CHEMISTRY

BOOKS - MODERN PUBLICATION

ELECTROCHEMISTRY

EXAMPLE

1. The resistance of a conductivity cell containing 0.001M KC1 solution at 298 K is 1500 . What is the cell constant if conductivity of 0.001M KC1 solution at 298 K is 0.146 x 10“3 S cm-1.

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2. The conductivity of 0.35M NaCl solution at 298K is 0.025 S/cm. Calculate its molar conductivity .

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3. A 0.05 M NaOH solution offered a resistance of 31.6 ohm ina conductivity cell at 298 K. if the area of the plates of the conductivity cell is 3.8 cm^2 and distance between them 1.4 cm. calculate the molar conductivity of the NaOH solution.

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4. Calculate the equivalent conductivity of 1M H2SO4 solution whose conductivity is 26 (10) s /cm

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5. Resistance of a conductivity cell filled with 0.1 mol L^{-1} KC1 solution is 100Ω.If the resistance of the same cell when filled with 0.02 mol L^{-1} KC1 solution is 520Ω , calculate the conductivity and molar conductivity of

0.02 mol L^{-1} KC1 solution. The conductivity of 0.1 mol $L(-1)$ KCl solution is 1.29 S/m.

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6. Fill in the blanks- Malarial symptoms takes ____to____ days to show.

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7. A conductivity cell when filled with 0.01M KCl has a resistance of $74.5 ohm$ at $25^{\circ} C$. When the same cell was filled with an aqueous solution of $0.05 M CaCl_2$ solution the resistance was $876 ohm$. Calculate Molar conductivity of solution.

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8. A potential difference of 20 V applied to the ends of a column of 0.1 M $AgNO_3$ solution, 4 cm in diameter and 12 cm in length have a current of

20 A. calculate the molar conductance of the solution.

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9. A potential difference of 20 V applied to the ends of a column of 0.1 M $AgNO_3$ solution, 4 cm in diameter and 12 cm in length have a current of 20 A. calculate the molar conductance of the solution.

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10. The electrical resistance of a column of 0.05 mol L^{-1} NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

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11. The electrical resistance of a column of 0.05 mol L^{-1} NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

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12. The electrical resistance of a column of 0.05 mol L^{-1} NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

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13. The conductivity of sodium chloride at 298K has been determined at different concentration and the results are given below:

Concentration(M):	0.001	0.010	0.020	0.050	0.100
$10^2 \times k(Sm^{-1})$:	1.237	11.85	23.15	55.53	1.06.74

Calculate A for all concentratins and draw a plot between A and $C^{\frac{1}{2}}$. Find the value of Lambda_m^@`.

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14. The molar conductivities at infinite dilution for sodium acetate, _hydrochloric acid and sodium cholride are 92.5,426.9 and 120.4 Scm^2mol^{-1} respectively at 298 K. Calculate the molar conductivity of acetic acid at infinite dilution.

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15. The molar conductivities at inifinite dilution for NaI, CH_3COONa and $(CH_3COO)_2$ Mg are 12.69, 9.10 and $18.78Sm^2mol^{-1}$ respectively at $25^\circ C$. What is the molar conductivity of Mgl_2 at infinite dilution?

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16. The molar conductance of ammonium hydroxide at concentration 0.1M and 0.01M are 3.6 and $34.0Scm^2mol^{-1}$ respectively. Calculate the degree of dissociation of NH_4OH at these concentration. Molar conductance at infinite dilution for NH_4OH is $271.1ohm^{-1}cm^2mol^{-1}$.

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17. Calculate the molar conductance at infinite dilution $(\lambda^o m)$ of $CaCl_2$,given that molar ionic conductance for $\lambda^o m\left(Ca^{2+}\right)119.5$ and $Cl-(76.3)Scm^2mol^{-1}$

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18. The molar conductivity at infinite dilution of $Al_2(SO_4)_3$ is $858Scm^2mol^{-1}$. Caclulate the molar ionic conductivity of Al^{3+} ion given that $\lambda^\circ\left(SO_4^{2-}\right) = 160Scm^2mol^{-1}$.

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19. The molar conductivity at infinite dilution of HCl, KCl and $CH_2ClCOOK$ are 4.26×10^{-2}, 1.50×10^{-2} and $1.13\times10^{-2}Sm^2mol^{-1}$ respectively. Calculate the molar conductivity at infinite dilution for monochloro acetic acid $(CH_2ClCOOH)$.

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20. The conductivity of a 0.01M solution of acetic acid atr 298K is $1.65 \times 10^{-4} Scm^{-1}$. Calculate

dissociation constant for acetic acid

Given that

$\lambda^{\circ}(H^{+}) = 349.1$ and $\lambda^{\circ}(CH_3COO^{-}) = 40.9 Scm^2 mol^{-1}$

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21. The conductivity of a 0.01M solution of acetic acid atr 298K is $1.65 \times 10^{-4} Scm^{-1}$. Calculate

dissociation constant for acetic acid

Given that

$\lambda^{\circ}(H^{+}) = 349.1$ and $\lambda^{\circ}(CH_3COO^{-}) = 40.9 Scm^2 mol^{-1}$

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22. The molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.1 S cm^2 mol^{-1}. Calculate its degree of dissociation and dissociation constant. Given (H^+) = 349.6 S $cm^2 mol^{-1}$ and (HCOO) = 54.6 S cm^2 mol^(-1).

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23. Conductivity of 0.00241M acetic acid is $7.896 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity and if Λ° for acetic acid is $390.5 Scm^2 mol^{-1}$. What is its dissociation constant?

A. 0

B.

C.

D.

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24. The specific conductance of a saturated solution of AgCl at 298K is found to be $1.386 \times 10^{-6} Scm^{-1}$. Calculate its solubility $(\lambda^{\circ}{}_{-}(Ag^{+}) = 62.0 Scm^2 mol^{-1}$ and $\lambda^{\circ}{}_{-}(Cl^{-}) = 76.3 Scm^2 mol^{-1})$.

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25. The molar concentration of acetic acid at infinite dilution is $390.7 Scm^2 mol^{-1}$. Calculate the molar condcutance of 0.01M acetic acid solution, given that the dissociation constant of acetic acid is 1.8×10^{-5}

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26. The conductivity of a saturated solution of AgBr at $25^{\circ} C$ is $8.5 \times 10^{-7} Scm^{-1}$. If the limiting molar ionic conductance of Ag^{+} and Br^{-} ions are 62 and $78 Scm^2 mol^{-1}$, then calculate the solubility product of AgBr.

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27. State whether the statement is true or false- Tiger, bear, lion, are herbivores because they eat plants and grass.

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28. The limiting molar condcutance of sodium chloride, potassium chloride and potassium bromide are 126.45, 149.86 and $151.92 ohm^{-1} cm^2 mol^{-1}$ respectively. Calculate the limiting molar ionic conductance of Na^+ given that limiting molar ionic conductance of Br^- ion is $76.34 ohm^{-1} cm^2 mol^{-1}$.

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29. What is the relationship between equivalent conductance and molar conductance? Illustrate by taking the example of $Al_2(SO_4)_3$.

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30. Fill in the blanks- Streptomysin is an_______.

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31. Fill in the blanks- Housefly is the carrier of _____ disease.

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32. Why is it not possible to determine Λ_m for weak electrolysis by extrapolation?

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33. What are the units of cell constant?

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34. Fill in the blanks- ______ converts milk to curd.

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35. Which of 0.1 HCl and 0.1 M NaCl do you expect to have greater Λ_m° and why?

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36. Which of the folloiwng pairs, will have greater conduction?

0.1 M acetic acid solution or 1M acetic acid solution.

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37. State whether the statement is true or false- Deer is a carnivorous animal because it eats only other animals.

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38. Which of the folloiwng pairs, will have greater conduction?

copper wire at $25^{\circ} C$ and copper wire at $50^{\circ} C$?

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39. A solution is placed in two different cells having cell constant 0.1 and $0.5 cm^{-1}$ respectively. Which of the two will have greater value of specific conductance?

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40. Define conductivity and give its units.

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41. Give relationship between molar conductance and equivalent conductance.

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42. What is the effect of temperature on the electrical conductance of

metallic conductor.

electrolytic conductor?

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43. Express the relation between conductivity and molar conductivity of a solution.

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44. Calculate the limiting molar conductivity of $CaSO_4$, if limiting molar conductivities of calcium and sulphate ions are 119.0 and $106.0 Scm^2 mol^{-1}$ respectively.

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45. Describe the following term with an example- Omnivorous animals.

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46. Arrange the following solutions in the decreasing order of specific conductance.

0.01 M NaCl

0.05M NaCl

0.1 M NaCl

0.5 M NaCl.

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47. Calculate the standard reduction electrode potential of the $Ni^{2+} \mid Ni$ electrode when the cell potential for the cell $Ni\left|Ni^{2+}(1M)\right|\left|Cu^{2+}\right|Cu$ is $0.59V\left(E^{\circ}Cu^{2+} \mid Cu = 0.34\right)$.

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48. Write the half cell reaction and the overall cell reaction for the electrochemical cell:

$Zn|Zn^{2+}(1.0M)||Pb^{2+}(1.0M)|Pb$

Calculate the standard e.m.f. for the cell if standard electrode potentials for $Pb^{2+}|Pb$ and $Zn^{2+}|Zn$ electrodes are -0.126V and -0.763V respectively.

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49. Iodine (I_2) and bromine (Br_2) are added to a solution containing iodide (I^-) and bromide (Br^-) ions. What reaction would occur if the concentration of each species is 1M? The electrode potentials for the reactions are:

$I_2 + 2\bar{e} \rightarrow 2I^-$, E^@=+0.54V`

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50. Iodine (I_2) and bromine (Br_2) are added to a solution containing iodide (I^-) and $bromide$(Br^-) $ions. W\hat{r}eactionwo\underline{d}our$ if $theconcentrationofeachspeciesis1M?Thee$

Br_2+2barerarr2Br^-, E^@=+1.08V`

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51. What will be the spontaneous reaction when the following half reactions are combined

$Fe^{3+} + \bar{e} \rightarrow Fe^{2+}, E^\circ = +0.77V$

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52. What will be the spontaneous reaction when the following half reactions are combined

$MnO_4^- + 8H^+ + 5\bar{e} \rightarrow Mn^{2+} + 4H_2O, E^\circ = +1.49V$

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53. In a simple electrochemical cell, which is in the standard state, the half cell reactions with their appropriate reduction potentials are:

$Pb^{2+}(aq) + 2\bar{e} \rightarrow Pb(s), (E^{\circ} = +0.13V)$.

$Ag^{+}(aq) + \bar{e} \rightarrow Ag(s), E^{\circ} = +0.80V)$

What is the cell reaction for the cell?

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54. In a simple electrochemical cell, which is in the standard state, the half cell reactions with their appropriate reduction potentials are:

$Pb^{2+}(aq) + 2\bar{e} \rightarrow Pb(s), (E^{\circ} = +0.13V)$.

$Ag^{+}(aq) + \bar{e} \rightarrow Ag(s), E^{\circ} = +0.80V)$

What is the cell reaction for the cell?

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55. Zinc rod is dipped in 0.1 M solution of ZnSO4. The salt is 95% dissociated at this dilution at 298 K. Calculate the electrode potential.

[Given EZn2+/Zn = +(-0.76 V]

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56. If E° for copper electrode is +0.34V, how will you calculate e.m.f. value when the solution in contact with it is 0.1 M in copper ions? How does e.m.f. for copper electrode change when concentration of Cu^{2+} ion in the solution is decreased?

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57. Calculate the reduction potential of the following electrode at 298K

$Pt, Cl_2(2.5atm)|HCl(0.01M), E^\circ Cl_2|2Cl^{=}1.36V.$

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58. Calculate the electrode potential of a silver electrode dipped in a 0.1 M solution of silver nitrate at 298K assuming $AgNO_3$ to be completely dissociated. The standard electrode potential of $Ag^+|Ag$ is 0.80V at 298K.

