CHEMISTRY

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

ELECTROCHEMISTRY

Example

1. The resistance of a solution A is $50ohm$ and that of solution B is $100ohm$, both solutions are taken in the same conductivity cell. If equal volumes of solution A and B are mixed, what is the resistance of the mixture using the same cell ? (Assume there is no change or increase in the $\propto$ of A and B on mixing).

A. 66.66 ω

B. 63.65 ω

C. 52.36 ω

D. 59.38 ω

Answer:

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2. The resistance of a decinormal solution of a salt occupying a volume between two platinum electrodes which are 1.80 cm apart and 5.4 cm^2 in area was found to be 50 ω calculate the equilvalent conductance of the solution

A. 66.66

B. 64.6

C. 60.62

D. 6567

Answer:

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3. A 0.05 M KOH solution offered resistance of 31.6 ω in a conductivity cell of cel constant 0.3967 cm^{-1} at 298 k what is the molar conductance of KOH solution

A. 150.3

B. 18068

C. 232

D. 215.7

Answer:

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4. $\overset{\circ}{\wedge}$ for NaCI HCI and NaAC are 126.4 425.9 , and 91.0 S $cm^2 \mathrm{mol}^{-1}$ respectively calulate $\overset{\infty}{\wedge} m$ for Hac.

A. 390.5

B. 180.3

C. 420.2

D. 350.5

Answer:

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5. $10800C$ of electricity passed through the electrolyte deposited $2.977g$ of metal with atomic mass $106.4gmol^{-1}$. The charge on the metal cation is

A. $+2$

B. $+3$

C. $+4$

D. $+1$

Answer:

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6. In an aqueous solution $AgNO_3$ and $CuSO_4$ are connected in series if Ag deposited at cathode is 1.08 g then Cu deposited is

A. 0.532 g

B. 0.181 g

C. 0.264 g

D. 0.315 g

Answer:

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7. The volume of O_2 liberated at STP by the passage of 2 faraday of electric charge thorugh acidulated water is

A. 22.4 L

B. 5.6 L

C. 11.2 L

D. 2.24 L

Answer:

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8. The standard oxidation ptoetial of zinic is 0.76 V and of silver is -0.80 V calculate the emf of the cell

$Zn|Zn(NO_3)_2(0.25M)||AgNO_3(0.1)M|Ag \text{at} 25^\circ C$

A. 1.158 V

B. 1.352 V

C. 0.768 V

D. 21.32 V

Answer:

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9. If for the half cell reaction E° value are given

$Cu^{2+} + e^- \rightarrow Cu^+, E^\circ = 0.15V$

$Cu^{2+} + 2e^- \rightarrow Cu^+, E^\circ = 0.34V$

calculate E° of the half cell reaction

$Cu^+ + e^- \rightarrow Cu$

A. $+0.53V$

B. $-0.53V$

C. $-0.80V$

D. $-0.28V$

Answer:

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Exercise 1

1. Which of the following has highest molar conductivity

A. Diamminedichloroplatinum (II)

B. Tetraamminedichlorocobalt (III) chloride

C. Potassium hexacyanoferrate (II)

D. Hexaaquachromium (III) choride

Answer: a

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2. What is the SI unit of conductivity?

A. ω^{-1}

B. $\omega^{-1}cm^{-1}$

C. $\omega^{-2} \equiv^{-1}$

D. $\omega^{-1}cm^{-2}$

Answer: B

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3. Conductivity of 0.01 M NaCl solution is 0.00147 $\text{ohm}^{-1}cm^{-1}$ what happens to this conductivity if extra 100 mL of H_2O will be added to the above solution ?

A. increases

B. decreases

C. remains unchanged

D. first increases and then decreases

Answer: B

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4. Resistance of $0.2M$ solution of an electrolyte is 50Ω. The specific conductance of the solution is $1.3Sm^{-1}$. If resistance of the $0.4M$ solution of the same electrolyte is 260Ω, its molar conductivity is .

A. 6250 $sm^2\text{mol}^{-1}$

B. $6.25 \times 10^{-14}\text{Sm}^2\text{mol}^{-1}$

C. $625 \times 10^{-4}sm^2\text{mol}^{-1}$

D. $62.5sms^2\text{mol}^{-1}$

Answer: B

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5. According of Kohlrausch law, the limiting value of molar conductivity of an electrolyte A_2B is

A. $\wedge^{\circ}_{A^+} + \wedge^{\circ}_{A^+} - \wedge^{\circ}_{B^-}$

B. $\wedge^{\circ}_{A^+} - \wedge_{A^\circ}$

C. $2\wedge_{A^+} + \frac{1}{2}\wedge^2_{A^+} + \wedge^\circ_{B^-}$

D. $2\wedge^\circ_{A^+} + \wedge^\circ_{B^-}$

Answer: D

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6. Two different electrolytic cells filled with molten $Cu(NO_3)_2$ and molten $AI(NO_3)_3$ respecitvely are connected in series when electricity is passed 2.7 g AI deposited on electrode calculate the weight of Cu deposited on cathode [C =63.5,

A. 190.5 g

B. 9.525 g

C. 63.5 g

D. 31.75 g

Answer: B

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7. When same quantity of electricity is passed for half an hour the amount of Cu and Cr deposited are respectively 0.375 g and 0.30 g ratio of electrochemical equivalent of cu nd cr is

A. 0.8

B. 1.25

C. 2.5

D. 1.62

Answer: B

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8. Which of the following electrolytic solutions has the least specific conductance?

A. 0.02 N

B. 0.2 N

C. 2N

D. 0.002 N

Answer: B

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9. The values of $\wedge_m^\infty$ for $NH_4Cl, NaOH,$ and $NaCl$ are, respectively, $149.74, 248.1$,and $126.4 ohm^{-1}cm^2eq^{-1}$. The value of $\wedge_{eq}^\infty NH_4OH$ is

A. 371.44

B. 271.44

C. 71.44

D. cannot be predicte from given data

Answer: D

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10. The molar conductivities of KCl, NaCl and KNO_3 are 152,128 and 111 $\mathrm{S\ cm^2 mol^{-1}}$ respectively. What is the molar conductivity of $NaNO_3$?

A. 101 s $cm^2 mol^{-1}$

B. 87 s $cm^2 mol^{-1}$

C. $-101 s cm^2 mol^{-1}$

D. $-391 s cm^2 mol^{-1}$

Answer: B

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11. The specific conductance (k) of an electrolyt e of 0.1 N concentration is related to equivalent conductance ($\wedge$) by the following formula

A. $\wedge = k$

B. $\wedge = 10k$

C. $\wedge = 100k$

D. $\wedge = 10000k$

Answer: D

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12. Conductivity (Unit Siemen's 'S') is directly proportional to area of the vessel and the concentration of the solution in it and is inversely proportionals to the length of the vessel, then the unit of constant of proportionality is :

A. $\mathrm{Sm\ mol}^{-1}$

B. $\mathrm{Sm}^2\mathrm{mol}^{-1}$

C. $\mathrm{S}^{-2}m^2$ mol

D. $\mathrm{S}^2\mathrm{m}^2\mathrm{mol}^2$

Answer: B

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13. Electrolysis of dilute aqueous $NaCl$ solution was carried out by passing $10mA$ current. The time required to liberate $0.01mol$ of H_2 gas at the cathode is $\left(1F = 96500Cmol^{-1}\right)$

A. 9.65×10^4s

B. 19.3×10^4 s

C. 28.95×10^4s

D. 38.6×10^4 s

Answer: B

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14. How many coulombs are required for the oxidation of $1mol$ of H_2O to O_2?

