. Can a Galvanic cell work without a salt bridge?

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-6

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-8

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

---

216. STATEMENT-1: The SRP of three metallic ions A,B,C are -0.3,-0.5,0.8 volt respectively, so oxidizing power of ions is C>A>B.

STATEMENT-2: Higher the SRP, higher the oxidizing power.

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-7

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-9

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

217. STATEMENT-1: We cannot add the electrode potential in order to get electrode potential of third electrode if no. of moles of electrons exchanged are not same.

STATEMENT-2: Electrode potential is an extensive property

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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218. The electrode potential of SHE is fixed as

A. If both the statements are TRUE and STATEMENTS-2 is the correct

   explantion of STATEMENTS-9

B. If both the statements are TRUE but STATEMENTS-2 is NOT the

   correct explanation of STATEMENTS-11

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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219. Calculate the oxidation number of V in (VO2)+

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220. STATEMENT-1: If $\left(\dfrac{dE_{cell}}{dT}\right)_P > 0,$ For a cell reaction then $\triangle S$ is

positive.

STATEMENT-2: $\triangle S = nFT\left(\dfrac{dE}{dT}\right)_p$.

a) If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

b) If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

c) If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

d) If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-11

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-13

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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221. STATEMENT-1: Molar conductivity increases with decrease in concentration for weak electrolytes.

STATEMENT-2: No. of ions increases and no. of ions per unit volume decreases due to dilution.

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-12

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-14

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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222. STATEMENT-1: Molar conductivity increases with decrease in concentration for weak electrolytes.

STATEMENT-2: No. of ions increases and no. of ions per unit volume decreases due to dilution.

A. If both the statements are TRUE and STATEMENTS-2 is the correct explantion of STATEMENTS-1

B. If both the statements are TRUE but STATEMENTS-2 is NOT the correct explanation of STATEMENTS-1

C. If STATEMENTS-1 is TRUE and STATEMENTS-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

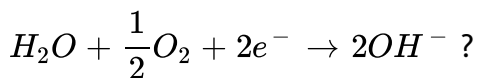**Answer: C**

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223. How many faradays are required for reduction of 1mol $C_6H_5NO_2$ into $C_6H_5NH_2$?

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224. What is the equivalent mass of O_2 in the following reaction ,

$$H_2O + \frac{1}{2}O_2 + 2e^- \rightarrow 2OH^- \text{ ?}$$

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225. The amount of electricity which release 2.0g of gold from a gold salt is same as that which dissolves 0.967g of copper anode during the electrolysis of copper sulphate solution. What is the oxidation number of gold in the gold ion ? (At mass of Cu=63.5,Au=197)

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226. when molten salt was elctrolysed for 5 min with9.65 A current , 0.18g of the metal was deposited. Calculate the Eq. mass of metal.
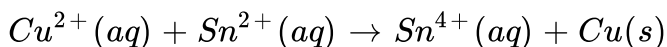
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227. During the electrolysis of a concentrated brine solution, Calculated the moles of chlorine gas produced by the passage of 4F electricity.

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228. Calculate the cell potential (in V) if `/_\` G=-96.5kJ/mol and n=1

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229. If K_c for the reaction

$$Cu^{2+}(aq) + Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + Cu(s)$$

at $25°$ C is represented as 2.6×10^y then find the value of y.

(Given:$E^{\circ}_{Cu^{2+}|Cu} = 0.34V$, $E_{Sn^{4+}|Sn^{2+}~^{\wedge}(\circ)} = 0.15V$

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230. Calculate the oxidation state of nitrogen (N) in (NO2)-

231. If the equilibrium constant for the reaction $Cd^{2+}(aq) + 4NH_3(aq) \Leftrightarrow Cd(NH_3)_4^{2+}(aq)$ is 10^x then find the value of x.

(Given: $E^{\circ}_{Cd^{2+}|Cd} = -0.4V$, $E^{\circ}_{Cd(NH_3)_4^{2+}|Cd} = -0.61V$)

232. At What pH oxidation potential of water is -0.81V ? E' =-1.23 V

233. The resistance of a conductivity cell containing 0.001M KCl solution at 298K is 1500Ω. What is the cell constant (in mm^{-1}) if the conductivity of 0.001M KCl solution is $2 \times 10^{-3} Smm^{-1}$

234. Molar conductivity at infinitre dilution of KCl,HCl and CH_3COOK are 0.013,0.038 and 0.009 Sm^2mol^{-1} respectively at 291K. If conductivity of 0.001M CH_3COOH is $2.72 \times 10^{-3}Sm^{-1}$ then find % degree of dissociation of CH_3COOH

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235. Molar conductivity of aqueous solution of HA is $200Scm^2mol^{-1}$, pH of this solution is 4

Calculate the value of $pK_a(HA)$ at $25°C$.

Given $\wedge_M^\infty (NaA) = 100scm^2mol^{-1}$,

$\wedge_M^\infty (HCl) = 425Scm^2mol^{-1}$,

$\wedge_M^\infty (NaCl) = 125Scm^2mol^{-1}$

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236. Calculate the oxidation number of nitrogen (N) in HN3

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Level 1 Q 1 To Q 30

1. Calculate oxidation number of Fe in Fe2O3.

Level 1 Q 91 To Q 120

1. The Zn acts as sacrified of cathodic protection to prevent rusting of iron because:

A. E°_{OP} of $Zn < E^{\circ}_{OP}$ of Fe

B. E°_{OP} of $Zn > E^{\circ}_{OP}$ of Fe

C. E°_{OP} of $Zn = E^{\circ}_{OP}$ of Fe

D. Zn is cheaper than iron

Answer: B

Level 2

1. What is the potential of an electrode which originally contained 0.1 MNO_3^- and $0.4MH^+$ and which has been treated by 80% of the cadmium necessary to reduce all the NO_3^- to NO(g) at 1 bar?