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59. At what concentration of silver ions will this electrode have a potential of 0 volt?

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60. 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:

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61. Calculate the standard electrode potential of Ni2+/Ni electrode if emf of the cell Ni |Ni2+(0.01 M)||Cu2+(0.1 M)| Cu(s) is 0.059 V at 25°C [Given:

Ecu2+Icu = +0.34 v]

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62. Write Nernst equation and calculate the e.m.f. of the following cell at 298 K:

$Cu(s)\left|Cu^{2+}(0.130M)\right|\left|Ag^{+}\left(1.0\times10^{-4}M\right)\right|Ag(s)$

Given that: $E^{\circ}_{Cu^{2+}/Cu}=+0.34V$ and $E^{\circ}_{Ag^{+}/Ag}=+0.80V$

(log 0.130=-1.1139).

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63. Write Nernst equation and calculate e.m.f. of the cell at 298 k.

$Mg(s)\left|Mg^{2+}(0.001M)\right|\left|Cu^{2+}(0.0001M)\right|Cu(s)$

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64. Write The Nernst equation and calculate the e.m.f. of the following cell at 298K.

$$Fe_{(s)}\left|Fe^{2+}_{(0.001M)}\right|\left|H^{+}_{(1M)}\right|H_{2(1atm)}.Pt$$

Given $E^{\circ}_{Fe^{2+}/Fe} = -0.44V$

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65. Write the Nernst equation and calculate the e.m.f. of the following cell at 298K.

$$Sn_{(s)}\left|Sn^{2+}_{(0.050M)}\right|\left|H^{+}(0.020M)\right|H_2(1atm/Pt)$$

Given $E^{\circ}_{Sn/Sn^{2+}} = -0.14V$

$$EMF = \left(E^{\circ}_{H^{+}/1/2H_2} - E^{\circ}_{Sn^{2+}/Sn}\right) - \frac{0.0591V}{2}\log\frac{\left[Sn^{2+}\right]}{\left[H^{+}\right]^{2}}.$$

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66. Represent the cell in which the following reaction takes place $Mg(s) + 2Ag^{+}(0.0001M) \rightarrow Mg^{2+}(0.130M) + 2Ag(s)$ Calculate its

E_{cell} if E_{cell} = 3.17 V.

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67. Calculate the e.m.f of the following cell:

$Cd\left|Cd^{2+}(0.01M)\right|\left|H^{+}(0.02M)\right|Pt, H_2(0.8atm)$

Given: $E^{\circ}\left(Cd^{2+} \mid Cd\right) = -0.40V$

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68. Write NERNST equation also Calculate the cell e.m.f. and ΔG for the cell reaction at $25^{\circ}C$

$Cr(s)/Cr^{3+}(0.1M)//Fe^{2+}(0.01M)/Fe(s)$

Given $E^0_{Cr^{3+}/Cr} = -0.75V$, $E^0_{Fe^{2+}/Fe} = -0.45V$

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69. Calculate the cell e.m.f. and ΔG for the cell reaction at $25^{\circ}C$ for the cell:

$Zn_{(s)}|Zn^{2+}(0.004M)||Cd^{2+}(0.2M)|Cd_{(s)}$

E° values at $25^{\circ}C$, $Zn^{2+}/Zn = -0.763V$

$Cd^{+2}/Cd = -0.403V$

$F = 96,500$, $R = 8.314JK^{-1}mole^{-1}$.

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70. A copper silver cell is set up. The copper ion concentration is 0.10 M. the concentration of silver ion is not known. The cell potential when measured was 0.422V. Determine the concentration of silver ions in the cell.

Given: $E_{Ag^{+}|Ag} = +0.80V$, $E_{Cu^{2+}|Cu} = +0.34V$

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71. A cell contains two hydrogen electrodes. The negative electrode is in contact with a solution of $10^{-6}M$ hydrogen ions. The e.m.f. of the cell is 0.118V at $25^{\circ}C$. Calculate the concentration of hydrogen when at the positive electrode.

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72. The standard reduction potential for $Cu^{2+} \mid Cu$ is +0.34V. Calculate the reduction potential at pH=14 for above couple. K_{sp} of $Cu(OH)_2$ is 1.0×10^{-19}.

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73. Two students use same stock solution of $ZnSO_4$ and a solution of $CuSO_4$. The e.m.f of one cell is 0.03V higher than the other. The concentratio of $CuSO_4$ in the cell with higher e.m.f value of 0.5M. Find out the concentration of $CuSO_4$ in the order cell.

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74. Consider the following cell:

$2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{3+}(aq) + 2H_2O(l)$

$E^{\circ}_{cell} = 1.67V$. When $\left[Fe^{2+}\right] = 1 \times 10^{-3}M$, $p(O_2) = 0.1atm$ e.m.f of the cell is 1.57V. Calculate the pH of the solution.

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75. The K_{sp} for AgCl at 298K is 1.0×10^{-10}. Calculate the electrode potential for $Ag^+|Ag$ electrode immersed in 1.0M KCl solution. Given: $E^{\circ}_{Ag^+|Ag} = 0.80V$

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76. Calculate the equilibrium constant of the reaction: $Cu(s) + 2Ag^+(aq) \rightarrow$ Cu^(2+)$(aq) + 2Ag(s)E^o(cell) = 0.46V$

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77. Calculate the equilibrium constant for the reaction at 298K 4 Br + O2 + 4H+ → 2 Br2 + 2H2O Given that Ecell = 0.16V

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78. Calculate the equilibrium constant of the reaction: $Cu(s)+2Ag^{+}(aq) \rightarrow$ Cu^(2+)$(aq)+2Ag(s)E^{o}(cell)=0.46V$

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79. Calculate the maximum work that can be obtained from the Daniell cells: $Zn\left|Zn^{2+}(aq)\right|\left|Cu^{2+}(aq)\right|Cu$ Given E^(c-)._((Zn^(2+)|Zn))=-0.76V and E^(c-)._((Cu^(2+)|Cu))=0.34V

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80. The Zinc/silver oxide cell is used in hearing aids and electric watches

$Zn \rightarrow Zn^{2+} + 2\bar{e}$

$E^{\circ} = 0.76V$

Ag_2O+H_2O+2barerarr2Ag+2OH^(-)E^@=0.344V`

Which is oxidised and which is reduced?

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81. The Zinc/silver oxide cell is used in hearing aids and electric watches

$Zn \rightarrow Zn^{2+} + 2\bar{e}$

$E^{\circ} = 0.76V$

Ag_2O+H_2O+2barerarr2Ag+2OH^(-)E^@=0.344V$F \in d$E^@

$ofthecell$ and DeltaG^@` in joules?

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82. Calculate the cell e.m.f. and ΔG for the cell reaction at $25^{\circ}C$ for the cell:

$Zn_{(s)} \left| Zn^{2+}(0.004M) \right| \left| Cd^{2+}(0.2M) \right| Cd_{(s)}$

E° values at $25^{\circ} C$, $Zn^{2+} / Zn = -0.763V$

$Cd^{+2} / Cd = -0.403V$

$F = 96, 500, R = 8.314 JK^{-1} mole^{-1}$.

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83. The $DE < aG^{\circ}$ for the Daniell cell has been found to be -212.3 kJ at $25^{\circ} C$. Calculate the equilibrium constant for the cell reaction.

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84. For the cell $Mg \left| Mg^{2+} \right| \left| Ag^{+} \right| Ag$ calculate equilibrium constant at $25^{\circ} C$ and also the maximum work that can be obtained from it.

$E^{\circ}\left(Mg^{2+}, Mg\right) = -2 \cdot 37V$ and $E^{\circ}\left(Ag^{+}, Ag\right) = +0 \cdot 80V$.

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85. Estimate the minimum potential difference needed to reduce Al_2O_3 at $500^\circ C$. The free energy change for the decomposition reaction:

$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + O_2$ is $\Delta G = \ + 960kJ$.

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

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87. Write Nernst equation for the following cell reaction:

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

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88. For the cell reaction

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

$E^{\circ}_{Sn^{2+} \mid Sn} = -0.136, E_{Pb^{2+} \mid Pb} = -0.126V$

Calculate the ratio of concentration of Pb^{2+} to Sn^{2+} ion at which the cell reaction be reversed.

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89. The E° values corresponding to the following two reduction electrode processes are:

$Cu^{+} \mid Cu = 0.52V$

$Cu^{2+} \mid Cu) = 0.16V$

Formulate the galvanic cell for their combination calculate the cell potential and $\Delta_r G^{\circ}$ for the cell reaction.

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90. A solution of $CuSO_4$ is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?

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91. How many moles of electrons are required to reduce 1 mol of MnO_4^- to Mn^{2+}?

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92. How many moles of electrons are required to Produce 10.0 g of Al from molten Al_2O_3?

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93. How many moles of electrons are given by 8960C?

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94. How many moles of electrons are given by

a current of 1.5A for 30 s?

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95. How many minutes it would take to reduce 0.20 mol of Cu^{2+} to Cu using a current of 10A?

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96. Calculate how long it will take to deposit 1.0 g of chromium when a current of 1.25A flows through a solution of chromium sulphate.

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97. How many coulombs are required to deposit 40.5g of aluminium when this electrode reaction is:

$$Al^{3+} + 3 \Longrightarrow Al$$

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98. How much electricity is required in coulomb for the oxidation of: 1 mol of H2O to O2?

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99. How much electricity is required in coulomb for the oxidation of: 1 mol of FeO to Fe2O3?

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100. How many coulombs of electricity are required for

reduction of 1 mol of MnO_4^- to Mn^{2+}.

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101. How many coulombs of electricity are required for

reduction of 1 mol of Cu^{2+} to Cu.

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102. How many coulombs of electricity are required for

reduction of 1 mol of `Al^(3+) to Al

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103. A solution of $Ni(NO_3)_2$ was electrolysed between platinum

electrodes using a current of 5 amp for 30 min. what is the mass of Ni deposited at the cathode?

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104. How many hours does it take to reduce 3 mol of Fe^{3+} to Fe^{2+} with 2.0 A current? (F=96500C)

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105. Three electrolytic cells A,B and C containing electrolyses of zinc sulphate, silver nitrate and copper sulphate respectively were connected in series. A steady current of 1.50 amp was passed through them until 1.45g of silver were deposited at the cathode of cell B.

HOw long did the current flow?

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106. Three electrolytic cells A,B and C containing electrolyses of zinc sulphate, silver nitrate and copper sulphate respectively were connected in series. A steady current of 1.50 amp was passed through them until 1.45g of silver were deposited at the cathode of cell B.

What weight of copper and zinc get deposited?

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107. In the electrolysis of acidulated water, it is desired to obtain hydrogen at the rate of 1cc per second at STP conditions. What should be the current passed?

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108. Predict the products of electrolysis of an aqueous solution of $CuBr_2$?

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109. Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5 amp was passed through them till 1.078 g of silver was deposited?

$\left[Ag = 107.8 gmol^{-1}, 1f = 96500C\right]$

How much electricity was consumed?

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110. Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5 amp was passed through them till 1.078 g of silver was deposited?

$\left[Ag = 107.8 gmol^{-1}, 1f = 96500C\right]$

What was the weight of oxygen gas liberated?

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111. How many moles of mercury will be produced by electrolysing 1.0 M Hg $(NO_3)_2$ solution with a current of 2.00 A for 3 hours ?

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112. Silver is electrodeposited on a metallic vessel of total surface area $900cm^2$ by passing a current of 0.5 ampere for two hours. Calculate the thickness of silver deposited (given density of siolver=$10.5gcm^{-3}$, atomic mass of silver=108amu, $F = 96500Cmol^{-1}$)

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113. Chromium metal can be plated out from an acidic solution containing CrO_3 according to the following reaction:

$CrO_3(aq) + 6H^+(aq) + 6\bar{e} \rightarrow Cr(s) + 3H_2O$

Calculate how many grams of chromium will be plate out by 24,000 coulombs.