A. 9.65×10^4C

B. 1.93×10^4C

C. 1.93×10^5 C

D. 19.3×10^5 C

Answer: C

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15. The equivalent conductivity of a solution containing 2.45 g of $CuSO_4$ per litre, is $91.0\Omega^{-1}cm^2eq^{-1}$. Its conductivity would be

A. $2.9 \times 10^{-3}\omega^{-1}cm^{-1}$

B. $1.9 \times 10^{-3}\omega^{-1}cm^{-1}$

C. $2.4 \times 10^{-3}\omega^{-1}cm^{-1}$

D. 19.3×10^5C

Answer: A

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16. Which of the statements about solution of electrolytes is not correct?

A. conductivity of solution depends upon size of ions

B. conductivity depends upon viscosity of solution

C. conductivtiy does not depend upon solvation of ions present in solution

D. conductivity of solution increase with temperature

Answer: C

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17. Solubility of a sparingly soluble salt s specific conductance k and the equivalent conductance $\wedge_0$ are related as

A. $S = 1000\ \frac{\wedge_0}{K}$

B. $S = k \wedge_0$

C. $S = \frac{k}{1000} \wedge_0$

D. $S = 1000 \frac{k}{\wedge_0}$

Answer: D

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18. Select the correct statement for $\lambda_m = E_m^\circ - AC^{1/2}$

A. This equation is for weak electrolyte

B. Intercept is equal to λ_m

C. slope is A s

D. value of A depends on the charge of cation and anion

Answer: D

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19. Which of the following statement (s) is /are true ?

A. $\wedge^{\circ}_{Na^+}$ and $\wedge^{\circ}_{CI^-}$ are limitin molar conductivity of sodium and chloride ioins respectively

B. $E^{\circ}_m = \lambda^{\circ}_{Na^+} + \lambda^{\circ}_{CI^-}$

C. $E^2_m = v_+ \lambda^{\circ}_{Na^+} + V_{\lambda}$

D. all of the above

Answer: C

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20. How many coulombs are required in order to reduce 12.3 g of nitrobenzene to niline ?

A. 579 C

B. 5790 c

C. 57900 C

D. 579000 C

Answer: C

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21. Consider th following statement

I Q=lt

II charge is required for reductin or reduction depends on the stoichiometry of electrode reaction

III charge on 1 electron $= 1.6021 \times 10^{-19}$ C

IV charge on one mole of elctron $= 1.6021 \times 10^{-19} C$

(V) Quantity of electricity is coulomb

VI 1F =96500 C mol^{-1} which of the statements (s) given above is /are incorrect ? choose the correct option

A. I and II

B. II and III

C. IV and V

D. VI and I

Answer: B

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22. Which of the following reaction is preferred at anodes during the electrolysis of H_2SO_4 at higher concentration ?

A. $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$

B. $2SO_4^{2-}(aq) \rightarrow S_2O_8^{2-}(aq) + 2e^-$

C. Both a and b

D. None of the above

Answer: C

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23. Aluminium is produced by the electrolysis of ...I ..in the presence of ... ii... fill in the blanks I & II with appropriate words

A. I aluminium oxide ii zeolite

B. I aluminium chloride, iii cryolite

C. I aluminium oxide ii cryolite

D. aluminium chloride , ii zeolite

Answer: D

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24. Which of the following statement (s) is /ar flase for elelctrolytic cell?

A. External source of votage is applied to carry coiut chemical reaction

B. these cells are mainly used in laboratory and chemical industry

C. these cell consist of two copper strips dipped in an aqueous solution of $CuSO_4$

D. none of the above

Answer: C

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25. At 298 K, the standard reduction potentials are 1.51 V for $MnO_4^- \mid Mn^{2+}$, $1.36V$ for $Cl^2 \mid Cl^-$, 1.07 V for $Br_2 \mid Br^-$, and 0.54 V for $I_2 \mid I^-$. At pH=3, permanganate is expected to oxidize $\left(\frac{RT}{F} = 0.059V\right)$:

A. $CI^- Br^-$ and T^-

B. Br^- and I^-

C. CI^- and Br^-

D. only I^-

Answer: B

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26. Using the Gibbs energy change, $\Delta G^{\circ} = +63.3kJ$, for the following reaction,

$Ag_2CO_3 \Leftrightarrow 2Ag^+(aq) + CO_3^{2-}$

the K_{sp} of $Ag_2CO_3(s)$ in water at $25^{\circ}C$ is

$(R = 8.314JK^{-1}mol^{-1})$

A. 3.2×10^{-26}

B. 8.0×10^{-12}

C. 2.9×10^{-3}

D. 7.9×10^{-2}

Answer: B

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27. The two half cell reaction of an electrochemical cell is given as

$Ag^+ + e^- \rightarrow Ag, E^\circ_{Ag^+} = -0.3995V$

$Fe^{2+} \rightarrow Fe^{3+} + e^-, E^\circ_{Fe^{3+}}/Fe^{2+} = -0.7120V$

The value of cell EMF will be

A. $-0.3125V$

B. $0.3125V$

C. $1.114V$

D. $-1.114V$

Answer: B

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28. For $Cr_2O_7^{2} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

$E^\circ = 1.33V. At 298k, \left[Cr_2O_7^{2-}\right] = 4.5$ millimole

$\left[Cr^{3+}\right] = 15$ millimole ,E is 1.067 v The pH of the solution is nearly eual to

A. 2

B. 3

C. 5

D. 4

Answer: A

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29. If the E° for a given reaction has a negative value, then which of the following gives the correct relationship for the of ΔG° and k_{aq}?

A. $\triangle\ G^{\circ} > 0, k_{eq} < 1$

B. $\triangle\ G^{\circ} > 0, k_{eq} > 1$

C. $\triangle\ G^{\circ} < 0 l k_{eq} > 1$

D. $\triangle\ G^{\circ} < 0, k_{eq} < 1$

Answer: C

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30. The electrode pptenticals for

$Cu^{2+}(aq) + e^{-} \rightarrow Cu^{+}(aq)$

and $Cu^{+}(aq) + e^{-} \rightarrow Cu(s)$

are $+0.15V$ and $+0.\ 50V$ repectively. The value of $E^{\circ}_{cu^{2+}/Cu}$ will be.

A. 0.150 V

B. 0.500 V

C. 0.325 V

D. 0.650 V

Answer: D

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31. Standard electrode potential of three metal X, Y and Z are $-1.2V,\ +0.5V$ and $-3.0V$ respectively. The reducing power of these

metals will be:

A. $x > y > Z$

B. $y > z > x$

C. $y > x > z$

D. $z > x > y$

Answer: D

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32. Given the following reaction involving A,B,C and D

(i) $C + B^+ \rightarrow C^+ + B$

(ii) $A^- + D \rightarrow$ NO reaction

(iii) $C^+ + A \rightarrow$ NO reaction

(iv) $D + B^+ \rightarrow D^+ + B$

the correct arrangement of A,B,C,D in the order of their decreasing ability as reducing agent

A. $d > b > c > a$

B. $a > c > d > b$

C. $c > a > b > d$

D. $c > a > d > b$

Answer: D

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33. The standard emf of a galvanic cell involving 2 motes of electrons in its redox reaction is 0.59 V the equilibriun constant for the redox reaction of the cell is

A. 10^{20}

B. 10^{5}

C. 10

D. 10^{10}

Answer: A

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34. If the half cel reactions are given as

(i) $Fe^{2+}(Aq) + 2e^- \rightarrow Fe(s), E^\circ = -0.44V$

(ii) $2H^+(sq) + \frac{1}{2}O_2(g) + 2e^- \rightarrow H_2O(l) E^\circ = +1.23V$

The E° for the reaction

$Fe(s) + 2H^+ + \frac{1}{2}O_2(g) \rightarrow Fe^{2+}(g) \rightarrow Fe^{2+}(aq) H_2O(l)$ will be

A. $+1.67V$

B. $-1.67V$

C. $+0.79V$

D. $-0.79V$

Answer: A

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35. The standard emf of a cell having one electron change is found to be $0.591V$ at $25^\circ C$, The equilibrium constant of the reaction is :

A. 1.0×10^1

B. 1.0×10^5

C. 1.0×10^{10}

D. 1.0×10^{30}

Answer: A

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36. E° values of $Mg^{2+}/Mg$is $-2.37V$ of Zn^{2+}/Zn is $-0.76V$ and $Fe^{2+}/Fe: -0.44V$

which of the following statement is correct ?