Give: $NO_3^- + 4H^+ + 3e^- \rightarrow NO + 2H_2O$, $E^\circ = 0.96V$, $\log 2 = 0.3$

A. 0.84V

B. 1.08V

C. 1.23V

D. 1.36V

Answer: A

2. Identify the species undergoes oxidation and reduction : 3MnO2 + 4Al

gives 3Mn + 2Al2O3

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Level 3 Passage
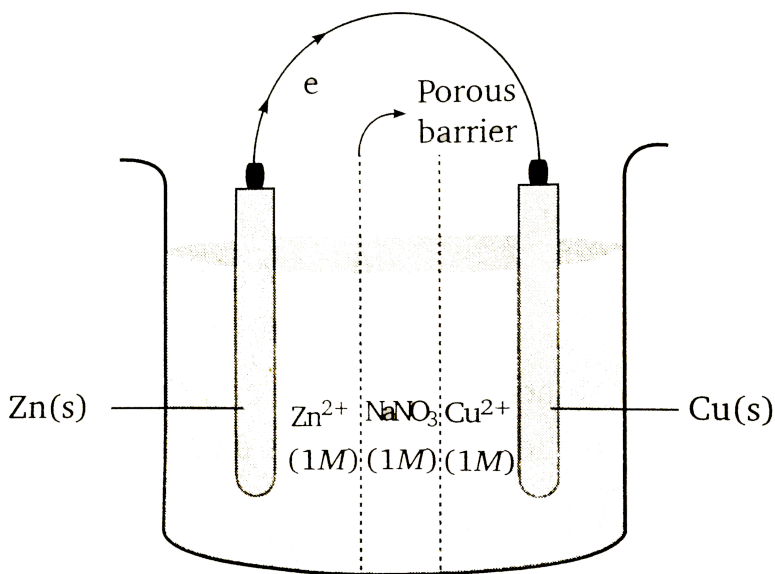
1.

A Galvanic cell consits of three compartment as shown in figure. The first

compartment contain $ZnSO_4$(1M) and III compartment contain $CuSO_4$

(1M). The mid compartment contain $NaNO_3$ (1M). Each compartment contain 1L solution:

$$E^{\circ}_{Zn^{2+}/Zn} = -0.76, E^{\circ}_{Cu^{2+}/Cu} = +0.34,$$

The concertation of Zn^{2+} in first compartment after passage of 0.1 F charge will be:

A. 1M

B. 1.05M

C. 1.025M

D. 0.5M

Answer: C

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2. Calculate the oxidation state of nitrogen (N) in NH3

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3. Write formula for the following compounds : Mercury(II)chloride

4. The molar conductivity of 0.04 M solution of $MgCl_2$ is 200 $Scm^2 mol^{-1}$ at 298 k. A cell with electrodes that are $2.0cm^2$ in surface area and 0.50cm apart is filled with $MgCl_2$ solution.

Conductance of $MgCl_2$ solution is :

A. $8 \times 10^{-3}S$

B. 32S

C. 0.032S

D. None of these

Answer: C

5. A saturated solution in $AgX\left(K_{sp} = 3 \times 10^{-12}\right)$ and $AgY\left(K_{sp} = 10^{-12}\right)$ has conductivity $0.4 \times 10^{-6}\Omega^{-1}cm^{-1}$.

Given: Limiting molar conductivity of $Ag^{+} = 60\Omega^{-1}cm^{2}mol^{-1}$

Limiting molar conductivity of $X^{-} = 90\Omega^{-1}cm^{2}mol^{-1}$

The conductivity of Y^{-} is (in $\Omega^{-1}cm^{-1}$):

A. 290

B. 2900

C. 2.9

D. None of these

Answer: A

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Level 3 One Or More Answers Are Correct

1. Which is /are correct statement ?

A. No corrosion takes place in vaccum

B. Corrosion is protected by electroplating

C. During rusting $Fe_2O_3 \cdot xH_2O$ formed

D. In presence of electrolyte, corrosion takes place with greater rate

Answer: A::B::C::D

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2. A dilute solution of KCl was placed between two Pt electrodes 10cm apart across which a potential difference of 10 volt was applied. Which is /are correct statement (Given: molar conductivity of K^+ at infinite dilution is 96.5 $Scm^2 mol^{-1}$

a) "Ionic mobility of " K^+ " is " $10^{-3}cm^2 \sec^{-1} volt^{-1}$

b) "The speed of" K^+ is $10^{-3}cm \sec^{-1}$

c) "Distance traveled by" K^+ in 5×10^3 sec is 5cm

d) "The potential gradient is 1.0 volt" cm^{-1}

A. Ionic mobility of K^+ is $10^{-3}cm^2 \sec^{-1} volt^{-1}$

B. The speed of K^+ is 10^{-3} cm sec^{-1}

C. Distance travelled by K^+ in 5×10^3 sec is 5cm

D. The potential gradient is 1.0 volt cm^{-1}

Answer: A::B::C::D

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3. Using stock notation , represent the following compounds: Tl2O

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Level 3 Match The Column

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1. Column-1 and column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II .One or more than one entries of column-I may have the matching with the same entries of

column-II

Column–I (Property)	Column–II (Unit)
(A) Conductance	(P) Sm^{-1}
(B) Conductivity	(Q) $S^{-1}m$
(C) Molar conductivity	(R) Sm^2mol^{-1}
(D) Resistivity	(S) S

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Level 3 Subjective Problems

1. Calculate the oxidation state of nitrogen (N) in NO2

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