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114. Chromium metal can be plated out from an acidic solution containing CrO_3 according to the following reaction:

$CrO_3(aq) + 6H^+(aq) + 6\bar{e} \rightarrow Cr(s) + 3H_2O$

Calculate how long will it take to place out 1.5 g of chromium using 12.5 amp current? (Atomic mass of Cr=52)

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115. How many hours does it require to produce 50.0 mL of O_2 gas measured at STP by electrolysis of water for a period of 3 hrs?

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116. A current of 1.5A is passed through 500 mL of 0.25M solution of zinc sulphate for 1 hr with a current efficiency of 90%. Calculate the final molarity of Zn^{2+} assuming volume to be constant.

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117. From the given cells:

Lead storage cell, Mercury cell, Fuel cell and Dry cell

Which cell is used in hearing aids?

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118. From the given cells:

Lead storage cell, Mercury cell, Fuel cell and Dry cell

Which cell is used in Apollo space Programme?

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119. From the given cells:

Lead storage cell, Mercury cell, Fuel cell and Dry cell

Which cell is used in automobiles and inverters?

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120. From the given cells:

Lead storage cell, Mercury cell, Fuel cell and Dry cell

Which cell does not have long life?

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121. What happens if external potential applied becomes greater than E°_{cell} of electrochemical cell?

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122. Using the E° values of A and B, predict which one is better for coating the surface of iron $\left[E^{\circ}\left(F\frac{e^{2+}}{F}e = -0.44V\right]$ to prevent corrosion and why?

Given: $E^{\circ}\left(A^{2+} \mid A\right) = -2.37V$ and $E^{\circ}\left(B^{2+} \mid B\right) = -0.14V$.

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123. Given that the standard electrode potentials of metals are:

$K^{+} \mid K = -2.93V, Ag^{+} \big| Ag = 0.80V, Cu^{2+} \big| Cu = 0.34V, Mg^{2+} \big| Mg =$

$Fe^{2+} \mid Fe = -0.44V.$

Arrange the metals in the increasing order of their reducing power.

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124. What is the change in free energy for

galvanic cell?

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125. What is the change in free energy for

electrolytic cell?

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126. Is it safe to stir 1M $AgNO_3$ solution with a copper spoon? Given $E^\circ Ag^+ | Ag = 0.80V, E^\circ_{Cu^{2+} | Cu} = 0.34V$ explain.

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127. Can Fe^{3+} oxidise Br^- to Br_2 under standard conditions?

$E_{Fe^{3+} | Fe^{2+}} = 0.771V, E_{Br_2 | Br^-} = 1.09V.$

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128. Two metals A and B have reduction potentials values -0.76V and +0.34V respectively. Which of these will liberate H_2 from dil H_2SO_4?

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129. Can tin coating on iron act as sacrificial anode in protecting iron against corrosion?

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130. What is role of $ZnCl_2$ in a dry cell?

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131. When the silver electrode having reduction potential 0.80V is attached to NHE, will it act as anode or cathode?

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132. Which cell was used in Apollo space programme ? What was the product used for ?

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133. How does concentration of sulphide acid change in lead storage battery when current in drawn from it?

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134. What is the effect of carbon dioxide in water on corrosion?

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135. Why is not the possible to measure the voltage of an isolated half reaction?

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136. Why does a dry cell become dead after a long time, even if it has not been used?

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137. Why does the cell potential of mercury cell remains constant throughout its life?

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138. Calculate the EMF of the cell, containing nickel and copper electrodes. Given $E^{\circ}\left(NI^{2+} \mid NI\right) = -0.25V$ and $E^{\circ}\left(Cu^{2+} \mid Cu\right) = +0.34V$.

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139. Why is the equilibrium constant K related to only E°_{cell} and not E_{cell}?

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140. How can you increase the reducton potential of an electrode?

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141. The E° values of MnO_4^- , Ce^{4+} and Cl_2 are 1.507, 1.61 and 1.358V respectively. Arrange these in order of increasing strength as oxidising agent.

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142. E° values for Fe^{3+}/Fe^{2+} and Ag^+/Ag are 0.771 V and 0.8 respectively. Is the reaction,

$Fe^{3+} + Ag \rightarrow Fe^{2+} + Ag^+$

Spontaneous or not ? Give reason also.

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143. The electrode potentials are:

$O_2 + 4\bar{e} + 4H^+ \rightarrow 2H_2O$

$Ce^{4+} + \bar{e} \rightarrow Ce^{3+}$

$E^{\circ} = 1.60V$

Will Ce^{4+} oxidize H_2O to O_2 in acidic solution?

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144. The chemical formula of rust is:

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145. Can we store copper sulphate in an iron vessel or not? Explain. .

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146. What re antirust solutions? Give one example.

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147. Is e.m.f extensitve or intensive property?

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148. What is the use of platinum foil in the hydrogen electrode?

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149. What type of a battery is lead storage battery? Write the anode and the cathode reactions and the overall reactions occuring in a lead storage battery.

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150. How would you determine the standard electrode potential of the system $Mg^{2+} | Mg$?

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151. Can you store copper sulphate solutions in a zinc pot?

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152. Consult the table of standard electrode potentials and suggest three substances that can oxidise ferrous ions under suitable conditions.

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153. Calculate the potential of hydrogen electrode income with a solution whose pH is 10.

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154. Calculate the emf of the cell in which the following reaction takes place: $Ni(s) + 2Ag^{+}(0.002M)Ni^{2+}(0.160M) + 2Ag(s)$ Given that $E^{V}\_(cell) = 1.05V$

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155. The cell in which the following reaction occurs:

$2Fe^{3+}(aq) + 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + I_2(s)$ has $E^{o}_{cell} = 0.236V$ at 298 K. Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.

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

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157. Suggest a way to determine the $A^{\circ}m$ value of water.

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158. The molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.1 S cm^2 mol^{-1}. Calculate its degree of dissociation and dissociation constant. Given (H^+) = 349.6 S cm^2mol^{-1} and (HCOO) = 54.6 S cm^2 mol^(-1).

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159. If a current of 0.5 ampere flows through a metallic wire for 2 hours, then how many electrons would flow through the wire?

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160. Suggest a list of metals that are extracted electrolytically.

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161. Consider the reaction: $Cr_2O_7^2 - \ + 14H^+ + 6e^{- \rightarrow} 2Cr^{3+} + 7H_2O$

What is the quantity of electricity in coulombs needed to reduce 1 mol of

$Cr_2O_7^{2-}$?

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162. Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

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163. Suggest two materials other than hydrogen that can be used as fuels in fuel cells.

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164. Explain how rusting of iron is envisaged as setting up of an electrochemical cell.

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165. Arrange the following metals in the order in which they displace each other from the solution of their salts. Al, Cu, Fe, Mg and Zn.

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166. Given that the standard electrode potentials of metals are:

$K^{+} \mid K = -2.93V, Ag^{+} \mid Ag = 0.80V, Cu^{2+} \mid Cu = 0.34V, Mg^{2+} \mid Mg =$

$Fe^{2+} \mid Fe = -0.44V.$

Arrange the metals in the increasing order of their reducing power.

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167. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place. Further show: Which of the electrode is negatively charged?

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168. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place. Further show: The carriers of the current in the cell.

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169. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place. Further show: Individual reaction at each electrode.

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170. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$

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171. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$

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172. Write Nernst equation and calculate e.m.f. of the cell at 298 k.

$Mg(s)\left|Mg^{2+}(0.001M)\right|\left|Cu^{2+}(0.0001M)\right|Cu(s)$

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173. Write The Nernst equation and calculate the e.m.f. of the following cell at 298K.

$Fe_{(s)}\left|Fe^{2+}_{(0.001M)}\right|\left|H^{+}_{(1M)}\right|H_{2(1atm)}.Pt$

Given $E^{\circ}_{Fe^{2+}/Fe} = -0.44V$

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174. Write the Nernst equation and calculate the e.m.f. of the following cell at 298K.

$Sn_{(s)}\left|Sn^{2+}_{(0.050M)}\right|\left|H^{+}(0.020M)\right|H_2(1atm/Pt)$

Given $E^{\circ}_{Sn/Sn^{2+}} = -0.14V$

$$EMF = \left(E^{\circ}_{H^{+}/1/2H_2} - E^{\circ}_{Sn^{2+}/Sn}\right) - \frac{0.0591V}{2}\log\frac{\left[Sn^{2+}\right]}{\left[H^{+}\right]^2}.$$

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175. Write the Nernst equation and calculate the emf of the following cells at 298K

$Pt(s)|Br_2(l)|Br(0.010M) \mid \left|H^{+}(0.030M)\right|H_2(g)(1^{-})Pt(s)$

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176. In the button cells widely used in watches and other devices the following reaction takes place: Zn(s) + Ag20(s) + H2O(l) Zn2+(aq) + 2Ag(s) + 20H"(aq) Determine rG and E for the reaction.

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177. Define conductivity and molar conductivity for the solution of an electrolyte. How do they vary when the concentration of electrolyte in the solution increases ?

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178. The conductivity of $0.20 M KCl$solution at 298 K is $0.0248 S cm^{-1}$. Calculate its molar conductivity.

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179. The resistance of a conductivity cell containing 0.001M KC1 solution at 298 K is 1500 . What is the cell constant if conductivity of 0.001M KC1 solution at 298 K is 0.146 x 10“3 S cm-1.

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180. Explain the formation of brass?

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181. Conductivity of 0.00241M acetic acid is $7.896 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity and if Λ° for acetic acid is $390.5 Scm^2 mol^{-1}$. What is its dissociation constant?

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182. How much charge is required for the following reductions: 1 mol of Al^(3+) to Al?

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183. How much charge is required for the following reductions: 1 mol of $Cu^{2+} \rightarrow Cu$?

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184. How much charge is required for the following reductions: 1 mol of $MnO4^{-}$ to Mn^(2+)?

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185. How much electricity in terms of Faraday is required to produce :20.0 g of Ca from molten $CaCl_2$?

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186. How much electricity in terms of Faraday is required to produce : 40.0 g of Al from molten A1203?

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187. How much electricity is required in coulomb for the oxidation of: 1 mol of H2O to O2?

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188. How much electricity is required in coulomb for the oxidation of: 1 mol of FeO to Fe2O3?

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189. A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode?

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190. Three electrolytic cells A,B and C containing electrolyses of zinc sulphate, silver nitrate and copper sulphate respectively were connected in series. A steady current of 1.50 amp was passed through them until 1.45g of silver were deposited at the cathode of cell B.

HOw long did the current flow?

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191. Predict if the reaction between the following is feasible:

$Fe^{3+}(aq)$ and $I^{-}(aq)$

Given standard electrode potentials:

$E_{1/2}\frac{I_2}{I^{\equiv}}0.54V$, $E^{\circ}_{1/2}C\frac{u^{2+}}{C}u = 0.34V$, $E_{\frac{1}{2}}B\frac{r_2}{B}r^{-} = 1.09V$, $E_{1/2}A\frac{g^{+}}{A}g = 0.80V$ and $E_{1/2}F\frac{e^{3+}}{F}e^{2+} = 0.77V$.

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192. Predict if the reaction between the following is feasible:

$Ag^{+}(aq)$ and $Cu(s)$

Given standard electrode potentials:

$E_{1/2}\frac{I_2}{I^{\equiv}}0.54V$, $E^{\circ}_{1/2}C\frac{u^{2+}}{C}u = 0.34V$, $E_{\frac{1}{2}}B\frac{r_2}{B}r^{-} = 1.09V$,

$E_{1/2}A\frac{g^{+}}{A}g = 0.80V$ and $E_{1/2}F\frac{e^{3+}}{F}e^{2+} = 0.77V$.