A. Zn will reduce Fe^{2+}

B. Zn will reduce Mg^{2+}

C. Mg oxidises Fe

D. Zn oxidises Fe

Answer: A

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37. The standard emf of a galvanic cell involving 2 motes of electrons in its redox reaction is 0.59 V the equilibriun constant for the redox reaction of the cell is

A. 10^{20}

B. 10^{5}

C. 10

D. 10^{10}

Answer: A

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38. The potential of the following cell is 0.34 V at $25^{\circ}C$ calculate the standard reduction potential of the copper half cell

$Pt|H_2(1atm)|H^+(1M)\ ||\ |Cu^{2+}(1M)|Cu$

A. $-3.4V$

B. $+3.4V$

C. $-0.34V$

D. $+0.34V$

Answer: D

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39. An electrochemical cell can behave like an electrolytic cell when

A. $E_{\text{cell}} = 0$

B. $E_{\text{cell}} > E_{\text{ext}}$

C. $E_{ext} > E_{cell}$

D. $E_{cell} = E_{ext}$

Answer: C

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40. Which cell will measures standard electrode potential of copper electrode ?

A. $Pt(s)|H_2(g, 0.1^-)|H^+(aq), 1M) \mid |Cu^{2+}(aq, 1M)|Cu$

B. $Pt(s)|H_2(g, 1^-)|H^+(aq, 1MM) \mid \mid (cu^{2+}(aq, 2M) \mid Cu$

C. $Pt(s)|H_2(g, 1^-)|H^+(aq, 1M) \mid |Cu^{2+}(aq, 1M)|Cu$

D. $Pt(s)|H_2(g, 1^-)H^+(Aq, 0.1M)||Cu^{2+}(aq, 1M)|Cu$

Answer: D

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41. The standard electrode potentials for the reactions

$Ag^+(aq) + e^- \rightarrow Ag(s)$

$Sn^{2+}(aq) + 2e^- \rightarrow Sn(s)$

at $25^\circ C$ are 0.80 V and -0.14 V respectively The emf of the cell

$Sn|Sn^{2+}(1M)||Ag^+(1M)|Ag$is

A. 0.48 V

B. 0.80 V

C. 1.08 V

D. 0.94 v

Answer: C

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42. $E^\circ_{ni^{2+}/Ni} = -0.25V E^\circ_{Au^{3+}/Au} = 1.50v$

The emf of the voltaic cell

$Ni/Ni^{2+}(1.0M) \mid |Au^{3+}(1.0M)|Au$ is

A. 1.25 V

B. $-1.75V$

C. 1.75 V

D. 2.0 V

Answer: C

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43. The cell reaction of a cell is

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

if the standard reduction potential of Mg and Cu are -2.37 V and +0.34 V respectively The emf of the cell is

A. 3.30 V

B. $-3.30v$

C. $+2.71V$

D. $-2.71V$

Answer: C

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44. Calculate the emf of the following cell at $25^\circ C$

$Pt(H_2)|HCI|(H_2Pt$

A. $-0.0206V$

B. $+0.0206V$

C. $+0.8056V$

D. $-0.8056V$

Answer: C

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45. Select the false statement for daniell cell

A. Reduction half cell reaction is

$$Cu^{2+}(Aq) + 2e^{-} \rightarrow Cu(s)$$

B. Oxidation half cell reaction is

$$Zn(s) \rightarrow Zn^{+}(aq) + 2e^{-}$$

C. Reductino half cell portion is also called redox coules

D. all of the above

Answer: D

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46. Select the correct statement(s) for the given relation

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

A. Reaction at cathode ,$Cu(s) \rightarrow Cu^{2+}(aq) + 2e^{-}$

B. $E_{Cell} = E_{cu^{2+}/Cu} - E_{Ag^{+}/Ag}$

C. Cell reaction is, $Cu(s)\left|Cu^{2+}(aq)\right|\left|Ag^{+}(aq)\right|Ag(s)$

D. None of the above

Answer: C

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47. Consider the reaction

$$\frac{1}{2}H_2(g) + AgCI(s) \rightarrow H^+(aq) + CI^-(aq) + Ag(s)$$

In which of the following galvanic ell the abvoe reaction occurs ?

A. $Ag|AgCI(s)|KCI(aq) \ || \ |AgNO_3(Aq)|Ag(s)$

B. $Pt|H_2(g)|HCI(Aq)||AgNO_3(aq)||Ag(s)$

C. $Pt|H_2(g)|HCI(aq)||AgCI(s)||Ag(s)$

D. $Pt|H_2(g)|KCI(aq)||AgCI(s)||Ag(s)$

Answer: D

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48. The standard reduction potential for Fe^{2+}/Fe and Sn^{2+}/Sn electrodes are -0.44 and -0.14 V respecitvely for the cell reaction $Fe^{2+} + Sn \rightarrow Fe + Sn^{2+}$ the standard emf is

A. $+0.30V$

B. $+0.58V$

C. $+0.58V$

D. $-0.30V$

Answer: B

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49. What will be the emf for the given half cell

$Pt \mid H_2(P_1)|H^+(aq)|H_2(P_2) \mid Pt$

A. $\frac{RT}{F}$ in $\frac{p_1}{p_2}$

B. $\frac{RT}{2F}$ in $\frac{p_1}{p_2}$

C. $\frac{RT}{F}$ in $\frac{P_2}{P_1}$

D. none of these

Answer: C

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50. In the process of rusting iron get

A. reduced

B. decomposed

C. oxidised

D. changed in fine powder

Answer: D

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51. When lead stroage battery discharges

A. SO_2 is evolved

B. $PbSO_4$ is consumed

C. Lead is formed

D. H_2SO_4 is consumed

Answer: A

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52. Galvanic cell is a device in which

A. chemical energy is converted into electrical energy

B. electrical energy is converted in to chemical energy

C. chemical energy is seen in the form of heat

D. thermal energy from an outside source is used to derive the cell reaction

Answer: D

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53. Which of the following is used widely in the manufacture of lead storage battery?

A. arsenic

B. lithium

C. bismuth

D. antimony

Answer: A

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54. While charging the lead storage battery:

A. $PbSO_4$ on anode is reduced to Pb

B. $PbSO_4$ on cathode is reduced to Pb

C. $PbSO_4$ on cathode is oxidised to Pb

D. $PbSO_4$ on anode is oixidsed to PbO_2

Answer: C

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55. The process of zinc plating on iron sheet is known as

A. annealing

B. roasting

C. galvanisation

D. smelting

Answer: B

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56. In $H_2 - O_2$ fuel cell, the reaction occurring at cathode is

A. $2H_2(g) + O_2(g) \rightarrow 2H_2(l)$

B. $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH(aq)$

C. $H^+ + e^- \rightarrow \frac{1}{2}H_2$

D. $H^+(aq) + OH^{aq} \rightarrow H_2O(l)$

Answer: A

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57. Corrosion of iron is essentially an electrochemical phenomeonon where the cell reaction are

A. Fe is oxidised to Fe^{3+} and H_2O is reduced to O_2^{2-}

B. Fe is oxidised to Fe^{2+} and H_2O is reduced to O_2^{2-}

C. Fe is oxidised to Fe^{2+} and H_2O is reduced to O_2

D. Fe is oxidised to Fe^{2+} and H_2O is reduced to O_2

Answer: D

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58. What is the compostion of rust ?

A. $FeO + Fe(OH)_2$

B. Fe_2O_3

C. $Fe_2O_3 + Fe_{OH}$

D. Fe_2O_3 and $Fe(OH)_3$

Answer: D

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59. Which coloruless gas evolves when NH_4CI reacts with zinc in a dry cell battery ?

A. NH_3

B. N_2

C. H_2

D. CI_2

Answer: D

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60. The acid used in lead storage battery is`

A. H_2SO_4 is consumed

B. H_3PO_4

C. HCI

D. HNO_3

Answer: D

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61. On the basis of electrochemical theory of aqueous corrosion, the reaction occurring at the cathode is

A. $O_2(g) + 4H^+(aq) + 4e^- \rightarrow 2H_2O(l)$

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

C. $Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$

D. $Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq)$

Answer: A

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62. The batteris which cannot be reused again are

A. primary batteries

B. secondary batteries

C. lead storage battery

D. nickel cadmium battery

Answer: A

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63. Dry cell is a

A. a primary battery

B. also called leclanche cell

C. used in transisitors and clocks

D. all of the above

Answer: d

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64. Which of the following statement in incorrect for dry cell ?

A. reaction at cathode

$$MnO_2 + NH_4^+ + NH_4^+ + e^- \rightarrow MnO(OH) + NH_3$$

B. Manganese is redcued from +5 to +4 state

C. cell potenital is 1.5 v

D. ammonia forms complex with Zn^{2+} to give $Zn(NH_2)_{4^{2+}}$

Answer: B

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65. Which among the following cell has longer life and more expensive to manufacture ?

A. lead storage cell

B. nickel cadmium cell

C. mercury cell

D. dry cell

Answer: B

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66. Match the terms of column I and column II and choose the correct option from the codes given below

A.

A	B	C	D
1	2	3	5

B.

A	B	C	D
5	2	1	4

C.

A	B	C	D
2	3	1	4

D.

A	B	C	D
4	3	5	2

Answer: D

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67. Which of the following statements is correct for fuel cells

A. They are sued in automobiles

B. they are pollution free

C. the efficiency is increased by adding better catalysts and electrolyte

D. all of the above

Answer: D

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68. In a hydrogen oxygen uel cell, combustion of hydrogen occurs to

A. produce high purity water

B. remove adsorbed oxygen from electrode surface

C. generate heat

D. create potential difference between two electrodes

Answer: D

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Exercise 2

1. Impure copper containing Fe ,Au ,Ag as impurities is elecrolytically refined A current of 140 A for 482.25 s decreased the mass of the anode by 22.26 g and increased the mass of cathode by 22.011 g percentage of iron in impure copper is (Given molar mass of Fe =55.5 mol^{-1} molar mass of Cu =63.54 g mol^{-1})

A. 0.95

B. 0.85

C. 0.97

D. 0.9

Answer: D

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2. The weight of silver (at $wt. = 108$) displaced by a quantity of electricity which displaced $5600mL$ of O_2 at STP will be:

A. 5.4 g

B. 10.8 g

C. 54.0 g

D. 108.0 g

Answer: C

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3. When $0.1 mol MnO_4^{2-}$ is oxidized the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is

A. 996500 C

B. 2×96500C

C. 9650 C

D. $96.50C$

Answer: D

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4. 20 mL solution of 0.1 M ferrous suplhate was completely oxidised using a suitable oxidising agent what is the number of electronic exchanged ?

A. 1.204×10^{22}

B. 193

C. 1930

D. 1.204×10^{21}

Answer: D

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5. The resistance of 1N solution of acetic acid is 250 ω when measured in a cell having a cell constant of $1.15csm^{-1}$ The equivalent conductance (in $\text{ohm}^{-1}cm^{2}\text{equiv}^{-1}$) of 1N acetic acid is

A. 2.3

B. 4.6

C. 9.2

D. 18.4

Answer: B

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6. AI_2O_3 is reduced by electrolysis at low potentials and high current if 4.0×10^4 amperes of curretn is passed through molten AI_2O_3 for 6h what mass of aluminimum is produced ? (Assume 100% current aluminimum atomic weight of AI=27)

A. 9.0×10^3 g

B. 8.1×10^4 g

C. 2.4×10^3g

D. $1.3 \times 10^4 g$

Answer: A

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7. The equivalent conductance of $\frac{M}{32}$ solution of a weak monobasic acid is 8.0 mho cm^2 and at infinite dilution is 400 mho cm^2 the dissociation constant of this acid is

A. 1.25×10^{-5}

B. 1.25×10^{-6}

C. 6.25×10^{-4}

D. 1.25×10^{-4}

Answer: A

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8. The rusting of iron takes place as follows

$2H^{\oplus e} + 2e^{-} + \frac{1}{2}O_2 \rightarrow H_2O(l), E^{-} = +1.23V$

$Fe^{2+}(aq) + 2e^{-} + 2e^{-} \rightarrow Fe(S), E^{-1} = -0.44V \triangle G^{-}$ for the net process is

A. $-322kJmol^{-1}$

B. $-152kJmol^{-1}$

C. $-76kJmol^{-1}$

D. $-161kJmol^{-1}$

Answer: C

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9. A varibale opposite external potential E_{ext} is applied to the cell $Zn\left|Zn^{2+}(1M)\right|Cu^{2+}(1M)\mid Cu$ of potential 1.1 V when $E_{\text{ext}} < 1.1V$ and $E_{\text{ext}} > 1.1V$ respecitively electrons flow from

A. cathode to anode in both cases

B. cathode to anode and anode to cathode

C. anode to cathode and cathode to anode

D. anode to cathode in both cases

Answer: B

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10. The resistance of $\frac{N}{10}$ solution is found to be $2.5 \times 10^3 \omega$ the equivalent conductance of the solution is (cell constant =1.25 cm^{-1})

A. 2.5 $\omega^{-1} cm^{-2} \equiv^{-1}$

B. 5.0 $\omega^{-1} cm^2 \equiv^{-01}$

C. 2.5 $\omega^{-1} cm^{-2} \equiv^{-1}$

D. 5.0 $\omega^{-1} cm^{-2} \equiv^{-1}$

Answer: D

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11. The molar conductivites $\wedge^{\circ}_{NaOAc}$ and $\wedge^{W}_{HCI}$ at infinite dilution in water at $25^{\circ} C$ are 91.0 and 426.2 cm^2/mol respecitvely To calculate $\wedge^{\circ}_{HoAc}$ the additional value required is

A. $\wedge^{\circ}_{H_2O}$

B. $\wedge^{\circ}_{KCI}$

C. $\wedge_{NaOH}$

D. $\wedge_{NaCI}$

Answer: C

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12. $\wedge^{\infty}_{CICH_2} COONa = 224\omega^{-1}cm^2\text{g equiv}^{-}$

$\wedge^{\infty}_{NaCI} = 38.5\omega^{-1}\text{g equiv}^{-1}$

$\wedge^{\infty}_{HCI} = 203\omega^{\infty} = 203\omega^{-1}cm^2\text{g equiv}^{-1}$

what is the value of $\wedge CICH_2COOH$?

A. 288 $ohm^{-1}cm^2$ g equiv^{-1}

B. $289.5ohm^{-1}cm^2\text{g equiv}^{-1}$

C. $388ohm^{-1}\text{g equiv}^{-1}$

D. $59.5ohm^{-1}cm^2\text{equiv}^{-1}$

Answer: C

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13. 9.65 C of electric current is passed through fused anhydrous $MgCI_2$ The magnesium metal thus obtained is completely converted in to grignard reagent th number of moles of gringnard reagent obtained is

A. 5×10^{-4}

B. 1×10^{-4}

C. 5×10^{-5}

D. 1×10^{-5}

Answer: C

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14. When electric current is passed through acidified water for 1930 s 1120 mL of H_2 gas is collected (at sTP) at the cathode what is the curent passed in amperes

A. 0.05

B. 0.5

C. 5

D. 50

Answer: D

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15. An inaccurate ammeter and silver coulmeter is connected in series in an electric circuit throug which a constant direct current flows if ammeter reads 0.6 ampere throughout one hour the silver deposited on coulometer was found to be 2.16 g whast % error is in the reading of ammetr [Assume 100% current efficiency]

A. 0.01

B. 0.0054

C. 0.0006

D. 0.1

Answer: B

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16. What is the current efficiency of an electro deposition of Cu metal from $CuSO_4$ solution in which 9.80 g copper is deposited by the passage of 5A current for 2h?