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193. Using the standard electrode potentials given in Table 3.1 predict if the reaction between the following is feasible: $Br_2(aq)$ and $Fe^{2+}(aq)$.

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194. An element Y has a valancy of 4. Write the formula for its carbonate

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195. Using the standard electrode potentials given in Table 3.1 predict if the reaction between the following is feasible: $Br_2(aq)$ and $Fe^{2+}(aq)$.

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196. Predict the products of electrolysis in each of the following: An aqueous solution of $AgNO_3$ with platinum electrodes.

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197. Predict the products of electrolysis in each of the following: A dilute solution of H_2SO_4 with platinum electrodes.

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198. Predict the products of electrolysis in each of the following: An aqueous solution of $CuCl_2$ with platinum electrodes.

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199. Can absolute electrode potential of an electrode be measured?

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200. True or false:

Both E°_{cell} and ΔG° for the cell reaction are intensive properties.

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201. Under what condition is $E_{cell} = 0$ and $\Delta_r G = 0$?

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202. For the hypothetical reaction

$A \rightarrow P$roducts , rate = - k [A]

The negative sign used in the rate expression indicate that

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203. Aquesous copper sulphate solution and aqueous silver nitrate solution are electroolysed by 1 Ampere current for 10 minutes in separate electrolytic cells. Will the mass of copper and silver deposited on the cathode be same or different? Explain your answer.

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204. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^{+}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place. Further show: Individual reaction at each electrode.

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205. Value of standard electrode potential for the oxidation of Cl^{-} ions is more positive than that of water, even then in the electrolysis of aqueous of water, even then in the electrolysis of aqueous sodium chloride, why is Cl^{-} oxidised at anode instead of water?

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206. What is electrode potential ? Give its types.

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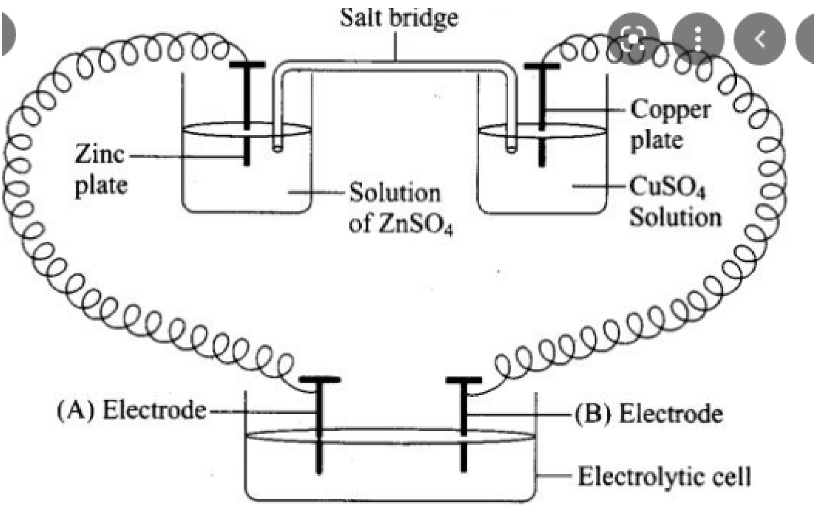
207. Consider the following diagram in which an electrochemical cell is coupled to an electrolytic cell. What will be the polarity of electrodes 'A' and 'B' in the electrolytic cell?



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208. Why is alternating current used for measuring resistance of an electrolytic solution?

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209. A galvanic cell has electrical potential of 1.1V. If an opposing potential of 1.1V is applied to this cell, what will happen to the cell reaction and current flowing through the cell?

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210. How will the pH of brine be affected when it is electrolysed?

Watch Video Solution

211. Why does the cell potential of mercury cell remains constant throughout its life?

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212. Which of the following is a strong electrolyte?

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213. How will the pH of brine be affected when it is electrolysed?

Watch Video Solution

214. In an aqueous solution how does specific conductivity of electrolytes change with addition of water?

Watch Video Solution

215. Which cell will measure standard electrode potential of copper electrode?

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216. Consider a cell given below

$Cu|Cu^{2+}||Cl^{-}|Cl_2, Pt$ Write the reactions that occur at anode and cathode.

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217. Write the Nernst equation for the cell reaction in the Daniel cell. How will the E_{cell} be affected when concentration of Zn^{2+} ion is increased?

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218. What advantage do the fuel cells have over primary and secondary batteries?

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219. Write the cell reaction of a lead storage battery when it is discharged. How does the density of the electrolyte change when the battery is discharged?

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220. Why on dilution the Λ_m of CH_3COOH incrases drastically, while that of CH_3COONa increases gradually.

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221. What are the limitations of cell theory?

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222. Why is a salt bridge or a porous plate not needed in a lead storage battery?

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223. The atomic number of an element is 13. What will be the number of electrons in its ion X3+

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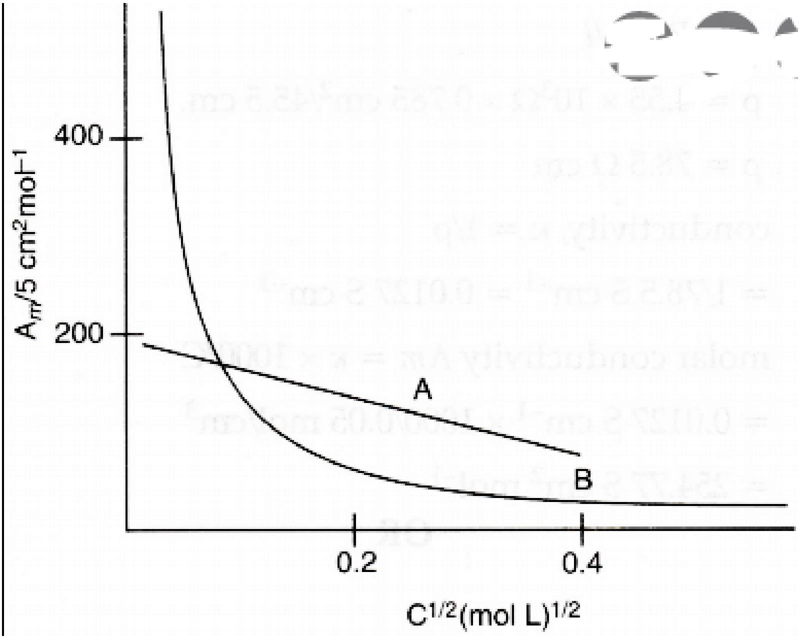
224. The following curve is obtained when molar conductivty, Λ_m is plotted against the square rot of concentration, $C^{1/2}$ along y and x axis respectively for the two electrolytes X and Y.



What can you say about the the nature of these two electrolytes?

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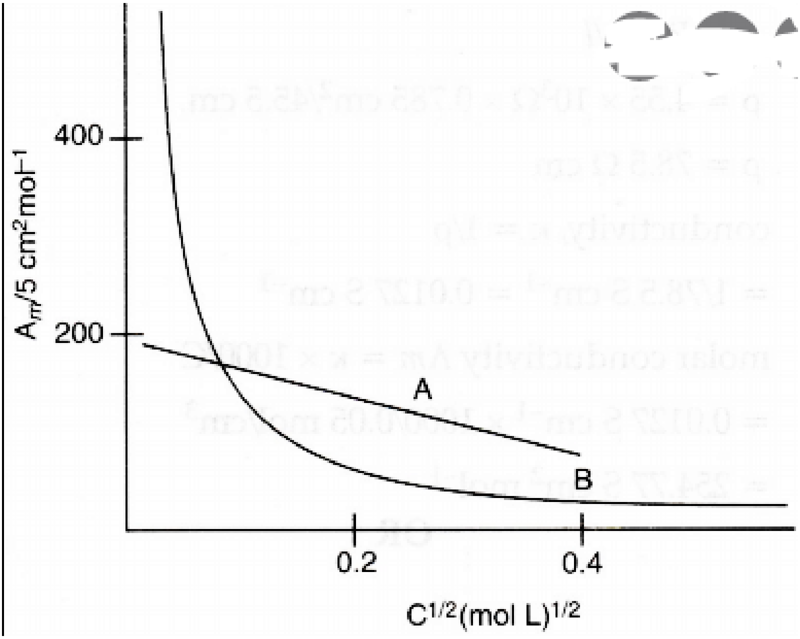
225. The following curve is obtained when molar conductivty, Λ_m is plotted against the square rot of concentration, $C^{1/2}$ along y and x axis respectively for the two electrolytes X and Y.



How do you account for the increase in Λ_m for the electolytes X and Y with dilution?

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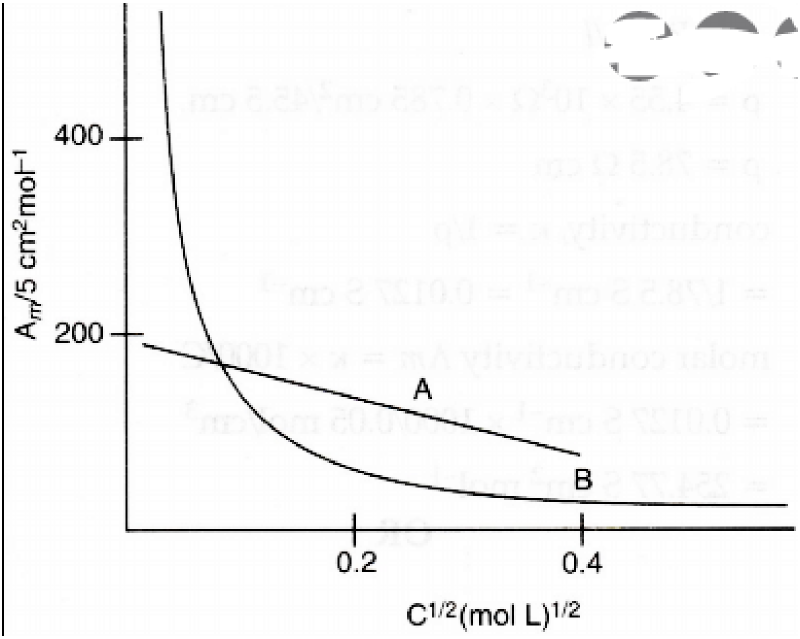
226. The following curve is obtained when molar conductivty, Λ_m is plotted against the square rot of concentration, $C^{1/2}$ along y and x axis respectively for the two electrolytes X and Y.



How can you determine Λ_m^{∞} for these electrolytes?

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227. Consider the following half cell reaction:

$Br_2 + 2\bar{e} \rightarrow 2Br^-, E^\circ = 1.09V$

$I_2 + 2\bar{e} \rightarrow 2I^-, E^\circ = 0.54V$

If I_2 and Br_2 are added to solution containing 1M concentration of I^- and Br^- resepctively.

Write and equation for the overall cell reaction and E° of the cell.

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228. Consider the following half cell reaction:

$Br_2 + 2\bar{e} \rightarrow 2Br^-, E^\circ = 1.09V$

$I_2 + 2\bar{e} \rightarrow 2I^-, E^\circ = 0.54V$

If I_2 and Br_2 are added to solution containing 1M concentration of I^- and Br^- resepctively.

How will the increase in the concentration of Br^- affect E_{cell}?

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229. Consider the following half cell reaction:

$Br_2 + 2\bar{e} \rightarrow 2Br^-, E^\circ = 1.09V$

$I_2 + 2\bar{e} \rightarrow 2I^-, E^\circ = 0.54V$

If I_2 and Br_2 are added to solution containing 1M concentration of I^- and Br^- resepctively.

How will the increase in the concentration of Br^- affect E_{cell}?

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230. Tarnished silver contains Ag_2S. Can this tranish be removed by placing tranished silver articels in an aluminium pan containing an inert electrolyte solution such as NaCl? The standard electrode potentials for the half cell reactions are:

$Ag_2S(s) + 2\bar{e} \rightarrow 2Ag(s) + S^{2-}(aq), \qquad E^{\circ} = -0.71V$ and $Al^{3+} + 3\bar{e} \rightarrow Al(s), E^{\circ} = -1.66V$.