A. 0.5

B. 8.528

C. 0.414

D. 1

Answer: B

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17. X g of silver is plated out on a serving tray by electrolysis of a solution containing silver in +1 oxidation state for a period of 8.0 h at current of 8.46 A what is the area of the tray if the thickness of silver plating is 0.0025 cm ? [Given denisty of silver =10.5 g cm^{-3}]

A. $10.7 \times 10^4 cm^2$

B. $1.02 \times 10^4 cm^2$

C. $4.1 \times 10^{23} cmsd^2$

D. $10.0 \times 10^4 cm^2$

Answer: C

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18. An aqueous solution of NaCI on electrolysis gives $H_2(g), CI_2(g)$ and NaOH according to reaction $2CI^-(Aq) + 2H_2O \rightarrow 2OH^-(Aq) + H_2(g) + CI_2(g)$ A direct current of 25 A with a current efficiency of 62% is passed through 20 L of NaCI solution (20%)by weight How long will it take to produce 1 kg of CI_2

A. $30.20h$

B. $12.17h$

C. $48.71h$

D. $14.61h$

Answer: A

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19. When a certain conductivity cell was filled with 0.01 M solution of KCI it had a resistance of 160 ω at $25^{\circ}C$ and when filled with 0.005 M NaOH it had a resistance of 190 ω if specific resistance of KCI solution is 700 ω cm specific conductance $\left(\omega^{-1}cm^{-1}\right)$ of NaOH solution is

A. 0.00120

B. 0.00170

C. 0.00180

D. 0.00190

Answer: A

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20. The ionic conductance of H^+ and SO_4^{2-} are 350 and $80 Scm^2 \text{equiv}^{-1}$ hence equivalent conductance $Scms^2 \text{equivalent}^{-1}$ and molar conductance $Scm^2 \text{mol}^{-1}$ of H_2SO_4 will be

A. $430, 430$

B. $860, 430$

C. $215, 430$

D. $430, 860$

Answer: D

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21. Equivalent conductance of $BaCI_2, H_2SO_4$ and HCI are $x_1 x_2$ and $x_3 Scm^2 \text{equiv}^{-1}$ at infinite dilution if specific conductance of saturated $BaSO_4$ solution is of y S cmd^{-1} then k_{SP} of $BaSO_4$ is

A. $\dfrac{10^3 y}{2(x_1 + x_2 - 2x_3)}$

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

C. $\dfrac{10^6 y^2}{4(x_1 + x_2 - 2x_3)^2}$

D. $\dfrac{x_1 + x_2 - 2x_3}{10^6 y^2}$

Answer: A

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22. For pure water degree of dissociation of water is 1.9×10^{-9}

$\wedge_m^\infty \left(H^+\right) = 350 Scm^2 mol^{-1}$

$\wedge_m^\infty \left(OH^-\right) = 200 Scm^2 mol^{-1}$

Hence molar conductance of water is

A. $1.045 \times 10^{-6} Scm^2 mo <^{-1}$

B. $1.045 \times 10^{-9} Scm^2 mol^{-1}$

C. $1.04 \times 10^{-14} Scm^2 mol^{-1}$

D. $1.04 \times 10^{-14} Scm^2 mol^{-1}$

Answer: A

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23. The efficiency of a fuel cell is 80 % and the standard heat of reatction is -300 kJ The reaction involves two electrons in redox change the E^- of the cell is

A. 1.24 V

B. 2.48 V

C. 0 V

D. 0.62 V

Answer: A

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24. Consider the following table

What is I,II,III,IV in the above table ?

A. I insulator II conductor III Aqueous solution IV Semiconductor

B. I Conductor II Insulator III Aqueous solution IV Semiconductor

C. I Conductor II Insulator III semiconductro IV Aqueous solution

D. I Conductor II Semiconductor III Aqueous solution IV Insulators

Answer: B

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25. Match the items of column I and column II and choose the correct option from the codes given below

A. $\begin{matrix} A & B & C & D \\ 1 & 3 & 2 & 4 \end{matrix}$

B.

C. $\begin{matrix} A & B & C & D \\ 4 & 2 & 3 & 1 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 4 & 3 & 2 & 1 \end{matrix}$

Answer: C

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26. The logarithm of the equilibriium constant of the cell reaction corresponding to the cell

$X(s)\left|x^{2+}(aq)\right|\left|Y^{+}(aq)\right|Y(s)$ with standard cell potential $E^{\circ}_{cell} = 1.2V$ given by

A. 12.5

B. 21.5

C. 40.6

D. 47.2

Answer: C

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27. At $25^\circ C$ temperature the cell potential of a given electrochemical cell is 1.92 V

$Mg(s)\left|Mg^{2+}(Aq)xM\right|\left|Fe^{2+}(aq)0.01M\right|Fe(s)$

Given $E_{Mg\,/\,mg^{2+}}(Aq) = 2.37v$

$E^{\circ}_{Fe\,/\,Fe^{2+}}(Aq) = 0.45V$

Find the value of x

A. $x = 0.01M$

B. $x < 0.01M$

C. $x > 0.01M$

D. x cannot be predicted

Answer: A

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28. For the following cell reaction

$Ag|Ag^+|AgCI|CI^-|CI_2$ Pt

$\triangle G_f^\circ\left(Ag^+\right) = 78Kj/mol$

E° of the cell is

E° of the cell is

A. $-0.50V$

B. $0.60V$

C. 6

D. None of these

Answer: A

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29. Two concentration cells of Ag with Ag electrode in $AgNO_3$ in first cell concentration of one electrode is 1M and other electrode is 0.1 M and emf is 0.065 V in second cell concentration of one electrode is 1 M and other electrode is 0.01 M calculate the emf of second cell

A. 0.12 V

B. 0.06 V

C. 0.09 V

D. 0.16 V

Answer: A

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30. The zinc / siver oxide cell is used in electric watches

$Zn \rightarrow Zn^{2+} + 2e^-, E^\circ = 0.76V$

$Ag_2 + H_2O + 2e^- \rightarrow 2ag + 2OH^-, E^\circ = -0.344V$

what is $\triangle G^\circ$ in joules for the reaction

A. 2.13×10^2

B. -213072

C. $+213072$

D. 213.072

Answer: D

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31. E_1, E_2 and E_3 are the emf of the following three galvancic cells respectively

$(i) Zn(s)\left|Zn^{2+}(0.1M)\right|\left|Cu^{2+}(1M)\right|Cu(s)$

$(ii) Zn(s)\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu(s)$

$(iii) An(s)\left|An^{2+}(1M)\right|\left|Cu^{2+}(0.1M)\right|Cu(s)$

Which one of the following is true ?

A. $E_2 > E_1 > E_3$

B. $E_1 > E_2 > e_3$

C. $E_3 > E_1 > E_2$

D. $E_3 > E_2 > E_1$

Answer: A

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32. Small quantities of compounds TX, TY and TZ are put into separate test tubes containing X, Y and Z solutions. TX does not react with any of these. TY reacts with both X and Z. TZ reacts only with X. The decreasing order of ease of oxidation of the anions X^-, Y^- and Z^- is

A. $T^-, Z^- x^-$

B. Z^-, X^-, Y^-

C. Y^-, X^-, Z^-

D. X^-, Z^-, Y^-

Answer: C

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33. $E^{\circ}_{Fe^{3+}/Fe} = -0.036V, E^{\circ}_{Fe^{2+}/Fe} = -0.0439V.$ The value of standard electrode potential for the change, $Fe^{3+}(aq) + e^{-} \rightarrow Fe^{2+}(aq)$ will be

A. $-0.072V$

B. $0.385V$

C. $0.770V$

D. $-0.270V$

Answer: A

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34. A device that convers energy of combustion of fueles like hydrogen and methane, directly into electrical energy is known as .

A. fuel cell

B. electrolytic cell

C. dynamo

D. nicd cell

Answer: D

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35. An alloy of Pb Ag weighing 1.08 g was dissolved in dilute HNO_3 and the volume made to 100 mL A silver electrode was dipped in the solution and the emf of the cell set up pt (s) $H_2(g)|H^+(1M)||Ag^+(aq)|Ag(s)$ was 0.62 V if $E^\circ_{cell} = 0.80V$ what is the percentage of Ag in the alloy ? At $25^\circ C R\frac{T}{F} = 0.6$

A. 25

B. 2.5

C. 10

D. 50

Answer: B

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36. The standard oxidation potentials of Zn,Cu Ag and Ni electrodes are + 0.76 - 0.34 - 0.80 and + 0.25 V repectively which of he following reactin will provide maximum voltage

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

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

C. $H_2Ni^{2+}(Aq) \rightarrow 2H^{+}(aq) + Ni$

D. $Zn + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu$

Answer: D

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37. The standard emf of a galvanic cell involving cell reaction with n=2 is found to be 0.295 v at $25^{\circ}c$ the equilibrium constant of the reaction would be (Given F= 96500 C $\mathrm{mol}^{-1} mR = 8.314 \mathrm{jk}^{-1}\mathrm{mol}^{-1}$)

A. 2.0×10^{11}

B. 4.0×10^{12}

C. 1.0×10^{2}

D. 1.0×10^{10}

Answer: B

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38. The standar reduction potentials of

$Zn^{2+}|Zn, Cu^{2+}||Cu^{2+}|Cu|Zn|Zn^{2+}||Ag^{+}|AgIIICu|Cu^{2+}||Ag^{+}|Ag$

What is the correct order of E°_{cell} of these cells ?

A. $II > IIII$

B. $II > I > III$

C. $I > II > III$

D. $III > I > II$

Answer: B

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39. The Edision storage cell is represented as

$Fe(s)|FeO(s)|KOH(aq)|Ni_2O_3(s)|Ni(s)$

The half cell reaction are

$Ni_2(s) + H_2O(l) + 2e^{-} \rightarrow 2NIO(s) + 2OH^{-}, E^{\circ} = +0.40V$ M

$FeO(s) + H_2O(l) + 2e^{-} \rightarrow Fe(s) + 2OG^{-}, E^{\circ} = -0.87V$

What is th emaximum amount of electrical energy that can be obtained from one mole of Ni_2O_3?

A. 127 kJ

B. 245.11 kj

C. 90.71 kj

D. 122.55 kj

Answer: A

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40. The standard reduction potentials at 298 K for the following half reactions are given against eath

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s), \ -0.762V$

$Cr^{3+}(aq) + 3e^- \rightarrow Cr(s), \ -0.740v$

$2H^+(Aq) + 2e^- \rightarrow H_2(g), 0.00V$

$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq), 0.770V$

Which is the strongest reducing agent

A. Zn(s)

B. Cs(s)

C. $H_2(g)$

D. $Fe^{3+}(aq)$

Answer: A

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41. Which of the following reaction cannot be a base for electrochemical cell ?

A. Zn

B. Tin

C. both a and b

D. none of these

Answer: A

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42. Standard electrode potential data are useful for understanding the suitability of an oxidant in a redox titration some half cell reactions and their standard potentials are given below

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

$Cr_2O_7^{2-}(Aq) + 14H^+(aq) + 6e^- \rightarrow 2cr^{3+}(aq) + 7H_2O(l), E^2 = 1.38V$

$CI_2(g) + 2e^- \rightarrow 2CI^-(aq), E^\circ = 1.40V$

Identify the incorrect statement regarding the qunatitavite estimation of gaseous $Fe(NO_3)_2$

A. MnO_4^- can be used in aqueous HCI

B. $Cr_2O_7^{2-}$ can be used in aqueous HCI

C. MnO_4^- can be used in aqueous H_2SO_4

D. $Cr_2O_7^{2-}$ can be used in aqueous H_2SO_4

Answer: B

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43. $Zn\left|Zn^{2+}(a=0.1M)\right|\left|Fe^{2+}(a=0.01M)\right|Fe$

the emf of the above cell is 0.2905 V Equilibrium constant for the cell reaction is

A. $10^{0.32/0.591}$

B. $10^{0.32/0.0295}$

C. $10^{0.26/0.295}$

D. $10^{0.32/0.295}$

Answer: D

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44. Condider the following statement

I Metallic electrodes are dipped into electrolyte

II half cell sare connected by metallic wire through voltemeter and switch

III There is no need of salt bridge if the electrodes are dip in the same

electrolyte

Which of the following statement (s) is /are true for the above diagram choose the correct option

A. I and II

B. II and III

C. III and I

D. I, II and III

Answer: C

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45. Nernst equation for the reaction

$aA + bB \xrightarrow{\text{ne}^-} cC + dD$ is

$$E_{cell} = E^{\circ}_{cell} - \frac{RT}{nF}\ln Q$$

what is Q in the Nernst equation

A. $\frac{[A]^a[B]^b}{[C]^c[D]^d}$

B. $\frac{[A]^a[D]^d}{[B]^b[C]^C}$

C. $\frac{[C]^c[D]^d}{[A]^a[B]^b}$

D. $\frac{[C]^c[A]^a}{[D]^d[B]^b}$

Answer: C

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46. Calculate the equilibrium costant log (K_c) for the reaction

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

[Given $E^2_{cell} = 1.1V$]

A. 1.98×10^{37}

B. 2.98×10^{36}

C. 1.68×10^{37}

D. 2.68×10^{36}

Answer: C

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47. Match the terms given in column I with the items given in column II and choose the correct option from the codes given below

A. $\begin{matrix} A & B & C & D \\ 2 & 1 & 3 & 4 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 4 & 1 & 2 & 3 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 1 & 2 & 3 & 4 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 4 & 3 & 2 & 1 \end{matrix}$

Answer: B

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48. Electrode potential for Mg electrode varies according to the euation

$$E_{mg^{2+}/Mg} = E_{Mg^{2+}/Mg} - \frac{0.059}{2}\frac{\log(1)}{(Mg^{2+})}$$

the graph of $E_{Mg^{2+}/Mg}$ vs $\log\left[Mg^{2+}\right]$ is

A. 

B. 

C. 

D. 