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231. If charge on the electron is $1.60 \times 10^{-19}C$ and 96500 C deposit 107.9g of silver from its solution, calculate the value of Avagadro's number.

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232. If the number of electrons in an ion Z3+ is 10 . What is the atomic number of Z .

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233. Show that their for two half reactions having potentials E_1 and E_2 which are combined to give a third half reactions having potential E_3 is

$$E_3 = \frac{n_1E_1 + n_2E_2}{n_3}$$

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234. Calculate the reductoin potential of a half cell consisting of a platinum electrode immersed in 2.0M Fe^{2+} and 0.02M Fe^{3+} solution $\left(E^\circ Fe^{3+} \mid Fe^{2+} = 0.771V\right)$.

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235. The standard reduction potential for the half cell:

$NO_3^{-\,(aq)} + 2H^+(aq) + \bar{e} \rightarrow NO_2 + H_2O$ is 0.78v.

What will be the reduction of the half cell in a neutral solution? Assume all the other species to be at unit concentration.

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236. The standard reduction potential for the half cell:

$NO_3^{-\,(aq)} + 2H^+(aq) + \bar{e} \rightarrow NO_2 + H_2O$ is 0.78v.

What will be the reduction of the half cell in a neutral solution? Assume all the other species to be at unit concentration.

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237. How many grams of silver could be plated out on a serving tray by elelctolysis of a solution containing silver in +1 oxidation state for a period of 8.0 hours at a current of 8.46 amperes? What is the area of the tray if the thickness of the silver plating is 0.0025 cm? density of silver is $10.5\frac{g}{c}m^3$.

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238. What pressure of H_2 would be required to make the e.m.f of hydrogen elecrode zero in pure water at $25^\circ C$?

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239. Conductivity of a saturated solution of $CO_2\left[Fe(CN)_6\right]$ is $2.06 \times 10^{-6} ohm^{-1} cm^{-1}$ and that of wter used is $4.0 \times 10^{-7} ohm^{-1} cm^{-1}$. Calculate the solubility and solubility product of $CO_2\left[Fe(CN)_6\right]$ in water at $25^\circ C$. [Ionic molar conductivities: $CO^{2+} = 86.0, \left[Fe(CN)_6\right]^{-4} = 444.0 ohm^{-1} cm^2 mol^{-1}\Big]$.

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EXERCISE

1. The resistance of a 0.25 mol or solution of an molar solution of an electrolyte was found to be 75Ω. Calculate the molar conductivity of the solution if the electrods in the cell are 1.8 cm a part and having an area of cross section $3.6 cm^2$.

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2. What is molar conductivity of an electrolyte?

Solution containing $0.1 mol L^{-1}$ of electrolyte and resistivity equal to 50 ohm cm.

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3. Explain the variation in molar conductivity of weak electrolyte with concentration.

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4. Calculate the resistance of 0.01N solution of an electrolyte whose equivalent conductivity is $420 ohm^{-1} cm^2 \equiv^{-1}$.

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5. The resistance of a 0.5 M solution of an electrolyte in a conductivity 'cell was found to be 25 ohm. Calculate the molar conductivity of the solution, if the electrodes in the cell are 1.6 cm apart and have an area of $3 \cdot 2cm^2$.

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6. 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:

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7. The conductivity of a solution containing 1.0 g of anhydrous $BaCl_2$ in $200cm^3$ of the solution has been found to be $0.0058Scm^{-1}$. Calculate the molar conductivity and equivalnet conductivity of the solution.

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8. The resistance of a 0.5M solution of an electrolyte was found to be 30Ω. Calculate the molar conductivity of the solution if the electrods in the cell are 1.5 cm a part and having an area of cross section is 2.0 cm^2.

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9. 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:

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10. When a certain conductance cell was filled $0.1 mol L^{-1}$ KCl, it has a resitance of $85 ohm$ and $25^\circ C$. When the same cell was filled with an aqueous solution of $0.052 mol L^{-1}$ of an electrolyte solution, the resistance was $96 ohm$. Calculate the molar conductivity of the electrolyte at this concentration. (conductivity of $0.1 mol L^{-1}$ KCl solution is $1.29 \times 10^{-2} S cm^{-1}$)

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11. The resistance of a conductivity cell with 0.1 M KCl solution is found to be $200 ohm$ at 298K. When the same cell was filled with 0.02 M NaCl solution, the resistance at the same temperature is found to be $1100 ohm$. Calculate:

the cell constant of the cell in m^{-1}. Given conductivity of 0.lM KCl is $1.29 Sm^{-1}$]

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12. The resistance of a conductivity cell with 0.1 M KCl solution is found to be $200 ohm$ at 298K. When the same cell was filled with 0.02 M NaCl solution, the resistance at the same temperature is found to be $1100 ohm$. Calculate:

the molar conductivity of 0.02 M NaCl solution in Sm^2mol^{-1}.

Given: Conductivity of 0.1 M KCl solution at 298K = $1.29Sm^{-1}$.

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13. 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?

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14. Specific conductivity of N/35 KCl at 298K is $0.002768ohm^{-1}cm^{-1}$ and it has resistance of 520 ohm. A N/25 solution of a salt kept in the same cell was found to have a resistance of 300 ohm at 298K. Calculate the equivalent conductance of the solution.

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15. The molar conductance of KCl solution at different concentration at 298K are given below:

c or $M\left(molL^{-1}\right)$	$\wedge_m\ \left(Scm^2mol^{-1}\right)$
0.000198	148.61
0.000309	148.29
0.000521	147.81
0.000989	147.09

Show that a plot of Λ_m and $C_{\frac{1}{2}}$ is a straight line. Determine the values of Λ_m and A for KCl.

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16. The conductance of 0.1 M acetic acid at 298 K is 5.20 and that of 0.001 M acetic acid is 49.2. The ionic molar conductivity at infinite dilution of acetate and hydrogen ions are 349.8 and $40.9scm^2mol^{-1}$ respectively. Calculate the degree of dissociatioan of acetic acid at these concentrations.

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17. The specific conductance of a saturated solution of AgCl at 298K is found to be $1.386 \times 10^{-6} Scm^{-1}$. Calculate its solubility $(\lambda^{\circ}\_(Ag^{+}) = 62.0 Scm^{2}mol^{-1}$ and $\lambda^{\circ}\_(Cl^{-}) = 76.3 Scm^{2}mol^{-1})$.

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18. The λ° values of KNO_3 and $LiNO_3$ are 145.0 and 110.1 S cm^2mol^{-1} respectively. The λ° value of K^{+} ion is 73.5S cm^2mol^{-1}. Calculate $\lambda^{\circ}(Li^{+})$.

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19. The conductivity of a 0.01M solution of acetic acid at 298K is $1.65 \times 10^{-4} Scm^{-1}$. Calculate

molar conductivity of the solution.

Given that

$\lambda^{\circ}(H^{+}) = 349.1$ and $\lambda^{\circ}(CH_3COO^{-}) = 40.9 Scm^2 mol^{-1}$

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20. The molar conductivity at infinite dilution for NH_4Cl, NaOH and NaCl kare 129.8, 217,4 and $108 Scm^2 mol^{-1}$ respectively. If the molar conductivity of 0.01 M solution of NH_4OH is $9.33 Scm^2 mol^{-1}$. Calculate What is the percentage dissociation of NH_4OH at this diluton?

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21. The molar conductivity at infinite dilution for NH_4Cl, NaOH and NaCl kare 129.8, 217,4 and $108 Scm^2 mol^{-1}$ respectively. If the molar conductivity of 0.01 M solution of NH_4OH is $9.33 Scm^2 mol^{-1}$. Calculate dissociation constant of NH_4OH.

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22. The conductivity of a saturated solution of AgBr at $25^{\circ}C$ is $8.5 \times 10^{-7} Scm^{-1}$. If the limiting molar ionic conductance of Ag^{+} and Br^{-} ions are 62 and $78 Scm^{2} mol^{-1}$, then calculate the solubility product of AgBr.

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23. Calculate the number of moles in the following : (2) 7.9 mg of Ca

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24. The conductivity of $0.001028 mol L^{-1}$ acetic acid is $4.95 \times 10^{-5} Scm^{-1}$.calculate the dissociation constant if $\Lambda^{\circ}(CH_3COOH)$ is $390.5 Scm^{2} mol^{-1}$.

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25. The conductivity of a saturated solution of $BaSO_4$ at 295 K is found to be $3.758 \times 10^{-6} ohm^{-1} cm^{-1}$ and that of water used is $1.386 \times 10^{-6} ohm^{-1} cm^{-1}$. Molar ionic conductance at infite dilution of of Ba^{2+} and SO_4^{2-} ions are 110 and $136.6 ohm^{-1} cm^2 mol^{-1}$ respectively. calculate teh solubility of $BaSO_4$ art 295 K (Atomic masses: Ba=137, S=32, O=16)

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26. An iron wire is immersed in a solution contianing $ZnSO_4$ and $NiSO_4$. When the concentration of each salt is 1M, predect giving reasons which of the following reactions is likely to proceed?

Ion reduces Zn^{2+} ions

Given $E^\circ(Zn^{2+} \mid Zn) = -0.76V$, $E^\circ(Fe^{2+} \mid Fe) = -0.44V$ and $E^\circ(NI^{2+} \mid Ni) = -0.25V$.

Watch Video Solution

27. An iron wire is immersed in a solution contianing $ZnSO_4$ and $NiSO_4$. When the concentration of each salt is 1M, predict giving reasons which of the following reactions is likely to proceed?

Ion reduces Ni^{2+} ions

Given $E^\circ(Zn^{2+} \mid Zn) = -0.76V$, $E^\circ(Fe^{2+} \mid Fe) = -0.44V$ and $E^\circ(NI^{2+} \mid Ni) = -0.25V$.

Watch Video Solution

28. Can a nickel spoon be used to stir a solution of copper sulphate ? Support your answer with reason. $[E^\circ(Ni^{2+}/Ni) = -0.25V, E^\circ(Cu^{2+}/Cu) = +0.34V]$

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29. What is the standard e.m.f. of the cell containing $Sn^{2+} \mid Sn$ and $Br_2 \mid Br^-$ electrodes?

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Watch Video Solution

30. Write each half cell reaction of the following electrochemical cell:

$Cu(s)|Cu^{2+}(1M)||Ag^{+}(1M)|Ag(s)$

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31. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$

Watch Video Solution

32. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$

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33. Can Chlorine gas be stored in Copper Cylinder ? Given $E^{\circ}_{Cu^{+}\,/\,Cu} = 0.34V$ and $E^{\circ}_{Cl_2\,/\,Cl} = 1.36V$

Watch Video Solution

34. Why does blue colour sulphate get discharged when zinc rod is dipped in it?

Given $E^{\circ}\left(C\frac{u^{2+}}{C}u\right) = 0.34V, E^{\circ}\left(Zn^{2+} \mid Zn\right) = -0.76V.$

Watch Video Solution

35. Calculate the electrode potential at copper electrode dipped in a 0.1 M solution of copper sulphate at 298K, assuming $CuSO_4$ to be completely ionised. The standard electrode potential of $Cu^{2+} \mid Cu$ is 0.34V at 298K.

Watch Video Solution

36. Write the Nernst equation and calculate E.M.F of the following reaction at 298 K

$Mg/Mg^{2+}(0.1M)//Cu^{2+}(0.01M)/Cu(s)$ given

$E^0_{\text{cell}}=2.71V, F=96500C/mol$

Watch Video Solution

37. Calculate the potential of the following cell reaction at 298K:

$Sn^{4+}(1.50M)+Zn(s)\rightarrow Sn^{2+}(0.5M)+zn^{2+}(2.0M)$

The standard potential of the cell is 0.89V, will the potential of the cell will increase or decrease if the concentration of Sn^{2+} is increased in the cell?