Answer: C

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49. The cell $Zn\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu$

$E^{\circ}_{\text{cell}} = 1.10V$ was allowed to be copletely discharged at 298 K The relative concentration of $\frac{Zn^{2+}}{Cu^{2+}}$ is

A. antilog (24.08)

B. 37.2

C. $10^{37.2}$

D. 9.65×10^4

Answer: D

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50. Using the standart electrode potential find out the pair between which redox reaction is not feasible

E^- values $Fe^{3+}/Fe^{2+} = +0.77 \frac{I_2}{I} = +0.54V$

$Cu^{2+}/Cu = +0.34 Ag^+/Ag = +80v$

A. Fe^{3+} and I^-

B. Ag^+ and Cu

C. Fe^{3+} and Cu

D. Ag^+ and Fe^{3+}

Answer: A

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51. Calculate the potential corresponding to the following cell

$Pt \mid Co^{2+}(2.0M), Co^{3+}(0.01M \mid \mid Cr^{3+}(0.5M)$

$Cr_2O_7^2(4.0M), H^+(1.5M) \mid Pt$

Given $E^2_{Co^{2+}/Co^{3+}} = -1.82V, E^2_{Cr_2O_7^{2-}/Cr^3} = +1.33V$

A. $-0.32v$

B. $+0.32V$

C. $-0.44v$

D. $+0.44V$

Answer: B

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52. For hydrogen oxygen fuel cell at atm and 298 K

$$H_2g + \frac{1}{2}O_2(g) \rightarrow H_2O(l),\ \triangle G^\circ = -240KJ$$

E^2 for the cell is approximately (Gevien F=96500 C)

A. 2.48 V

B. 1.24 V

C. 2.5 V

D. 1.26 V

Answer: B

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53. which of the following statement is true for the electrochemical daniell cell

A. electrons flow from copper electrode to zinc electrode

B. current flows from zinc electrode to copper electrode

C. caation move towards copper electrode

D. cations move toward zinc electrode

Answer: C

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54. Standard free energies fo formation (in kJ/ mol) at 298 K are -237.2 -394.4 and -8.2 for $H_2O(l)CO_2(g)$ and pentane (g) respecitively the value of E°_{cell} for the pentane oxygen fuel cell is

A. 1.98 V

B. 2.0968 V

C. 1.0968 V

D. 0.0968 V

Answer: C

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55. Which of the followng reaction is used to make a fuel cell

A. $Cd(s) + 2Ni(OH)_3(s) \rightarrow Cd(s) + 2Ni(OH)_2(s) + H_2O(l)$

B. $Pb(s) + PbO_2(s) + 2H_2(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

C. $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

D. $2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

Answer: D

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56. The cell reaction of the galvanic cell

$Cu(s)\left|Cu^{2+}(aq)\right|\left|Hg^{2+}(aq)\right|Hg(l)$ is

A. $Hg + Cu^{2+} \rightarrow Hg^{2+} + cu$

B. $Hg + Cu^{2+} \rightarrow Cu^+ + Hg^+$

C. $Cu + Hg \rightarrow CuG$

D. $Cu + Hg^{2+} \rightarrow Cu^{2+} Hg$

Answer: A

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57. Matach column I with column II related to the figure given below and then select the appropriate option from the codes given

A.

A	B	C	D
2	1	3	2

B.

A	B	C	D
2	3	1	2

C.

A	B	C	D
1	2	1	3

D.

A	B	C	D
1	2	3	1

Answer: D

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58. Which of the following reaction cannot be a base for electrochemical cell

A. $H_2 + O_2 \rightarrow H_2O$

B. $AgNO_3 + Zn \rightarrow Zn(NO_3\_(2) + Ag$

C. $AgNO_3 + NacI \rightarrow AgCI + NaNO_2$

D.

$$KMnO_4 + FeSIO_4 + H_2SO_4 \rightarrow K_2SO_4 + Fe_2(SO_{45}\_(3) + MnS$$

Answer: B

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59. The electrochemical cell stops working after sometimes because

A. electrode potential of both the electrodes becomes zero

B. electrode potential of both the electrodes becomes equal

C. one of the electrode is eaten away

D. the cell reaction gets reversed

Answer: B

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60. In a hydrogen oxygen fuel cell combustion of hydrogen occurs to

A. generate heat

B. create potential difference between the two electodes

C. produce high purity water

D. remove adsorb oxygen from electrodes

Answer: C

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61. In a galvanic cell the eletrons flow from

A. anode to cathode through the solution

B. cathode to anode through the solution

C. anode to cathode through the external circuit

D. cathode to anode through the external circuit

Answer: C

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62. In the electrolytic cell flow of electrons is form

A. cathode to anode in solution

B. cathode to anode through external supply

C. cathode to anode through internal supply

D. anode to cathode through internal supply

Answer: A

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63. What is the anode and cathode in the given in the below

A. Anode Cathode
Zinc cup Carbon rod

B. Anode Cathode
Carbon cup Zinc rod

C. Anode Cathode
Zinc rod Carbon cup

D. Anode Cathode
Zinc cup Zinc rod

Answer: C

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64. What is the product produced by this cell

A. hydrogen

B. oxygen

C. water

D. all of these

Answer: D

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65. Mark the incorrect statement (s) for fuel cell

A. it is used in pollo space programme and for drinking water supply for astronauts

B. gydrogen and oxygen are bubbled through porous carbon electrode

C. catalyst like finely divided pt or pd are incorporated in to electrode

D. anode reaction is

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

Answer: C

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66. Which of the following statement (s) is / are true for secondary cell

A. it cannot be reused

B. it cannot be recharged

C. it undergo large number of charging and discharging cycles

D. all of the above

Answer: B

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67. Condisder the following reactions at $1100^\circ C$

$(i) 2C + O_2 \rightarrow 2CO, \ \triangle G^\circ = -460 kJ mol^{-1}$

$(ii) 2Zn + O_2 \rightarrow 2Zno, \ \triangle G^\circ = -360 kjmol^{-1}$

Based on the observation select the correct alternate

A. zinc can be oxidised by co

B. zinc oxide can be reduced by carbon

C. both a and b

D. none of the above

Answer: A

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68. E_{cell}° for some half cell reaction are given below on the basis of these mark the correct answer

$IH^{+}(aq) + e^{-} \rightarrow \frac{1}{2}H_2(g), E_{cell}^{-} = 0.00V$

II$2H_2O(l) \rightarrow O_2(g) + 4H^{+}(Aq) + 4e^{-}, E_{cell}^{-} = 1.23V$

III $2SO_4^{2-}(aq) \rightarrow S_2O_8^{2-}(aq) + 2e^{-} + 2e^{-}, E_{cell}^{-} = 1.96V$

A. in dilute suplhuric acid solution hydrogen will be reduced at cathode

B. in concentrated sulplhuric acid solution water will be oxidised at anode

C. in dilute sulphuric acid solution water will be oxidised at cathode

D. in dilute sulphuric acid solution SO_4^{2-} ion will be oxidised to tetrathionate ion anode

Answer: D

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69. The standard electrode potentials for the ractions

$Ag^+(aq) + e^- \rightarrow Ag(s)$

$sn^+(aq) + 2e^- \rightarrow Sn(s)$

at $25^\circ C$ are 0.80 V and -0.14 V respectively the emf of the cell $Sn|Sn^{2+}|(1M)|Ag^+(1M)|$ Ag is

A. 0.48 V

B. 0.80 v

C. 1.08 V

D. 0.94 V

Answer: D

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70. The equation representing the process by which standard reductin potential of zinic can be defined is

A. $Zn^{2+}(s) + 2e^- \rightarrow Zn$

B. $Zn(g) \rightarrow Zn^{2+}(g) + 2e^-$

C. $Zn^{2+}(g) + 2e^- \rightarrow Zn$

D. $Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$

Answer: C

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71. The emf of the cell $Ni\left|Ni^{2}(1.0M)\right|\left|Ag^{+}(1.0M)\right|Ag$

E° for $Ni^{2+}/Ni = -0.25V, E^{\circ}$ for $Ag^{+}/Ag^{+}/Ag = 0.80V$ is given by

A. $+0.55V$

B. $-1.05V$

C. $+1.05V$

D. $-0.55V$

Answer: A

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Mht Cet Corner

1. How many faradays of electricity are required to deposit 10g of calcium from molten calcium chloide using inert electrodes ?

(Molar mass of calcium =40 g mol^{-1})

A. $0.5F$

B. $1F$

C. $0.25F$

D. $2F$

Answer: A

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2. In the cell represented by

$Pb(s)\left|Pb^{2+}(1M)\right|\left|Ag^{+}(1M)\right|Ag(s)$ the reducing agent is

A. Pb

B. Pb^{2+}

C. Ag

D. Ag^{+}

Answer: A

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3. In dry cell what acts as a negative electrode ?

A. Zinc

B. graphite

C. ammonium chloride

D. manganese dioxide

Answer: D

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4. The overall reaction taking place at anode during electrolysis of fused sodium using suitable electrode is

A. oxidation of chloride

B. reduction of sodium ions

C. reductin of chlorine

D. oxidation of sodium atoms

Answer: A

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5. The process in which metal surface is made inactive is called

A. passivation

B. galvanising

C. corrosion

D. pickling

Answer: A

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6. Which of the following complexes has lowest molar conductance

A. $CoCI_3.\ 3NH_3$

B. $CoCI_3.4NH_3$

C. $CoCI_3.5NH_3$

D. $CoCI_3.6NH_3$

Answer: C

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7. How is electrical conductance of a conductor related with length and area a cross section of the conductor

A. $G = l.\ a.\ k^{-1}$

B. $G = k.\ i.\ a^{-1}$

C. $G = k.\ a.\ i^{-1}$

D. $G = k.\ i.\ a^{-2}$

Answer: C

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8. At $25^\circ C$ molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is $9.54 ohm^{-1} cm^2 mol^{-1}$ and at infinte dilution its molar conductance is $238 ohm^{-1} cm^2 mol^{-1}$ The degree of ionisation of ammonium hydroxide at the same concentration and termperature is

A. 0.0208

B. 0.208

C. 0.04008

D. 0.408

Answer: A

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9. A buttonn cell used in watches function as following $Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow 2Ag(s) + Zn^{2+}(aq) + 2OG^{-}(aq), E^{\circ} =$ the cell potential will be

A. 1.10 V

B. 0.42 V

C. 0.84 V

D. 1.34 v

Answer: B

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10. According to Faraday's first law

A. $w = \frac{96500 \times E}{l \times t}$

B. $w = \frac{l \times t \times E}{96500}$

C. $E = \frac{l \times t \times 96500}{w}$

D. $E = \frac{l \times w}{t \times 96500}$

Answer: B

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11. C electricity deposits

A. 10.8 G of Ag

B. 965000 G of Ag

C. electrochemical equivalent of Ag

D. half of electrochemical equivalent of Ag

Answer: C

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12. Given for Sn^{4+}/Sn^{2+} standard reduction potential is 0.15 V and for Au^{3+}/Au standard reduction potential is 1.5 V for the reaction

$3Sn^2 + 2Au^{3+} \rightarrow 3Sn^{4+} + 2ASu$

The value of E°_{cell} is

A. $+1.35$

B. $+2.55$

C. -1.35

D. -2.55

Answer: A

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13. Oxidation potential of unimoles of calomel is

A. $+0.25v$

B. $0.00V$

C. $+0.287V$

D. $-0.28V$

Answer: D

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14. The standard reduction potential for Mg^{2+}/Mg is 2.37 V and for Cu^{2+}/Cu is 0.337 The E°_{cell} for the following reaction $Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$ is

A. $+2.03V$

B. $-2.03V$

C. $-2.7V$

D. $+2.7V$

Answer: B

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15. Copper is a divalent metal the value of its electrochemical equivalent is 3.29×10^{-4} g its atomic mass is

A. $31.74g$

B. `63.5

C. 15.87

D. 126.9

Answer: B

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16. Cell reaction is spontaneous when

A. E_{red}° is negative

B. E_{red}° is positive

C. $\triangle G^{\circ}$ is negative

D. $\triangle G^{\circ}$ is positive

Answer: C

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17. Cu^{+} (aq) is unstable in solution and undergoes simultaneous oxidation and reduction according to the reaction $2cu^{+}(Aq) \rightarrow Cu^{2+}(aq) + cu(s)$

choose correct E^{2} for above reaction if

$E^{\circ}_{Cu^{2+}/Cu} = 0.34V$ and $E_{+}\left(Cu^{2+}/Cu^{+}\right)^{2}$ =0.15 V`

A. $-0.38V$

B. $+0.49V$

C. $+0.38V$

D. $-0.19V$

Answer: C

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18. The amount of silver deposited on passing 2 F of electricty throught aqueous solution of $AgNO_3$ is

A. 54 g

B. 108 g

C. 216 g

D. 324 g

Answer: C

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19. EMF of hydrogen electrode in terms of pH is (at 1 atm pressure)

A. $E_{H_2 = \frac{RT}{F} \times pH}$

B. $E_{H_2} = \frac{RT}{F} = \frac{1}{pH}$

C. $E_{H_2} = \frac{2.303RT}{F}pH$

D. $E_{H_2} = -0.591pH$

Answer: D

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20. The standard E°_{red} values of A,B and C are + 0.68 V -254 V - 0.50 V respectively the order of their reducing power is

A. $A > B > C$

B. $> C > B$

C. $C > B > A$

D. $B > C > A$

Answer: A

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21. The ionic conductance of Ba^{2+} and CI^{-} are respectively 127 and 76 $\omega^{-1}cm^2$ of $BaCI_2$ at infinite dilution will be

A. 139.5

B. 203

C. 279

D. 101.5

Answer: B

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22. The reduction electrode potential E of 0.1 M solutoin of $M^{+}\text{ions}\left(E_{RP}^{\circ} = -2.36V\right)$ is

A. $-4.82V$

B. $-2.41v$

C. $+2.41v$

D. none of these

Answer: A

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23. The oxidation potential values of A,B,C and D are -0.03 V + 0.18 V-0.07 and +0.1 v respecitively the non spontaneous cell reaction takes place between

A. A and B

B. B an D

C. D and A

D. B and C

Answer: C

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24. Na is used in the reduction of Zn salt because

A. $E^{\circ}_{Zn\,(\,\mathrm{oxi}\,)} > E^{\circ}_{Na\,(\,\mathrm{oxi}\,)}$

B. $E^{\circ}_{Zn\,(\,\mathrm{red}\,)} < E^{\circ}_{Na\,(\,\mathrm{red}\,)}$

C. $E^{\circ}_{Zn\,(\,\mathrm{oxi}\,)} < E^{\circ}_{Na\,(\,\mathrm{oxi}\,)}$

D. Both a and b

Answer: C

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25. Reduction potentials of A,B,C and D are 0.8 V 0.79 V, 0.34 V and -2.37 V respectively which element displaces all the other three elements

A. B

B. A

C. D

D. C

Answer: C

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26. When 1 F of electricity is passed through acidulated water O_2 evolved is

A. $11.2dm^3$

B. $5.6dm^3$

C. $22.4dm^3$

D. $1.0dm^3$

Answer: B

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27. Standard electrode potential of ell $H_2|H^+||Ag^+|Ag$ is $(Ag^+/Ag)^\circ = 0.80V$

A. 0.8 v

B. $-0.8V$

C. $-1.2V$

D. $1.2v$

Answer: D

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28. The emf of a galvanic cell with electrode potential of $Zn^{2+}/Zn = -0.76V$ and that of $Cu^{2+}/Cu = +0.34V$ is

A. $+0.34V$

B. $+0.76V$

C. $-1.1v$

D. $+1.1V$

Answer: B

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29. What is the ratio of the weights liberated at the cathode when the same current is passed through two solutions of ferric and ferrous slats arranged in series for a given time interval

A. $3:2$

B. $2:3$

C. $1:3$

D. $3:1$

Answer: B

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30. The emf of a galvanic cell with electrode potential of Zn=+0.76 V and that of Cu =-0.34 V is

A. $-1.1V$

B. $+1.1v$

C. $+0.34V$

D. $+0.76v$

Answer: A

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31. When one faraday current is passed which of the following would deposit 1 g atomic weight of the metal

A. NaCl

B. $BaCI_2$

C. $AICI_3$

D. $CuSO_4$

Answer: B

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32. The atomic weight of Fe is 56 The weight of Fe deposited from $FeCI_3$ solution by passing 0.6 faraday of electricity is

A. 5.6 g

B. 11.2 g

C. 22.4 g

D. 33.6 g

Answer: B

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