Watch Video Solution

38. Calculate the e.m.f. of the following cell at 298 K,

$Mg|Mg^{2+}(0.130M)||Ag^{+}(1.0\times10^{-4}M)|Ag$

Watch Video Solution

39. Consider a cell composed of the following half cells:

$Ag(s) + Ag^{)} + \Big)(aq)$

The e.m.f of the cell is 2.96V at $Mg^{2+} = 0.130M$ and $\left[Ag^{+}\right] = 1.0 \times 10^{-4}M$. Calculate the standard e.m.f. of the cell $\left(R = 8.3JK^{-1}mol^{-1}, F = 96500C\right)$.

Watch Video Solution

40. Write Nernst equation and calculate the e.m.f of the following cell at 298 K:

$Zn\left|Zn^{2+}(0.01M)\right|\left|Fe^{2+}(0.005M)\right|Fe$

Given that:

$\left(Zn^{2+}/Zn\right) = -0.763V$ and $E^{\circ}_{Fe^{2+}/Fe} = -0.44V \quad \log 2 = 0.3010$

.

Watch Video Solution

41. The calculate the e.mf. Of the following cell at 298:

$$Fe\left|Fe^{2+}(0.1M)\right|\left|Ag^{2+}(0.1M)\right|Ag$$

$$E^{\circ}_{(Fe^{2+}/Fe)} = -0.44V, E^{\circ}_{(Ag^{+}/Ag)} = 0.80V.$$

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42. Calculate the e.m.f of the following cell at 298K

$$2Cr(s) + 3Fe^{2+}(0.01M) \rightarrow 2Cr^{3+}(0.1M) + 3Fe(s)$$

Given: $E^{\circ}\left(Cr^{3+} \mid Cr\right) = -0.75V, E^{\circ}\left(Fe^{2+} \mid Fe\right) = -0.45V.$

Watch Video Solution

43. Calculate the electrode potential at copper electrode dipped in a 0.1 M solution of copper sulphate at 298K, assuming $CuSO_4$ to be completely ionised. The standard electrode potential of $Cu^{2+} \mid Cu$ is 0.34V at 298K.

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44. At what concentration of silver ions will this electrode have a potential of 0 volt?

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45. Calculate the equilibrium constant for the reaction 2Fe3+(aq) + 2I–(aq) → 2Fe2+(aq) + I2(s) E0cell = 0.236V

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46. Calculate the K_c for the reaction:

$NiO_2 + 2Cl^{-} + 4H^{+} \Leftrightarrow Cl_2 + NI^{2+} + 2H_2O$ at 298K if E°_{cell} is 0.320V.

Watch Video Solution

47. Calculate the $25^{\circ}C$ the equilibrium constnat for the reaction:

$2Fe^{3+} + Sn^{2+} \Leftrightarrow 2Fe^{2+} + Sn^{4+}$

Given that: $E_{Fe^{3+} + Fe^{2+}}$, Pt=0.771V, $E_{Sn^{4+} \mid Sn^{2+}}$ Pt=0.150V.

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48. For a cell reaction:

$A(s) + 2B^{+}(Aq) \rightarrow A^{2+}(aq) + 2B(s)$ the equilibrium constant is 1×10^{4} calculate E°_{cell}.

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49. Calculate the equilibrium constant for the reaction:

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

If $E_{Cd^{2+} \mid Cd} = -0.403V$ and $E_{Zn^{2+} \mid Zn} = -.763V$

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50. Calculate ΔG° and equilibrium constant for the cell reaction,

$Cl_2 + 2l^{-} \Leftrightarrow 2Cl^{-} + I_2$

Given that: $E^{\circ}\left(Cl_2, Cl^{-}\right) = 1 \cdot 36V, E^{\circ}\left(l_2, l^{-}\right) = 0 \cdot 536V$

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51. Calculate ΔG and E_{cell} for the cell:

$AI / AI^{3+}(0.01M) | \; | Fe^{2+}(0.02M) / Fe$ given that $E^{\circ}\left(Al^{3+} / Al\right) = -1.66V$ and $E^{\circ}\left(Fe^{2+} / Fe\right) = -0.44V$

Watch Video Solution

52. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$

Watch Video Solution

53. Write Nernst equation and calculate the e.m.f. of the following cell at 298 K:

$Cu(s) \middle| Cu^{2+}(0.130M) \middle\| Ag^{+}\left(1.0 \times 10^{-4}M\right) \middle| Ag(s)$

Given that: $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$ and $E^{\circ}_{Ag^{+}/Ag} = +0.80V$

(log 0.130=-1.1139).

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54. When a current of 0.75A is passed through a $CuSO_4$ solution for 25 min, 0.369g of copper is deposited. Calculate the atomic mass of copper.

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55. How many grams of chlorine can be produced by the electrolysis of molten NaCl with a current of 1.00 A for 15 minutes?

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56. What mass of zinc can be produced by the electrolysis of zinc sulphate solution when a current of 1.5 amperes is passed for 15 minutes ? The atomic mass of zinc=65.4 amu.

Watch Video Solution

57. How much electricity is required in coulomb for the oxidation of: 1 mol of FeO to Fe2O3?

Watch Video Solution

58. How many coulombs of electriciy are required for the following processes:

oxidation of 1 mol of H_2O_2 to O_2.

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59. How many coulombs of electriciy are required for the following processes:

reduction of 1 mol of F_2 to $2F^-$?

Watch Video Solution

60. The same quantity of electrical charge that deposited 0.583g of silver was passed through solution of gold salt and 0.355g of gold was formed. What is the oxidation state of gold in this salt?

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61. How many hours does it require to produce 50.0 mL of O_2 gas measured at STP by electrolysis of water for a period of 3 hrs?

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62. How many hours does it take to reduce 3 mol of Fe^{3+} to Fe^{2+} with 2.0 A current? (F=96500C)

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63. How much electricity in terms of Faraday is required to produce :20.0 g of Ca from molten $CaCl_2$?

Watch Video Solution

64. How much electricity in terms of Faraday is required to produce : 40.0 g of Al from molten A1203?

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65. Silver is electrodeposited on a metallic vessel of total surface area $800cm^2$ by passing a current of 0.2 ampere for 3 hours. Calculate the thickness of silver deposited given density is 10.47g/cc. (At. Wt. of Ag=107.92).

Watch Video Solution

66. How much electricity in terms of Faraday is required to produce : 40.0 g of Al from molten A1203?

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67. True or false:

An electrochemical cell works only if emf is negative.

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68. True or false:

In an electrolytic cell reduction occurs at cathode.

Watch Video Solution

69. True or false:

Electrolytic conductance generally decreases with rise in temperature.

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70. Oxidation potential is the .....of reduction potential

Watch Video Solution

71. True or false:

In Zn-Cu cell, copper acts as a cathode while in Cu-Ag cell, copper acts as anode.

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72. True or false:

Metallic conductance decreases with increase in temperature.

Watch Video Solution

73. True or false:

Both E°_{cell} and ΔG° for the cell reaction are intensive properties.

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74. Calculate formula mass of calcium chloride

Watch Video Solution

75. Calculate formula mass of sodium carbonate

Watch Video Solution

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

Watch Video Solution

77. Fill ups

In an electrochemical cell, oxidaton occurs at........and reduction occurs at................. .

Watch Video Solution

78. Fill ups

ΔG° is related to e.m.f of the cell is................ .

Watch Video Solution

79. Fill ups

The units of cell constant is................. .

Watch Video Solution

80. Fill ups

In a Leclanche cell, MnO_2 acts as.................. .

Watch Video Solution

81. Fill ups

Protection of iron by coating with zinc is called.................. .

Watch Video Solution

82. Fill ups

For the spontaneous electrochemical cell reaction, E° should be..................... ..

Watch Video Solution

83. Fill ups

The electrolyte used in $H_2 - O_2$ fuel cell isâ€¦â€¦â€¦â€¦â€¦.. .

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84. Fill ups

In Leclanche dry cell, the cathode isâ€¦â€¦â€¦â€¦â€¦.

Watch Video Solution

85. Fill ups

In electrolytic cell, reduction occurs at.................... .

Watch Video Solution

86. Fill ups

In lead storage cell, the cathode consists ofâ€¦â€¦â€¦â€¦â€¦â€¦ .

Watch Video Solution

87. The chemical formula of rust is:

Watch Video Solution

88. What are the units of molar conductivity?

Watch Video Solution

89. Fill ups

The equilibrium constant and e.m.f of the cell are released asâ€¦â€¦â€¦â€¦â€¦â€¦â€¦ .

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90. Choose the correct answer:

In an electrochemcal cell, reduction will occur at the electrode having lower/higher oxidation potential.

Watch Video Solution

91. Choose the correct statement.

Watch Video Solution

92. Electrical conductance of metals decreases with increase in temperature.

Watch Video Solution

93. Choose the correct answer:

In a Daniel cell, when $E_{ext} > 1.10V$, then current flows from Zn to Cu/Cu to Zn.

Watch Video Solution

94. Choose the correct answer:

E°_{cell} is directly/inversly proportional to ΔG°.

Watch Video Solution

95. Choose the correct answer:

By passing 96500 C of electriciy through aqueous Al_2O_3 the amount of Al produced is 27g/9g

Watch Video Solution

96. Choose the correct answer:

In the electrolysis of molten $PbBr_2, B\frac{r_2}{P}b$ is produced at anode.

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97. Choose the correct answer:

In Leclanche cell, zinc cylinder acts as a anode/cathode.

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98. Choose the correct statement.

Watch Video Solution

99. Choose the correct answer:

In mercury cell, zinc acts as anode/cathode.

Watch Video Solution

100. Choose the correct answer:

Presence of CO_2 in natural water incrases/decreases rusting of iron.

Watch Video Solution

101. Write Nernst equation for the following cell reaction:

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

Watch Video Solution

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

Watch Video Solution

103. Write the overall cell reaction for lead storage battery.

Watch Video Solution

104. How is cell potential related to the free energy change? State meaning of each term used.

Watch Video Solution

105. Can we store copper sulphate solution in an iron vessel ?

Watch Video Solution

106. What is the formular of rust?

Watch Video Solution

107. Fill ups

ΔG° is related to e.m.f of the cell is............... .

Watch Video Solution

108. How does the concentration of sulphuric acid change in lead storage battery when current is drawn from it?

Watch Video Solution

109. How many coulombs are required for the reduction of one mole of aluminiium ?

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

Watch Video Solution

110. Define molar conductivity or molar conductance?

Watch Video Solution

111. Why does a dry cell become dead after a long time, even if it has not been used?

Watch Video Solution

112. What is the baisis of obtaining electrical energy in the fuel cells?

Watch Video Solution

113. Give an example of a fuel cell?

Watch Video Solution

114. How is molar conductivity related to conductivity of a solution? Derive the units of molar conductivity.

Watch Video Solution

115. Write the product obtained at andoe on electorlysis of concentrated sulphuric acid using platinum electodes.

Watch Video Solution

116. What is relation between conductivity and molar conductivity ?

Watch Video Solution

117. Express the reation between among the conductivity of a solution in the cell, the cell constant and the resistance of the solution in the cell.

Watch Video Solution

118. Which cell was used in Apollo space programme ? What was the product used for ?

Watch Video Solution

119. What is the amount of electricity required to deposit one mole of aluminium from a solution of $AlCl_3$?

Watch Video Solution

120. How can you increase the reducton potential of an electrode?

Watch Video Solution

121. What is the amount of electricity required to deposit one mole of Zinc form the solution of $ZnSO_4$?

Watch Video Solution

122. Which reference electrode is used to measure the electrode potential of other electrodes?

Watch Video Solution

123. What is the effect of decreasing concentration on the molar conductivity of weak electrolyte?

Watch Video Solution

Watch Video Solution

124. What is secondary cells?

Watch Video Solution

125. Can we store copper sulphate solution in a zinc vessel ?

Watch Video Solution

126. Suggest two materials other than hydrogen that can be used as fuels in fuel cells.

Watch Video Solution

127. Write Nernst equation for a singel electrode potential.

Watch Video Solution

128. How does resistivity of conductor vary with temperature?

Watch Video Solution

129. What is molar conductivity?

Watch Video Solution

130. Galvanised iron sheets are coated with: C, Cu, Zn, Ni.

A. C

B. Cu

C. Zn

D. Ni

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131. For a redox reaction to proceed in a cell, the e.m.f. must be:

A. positive

B. negativwe

C. fixed

D. zero

Watch Video Solution

132. The units of conductivity are

A. $ohm^{-1}cm^{-1}$

B. $ohm^{-1}cm^{2}$

C. ohm^{-1}

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

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133. Name the metal used in galvanisation of iron?

A. zinc

B. magnesium

C. copper

D. aluminium

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134. Which of the following statements is false?

A. Oxidation and reduction half reactions occur at electrodes in electrochemical cell.s

B. All voltaic cells involve the use of electricity to initiate non spontaneous chemical reaciton.

C. Reduction occurs at the cathode

D. Oxidation occurs at the anode.

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135. The tendencies of the electrodes made up of Cu,Zn and Ag to release electrons, when dipped in their respective salt solutions decreases in the order: $Zn > Ag > Cu,$ $Cu > Zn > Ag,$ $Zn > Cu > Ag,$ $Ag > Cu > Zn.$

A. ZngtAggtCu

B. CugtZngtAg

C. ZngtCugtAg

D. AggtCugtZn

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136. The units of cell constant are: $ohm^{-1}cm^{-1}, cm, ohm^{-1}cm, cm^{-1}$

A. $ohm^{-1}cm^{-1}$

B. cm

C. $ohm^{-1}cm^{-1}$

D. cm^{-1}

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137. Consider the following reactions:

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

With reference to the above reaction which one of the following is correct statement:

A. Zn is reduced to Zn^{2+}

B. Zn is oxidised to Zn^{+}

C. Zn^{2+} ions are oxidised to Zn

D. Cu^{2+} ions are oxidised to Cu.

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138. Define conductivity and molar conductivity for the solution of an electrolyte. How do they vary when the concentration of electrolyte in the solution increases ?

Watch Video Solution

139. Write two difference between strong and weak electrolytes.

Watch Video Solution

140. How is molar conductivity related to conductivity of a solution? Derive the units of molar conductivity.

Watch Video Solution

141. What are the factors which affect which affect the conductivity of an electolyte solution? How will you explain weak and a strong electrolyte based on their conductivity values?

Watch Video Solution

142. What are the factors which affect which affect the conductivity of an electolyte solution? How will you explain weak and a strong electrolyte based on their conductivity values?

Watch Video Solution

143. Why does the colour of copper sulphate solution change,when anb iron nail is dipped in it?

Watch Video Solution

144. How is cell potential related to the free energy change? State meaning of each term used.

Watch Video Solution

145. How is standard Gibbs energy of a reaction related to its equilibrium constant?

Watch Video Solution

146. What are the products of the electrolysis of molten sodium chloride?

Watch Video Solution

147. What is corrosion? What is the chemical formula of rust?

Watch Video Solution

148. What do you understand by sacrificial protection and electrical protection of corrosion?

Watch Video Solution

149. The number of electrons in an ion Y2- is 10. What is the atomic number of an element Y.

Watch Video Solution

150. The formula of metal carbonate of a metal M is M2CO3. What is the formula of its iodide.

Watch Video Solution

151. The formula of metal carbonate of a metal M is M2CO3. What is the formula of its nitride.

Watch Video Solution

152. Write the cell reactions which occur in lead storage battery when the batteyr is on charging.

Watch Video Solution

153. What is a Galvanic cell? Give the function of salt bridge.

Watch Video Solution

154. Can a zinc spoon be used to stir a solution of copper sulphate? Support your answer with reason

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

Watch Video Solution

155. What are weak electrolytes ? Give examples.

Watch Video Solution

156. The formula of metal carbonate of a metal M is M2CO3. What is the formula of its phosphate.

Watch Video Solution

157. Why does a dry cell become dead after a long time, even if it has not been used?

Watch Video Solution

158. How many moles are 5 grams of calcium ?

Watch Video Solution

159. What are fuel cells ? Discuss $H_2 - O_2$ fuel cell. List some advantages of fuel cells over other cells.

Watch Video Solution

160. What is the effect of decreasing concentration on the molar conductivity of weak electrolyte?

Watch Video Solution

161. Calculate the limiting molar conductivity of $CaSO_4$ limiting molar conductivities of calcium and sulphate ions are 119.0 and $106.0 Scm^2 mol^{-1}$ respectively.

Watch Video Solution

162. Distinguish between emf and potential difference.

Watch Video Solution

163. Calculate the standard electrode potential of $Ni^{2+} \mid Ni$ electrode if the cell potential of the cell:

$Ni|Ni^{2+}(0.01M)||Cu^{2+}(0.1M)|Cu$ is 0.59V

Given: $E_{Cu^{2+} \mid Cu} = 0.34V$.

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164. What is the mass of 4 moles of aluminium atoms ?

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165. Calculate the number of atoms in 0.2 mole of sodium (Na).

Watch Video Solution

166. How many moles are 9.033 (10*24) atoms of helium (He)

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167. Calculate the number of iron atoms in a piece of iron weighing 2.8g

Watch Video Solution

168. Define molar conductivity of an electolytic solution. How does molar conductivity vary with concentration for a weak electrolyte?

Watch Video Solution

169. The function of a salt bridge is to :

Watch Video Solution

170. The molar conductivity at infinite dilution of $Al_2(SO_4)_3$ is $858 Scm^2 mol^{-1}$. Caclulate the molar ionic conductivity of Al^{3+} ion given that $\lambda^{\circ}\left(SO_4^{2-}\right) = 160 Scm^2 mol^{-1}$.

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171. If one mole of carbon atoms weighs 12 grams , what is mass in grams of 1 atom of carbon.

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172. The calculate the e.mf. Of the following cell at 298:

$Fe\left|Fe^{2+}(0.1M)\right|\left|Ag^{2+}(0.1M)\right|Ag$

$E^{\circ}_{(Fe^{2+}/Fe)} = -0.44V, E^{\circ}_{(Ag^{+}/Ag)} = 0.80V.$

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173. Convert 88 g of carbon dioxide into moles.

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174. Calculate the equilibrium constant of the reaction:

$Cu(s) + 2Ag^{+}(aq) \rightarrow$ Cu^(2+)$(aq) + 2Ag(s)E^{o}(cell) = 0.46V$

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175. What is the molar mass of C2H6O.

Watch Video Solution

176. Can we store copper sulphate solution in iron vessel? Give suitable explanation in support of your answer

$\left[E^{\circ}\left(Cu^{2+}/Cu\right) = +0.34V, E^{\circ}\left(Fe^{2+}/Fe\right) = -0.44V\right]$

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177. What is the molar mass of C12H22011 .

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178. What is the molar mass of C6H5NH2 .

Watch Video Solution

179. Write the cathode, anode and cell reaction in the lead storage cell.

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180. What is the mass of 0.5 mole of ammonia.

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181. Give the cathode, anode, electrolyte and electrode reactions of mercury cell.

Watch Video Solution

182. What is the molar mass of ClF3.

Watch Video Solution

183. What is the number of molecules in 0.25 moles of oxygen.

Watch Video Solution

184. The standard electrode potential for Daniell cell is 1. IV. Calculate the standard Gibbs energy for the reaction: Zn(s) + Cu^(2+) (aq) rarr Zn^(2+) (aq) + Cu(s)

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185. In the cell: $Cr(s)\left|Cr^{3+}(sq)\right| \mid Cd^{2+}(aq) + Cd(s)$

Write down the anodic and cathodic reactions and the overall cell reaction.

Watch Video Solution

186. In the cell: $Cr(s)\left|Cr^{3+}(sq)\right| \mid Cd^{2+}(aq) + Cd(s)$

Write the Nernst equation for the reaction gven above.

Watch Video Solution

187. Convert 12.044 (10 * 22) molecules of sulphur dioxide into moles.

Watch Video Solution

188. What is secondary cells?

Watch Video Solution

189. What is a secondary batteyr? Write the mechanism of recharging of lead storage battery with the help of chemical reaction.

Watch Video Solution

190. Define standard electrode potential.

Watch Video Solution

191. The standard electrode potential for Daniell cell is 1. IV. Calculate the standard Gibbs energy for the reaction: Zn(s) + Cu^(2+) (aq) rarr Zn^(2+) (aq) + Cu(s)

Watch Video Solution

192. Following reactions occurs at cathode during the electrolysis of aqueous silver chloride solutoin:

$Ag^{+}(aq) + \bar{e} \rightarrow Ag(s)$

$E^{\circ} = +0.80V$ and $H^{+}(aq) + \bar{e} \rightarrow \frac{1}{2}H_2(g)$

$E^{\circ} = 0.00V$

On the basis of their standard reduction potential values. which reaction is feasible at the cahode and why?

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193. Define molar conductivity or molar conductance?

Watch Video Solution

Watch Video Solution

194. What is the difference between e.m.f. and potential diffrence?

Watch Video Solution

195. What is salt bridge? give its functions.

Watch Video Solution

196. Discuss the electrochemical theory of corrosion.

Watch Video Solution

197. What are primary cells ? Give two examples.

Watch Video Solution

198. Write short note on lead storage battery.

Watch Video Solution

199. For the reaction : $Ni(s) + 2Ag^{+}(1M) \rightarrow Ni^{+2}(1M) + 2Ag(s)$.

Which species get reduced?

Watch Video Solution

200. Write the Nernst equation for the above cell, if

$E^{\circ}\left(Zn^{2+} \mid Zn\right) = -0.76V, E^{\circ}\left(Cu^{\circ +} \mid Cu\right) = +0.34V$

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201. What is a secondary batteyr? Write the mechanism of recharging of lead storage battery with the help of chemical reaction.

Watch Video Solution

202. Which of the following is a secondary cell?

Dry cell

Leclanche cell

Mercury cell

None of these

What is the realtionship between resistance and conductance?

Watch Video Solution

203. Which of the following is a secondary cell?

Dry cell

Leclanche cell

Mercury cell

None of these

One of the fuel cell uses the reaciton of hydrogen and oxygen to form water. Write down the cell reaction taking place in the anode and cathode of that fuel cell.

Watch Video Solution

204. Give the Nernst equation of the cell:

$Ni(s)|NI^{2+}(aq)(0.1M)||Ag^{+}(aq)(0.1M)|Ag(s)$ and also find the cell potential.

given that $E^{\circ}\left(Ag^{+}|Ag\right) = 0.80V, E^{\circ}\left(Ni^{2+} \mid Ni\right) = -0.25V$

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205. Calculate the standard cell potentials of galvanic cell in which the following reactions take place: Calculate the $\Delta_r G^o$ and equilibrium constant of the reactions. $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$

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206. On the basis of the standard electrode potential values states for acid solution, predict whether Ti^{4+} species may be used to oxidise Fe^{2+}

to Fe^{3+}.

$Ti^{4+} + e^- \rightarrow Ti^{3+} \quad E^\circ = +0.01V$

$Fe^{3+} + e^- \rightarrow Fe^{2+} \quad E^\circ = +0.77V$

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207. What type of a battery is lead storage battery? Write the anode and the cathode reactions and the overall reactions occuring in a lead storage battery when current is drawn from it.

Watch Video Solution

208. How is molar conductivity related to conductivity of a solution? Derive the units of molar conductivity.

Watch Video Solution

209. Given that the standard electrode potentials of metals are:

$K^+ \mid K = -2.93V, Ag^+ \left| Ag = 0.80V, Cu^{2+} \right| Cu = 0.34V, Mg^{2+} \left| Mg = \right.$

$Fe^{2+} \mid Fe = -0.44V.$

Arrange the metals in the increasing order of their reducing power.

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210. Two half reactions in electochemical cell are given below:

$MnO_4^{-\,(aq)} + 8H^+(aq) + 5\bar{e} \to Mn^{2+}(aq) + 4H_2O(l),$

$sn^{2+}(aq) \to Sn^{4+}(aq) + 2\bar{e},$

Construct the redox reaction equation form the two Half-reactions and calculate the cell potential from the standard potentials and predict the reaction is reactant or product favoured.

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

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212. Calcualate the $\Delta_r G$ for the reaction:

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

Given: $E^{\circ}_{cell} = +2.71V, 1F = 96500Cmol^{-1}$

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213. Which cell was used in Apollo space programme ? What was the product used for ?

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214. Define the following:

Fuel Cell.

Watch Video Solution

215. Define the following:

Limiting molar conductivity

Watch Video Solution

216. Define the following terms:

Molar conductivity(Λ_m)

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217. Define the following terms:

Secondary batteries.

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218. Following reactions occurs at cathode during the electrolysis of aqueos sodium chloride solution:

$Na^+(aq) + \bar{e} \rightarrow Na(s), E^\circ = -2.71V$ and $H^+(aq) + \bar{e} \rightarrow \frac{1}{2}H_2(g),$

$E^{\circ} = 0.00V$

On the basis of their standard reducton electrode potential (E°) values, which reaction is feasible at the cathode and why?

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219. Why does potential of mercury cell remain constant throughout its life?

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220. Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5 amp was passed through them till 1.078 g of silver was deposited?

$[Ag = 107.8 gmol^{-1}, 1f = 96500C]$

What was the weight of oxygen gas liberated?

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221. Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5 amp was passed through them till 1.078 g of silver was deposited?

$[Ag = 107.8 gmol^{-1}, 1f = 96500C]$

What was the weight of oxygen gas liberated?

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222. Give reasons:

Rusting of iron pipe can be prevented by joining with a piece of magnesium?

Watch Video Solution

223. Give reasons:

Conductivity of an electorlyte solution decreases with the decreases in concentration.

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224. What is a fuel cell? What is its main advantages?

Watch Video Solution

225. What are het reactions occuring at the cathode and anode of a Leclanche cell?

Watch Video Solution

226. In the button cell widely used for watches and other devices, the following reaction takes place:

$Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$

Determine the value of K_c for the above reaction using the following data?

$AgO_2(s) + H_2O(l) + 2\bar{e} \rightarrow 2Ag(s) + 2Oh^-(aq)$

$(E^\circ = 0.344V)$

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

$(E^{\circ} = -0.76V)$

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227. Explain construction and working of fuel cell?

Watch Video Solution

228. The standard electrode potential for Daniell cell is 1. IV. Calculate the standard Gibbs energy for the reaction: Zn(s) + Cu^(2+) (aq) rarr Zn^(2+) (aq) + Cu(s)

Watch Video Solution

229. Write Nernst equation and cell reaction of the following cell:

$Zn \left| Zn^{2+} \right| \left| Cu^{2+} \right| Cu$

Watch Video Solution

230. What type of a battery is lead storage battery? Write the anode and the cathode reactions and the overall reactions occuring in a lead storage battery when current is drawn from it.

Watch Video Solution

231. In the button cells widely used in watches and other devices the following reaction takes place: Zn(s) + Ag2O(s) + H2O(l) Zn2+(aq) + 2Ag(s) + 2OH“(aq) Determine rG and E for the reaction.

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232. Define molar conductivity of an electolytic solution. How does molar conductivity vary with concentration for a weak electrolyte?

Watch Video Solution

233. Explain Kohlrausch's law of independent migration of ions. Mention one application of the law.

Watch Video Solution

234. Explain the variation in molar conductivity of weak electrolyte with concentration.

Watch Video Solution

235. The resistance of a conductivity cell containing 0.001M KC1 solution at 298 K is 1500 . What is the cell constant if conductivity of 0.001M KC1 solution at 298 K is 0.146 x 10“3 S cm-1.

Watch Video Solution

236. Define the following:

Limiting molar conductivity?

Watch Video Solution

237. Define the following:

Fuel Cell.

Watch Video Solution

238. Resistance of a conductivity cell filled $0.1 mol L^{-1} KCl$ solution is $100 ohm$. If the resistance of the same cell when filled with $0.02 mol L^{-1} KCl$ solution is $520 ohm$, calculate the conductivity and molar conductivity of $0.02 mol L^{-1}$ KCl solution. The conductivity of $0.1 mol L^{-1}$ KCl solution is $1.29 \times 10^{-2} cm^{-1}$?

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239. State Faraday's first law of electrolysis.

Watch Video Solution

240. Write the Nernst equation and calculate E.M.F of the following reaction at 298 K

$Mg / Mg^{2+}(0.1M)//Cu^{2+}(0.01M) / Cu(s)$ given

$E^0_{\text{cell}} = 2.71V, F = 96500C / mol$

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241. In an electrochemical cell,

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242. What is a Galvanic cell? Give the function of salt bridge.

Watch Video Solution

243. Define the process of oxidation and reducton with example.

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Watch Video Solution

244. You are provided with the following substances: copper rod, zinc rod, salt bridge, two glass beaker, a piece of wire, 1 M $CuSO_4$ solution, $1MZnSO_4$ solutoin.

Represent the cell made using the above materials.

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245. Write the Nernst equation for the above cell, if

$E^\circ\left(Zn^{2+} \mid Zn\right) = -0.76V, E^\circ\left(Cu^{\circ +} \mid Cu\right) = +0.34V$

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246. Write two point of differences between metallic conductance and electolytic conductance.

Watch Video Solution

247. State Kohlrausch's law. Molar conductivity at infinite dilution of NH_4Cl, NaOH and NaCl solution at 298K are 110, 100 and $105 Scm^2 mol^{-1}$ respectively. Calculate the molar conductivity of NH_4OH solution.

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248. What is equivalent conductivity and molar conductivity of an electrolyte in solution?

Watch Video Solution

249. Write the Nernst equation and calculate the emf of the following cell at 298K.

$Cu(s)(0.130M) \mid \left|Ag^+\left(1.0 \times 10^{-4}\right)\right| Ag(s)$

Given $E^\circ\left(Cu^{2+} \mid Cu\right) = +0.34V, E^\circ\left(Ag^+|Ag\right) = +0.80V$

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250. Define specific conductivity and molar conductivity for the solution of an electrolyte. How do they vary with dilution?

Watch Video Solution

251. Calculate the Λ_m° for NH_4OH given that the values of Λ_m° for $Ba(OH)_2$, $BaCl_2$ and NH_4Cl are 523.28, 280.0 and $129.8 scm^2 mol^{-1}$ respectively.

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252. What is electrolysis? State and explain Faraday's two laws of electrolysis.

Watch Video Solution

253. How many coulombs are required to deposit 40.5g of aluminium when this electrode reaction is:

$Al^{3+} + 3 \Longrightarrow Al$

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254. What is the electochemical series? Write one application of electochemical series. Calculate the standard electrode potential of $Ni^{2+} \mid Ni$ electrode, if the cell potential fo the cell:

$Ni|NI^{2+}(0.01M)||Cu^{2+}(0.1M)|Cu$ is 0.59V.

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255. What is a fuel cell? Write its one advantage over other ordinary cells.

Watch Video Solution

256. A voltaic cell is set up at $25^{\circ}C$ with the given half cells: $Ag^{+}(0.001M) \mid Ag$ and $Cu^{2+}(0.10M) \mid Cu$.

What would be the voltage of the cell $\left(E^{\circ}_{cell} = 0.46V\right)$?

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257. What is meant by 'molar conductivity' of a solutin? Describe how for weak and strong electrolytes, molar conductivity changes with concentration of soluton. How is such change explained?

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258. The molar conductivity of 1.5 M solution of an electrolysis is found to be $138.9 Scm^2 mol^{-1}$. Calculate the conductivity of this solution?

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259. State two advantage of $H_2 - O_2$ fuel cell over ordinary cell.

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260. Silver is electrodeposited on a metallic of vessel of total surface area $900 cm^2$ by passing a current of 0.5 amp for two hours. Calculate the thicknessof silver deposited.

Watch Video Solution

261. Rusting of iron quicker in saline water than in ordinary water. Explain.

Watch Video Solution

262. Give reasons for the following:

Aluminium metal cannot be produced by elelctolysis of aqueous solution of aluminium salt.

Watch Video Solution

263. Resistance of a conductivity cell filled with 0.1 mol L^{-1} KC1 solution is 100Ω.If the resistance of the same cell when filled with 0.02 mol L^{-1} KC1 solution is 520Ω , calculate the conductivity and molar conductivity of 0.02 mol L^{-1} KC1 solution. The conductivity of 0.1 mol $L(-1)$ KCl solution is 1.29 S/m.

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264. Write the overall cell reaction for lead storage battery.

Watch Video Solution

265. A copper silver cell is set up. The copper ion concentration is 0.10 M. the concentration of silver ion is not known. The cell potential when measured was 0.422V. Determine the concentration of silver ions in the cell.

Given: $E_{Ag^+ | Ag} = +0.80V, E_{Cu^{2+} | Cu} = +0.34V$

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266. What type of a battery is lead storage battery? Write the anode and the cathode reactions and the overall reactions occuring in a lead storage battery when current is drawn from it.

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267. Calculate the potential for half cell containing 0.1 M $K_2Cr_2O_7(aq)$, $0.20 M Cr^{3+}(aq)$ and $1.0 \times 10^{-4} M H^+(aq)$ The half cell reaction is.

$CrO_7^{2-}(aq) + 14H^+ + 6\bar{e} \to 2Cr^{3+}(aq) + 7H_2O(l)$

and the standard electrode potential is given as: $E^\circ = 1.33V$.

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268. How many moles of mercury will be produced by electrolysing 1.0 M Hg $(NO_3)_2$ solution with a current of 2.00 A for 3 hours ?

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269. A voltaic cell is set up at $24^\circ C$ with the following half-cells $AI^{3+}(0.001M)$ and $Ni^{2+}(0.50M)$. Write an equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

(Given : $E^\circ_{Ni^{2+}/Ni} = -0.25V, E^\circ_{Al^{3+}/Al} = -1.66V$)

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270. Caculate the E°_{cell} for the following reaction at 298K:

$2Cr(s) + 3Fe^{2+}(0.01M) \to 2Cr^{3+}(0.01M) + 3Fe(s)$

Given $E_{cell} = 0.261V$.

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271. Using the E° values of A and B, predict which one is better for coating the surface of iron $\left[E^{\circ}\left(F\frac{e^{2+}}{F}e = -0.44V\right]\right.$ to prevent corrosion and why?

Given: $E^{\circ}\left(A^{2+} \mid A\right) = -2.37V$ and $E^{\circ}\left(B^{2+} \mid B\right) = -0.14V$.

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272. The conductivity of $0.001 molL^{-1}$ solution of CH_3COOH is $3.905 \times 10^{-5} Scm^{-1}$. Calculate the molar conductivity and degree of dissociation

Give that $\lambda^{\circ}\left(H^{+}\right) = 349.65 Scm^2 mol^{-1}$ and $\lambda^{\circ}\left(CH_2COO^{-40.9} Scm^2 mol^{-1}\right.$.

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273. Define electrochemical cell. What happens if external potential applied becomes greater than E°_{cell} of electochemcial cell?

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274. An equimolar concentration of Fe^{2+} and Fe^{3+} what must be the $[Ag^{+}]$ so that the value of the galvanic cell made from $Ag^{+}|Ag$ and $Fe^{3+} \mid Fe^{2+}$ electrodes equals zero? The cell reaction is

$Fe^{2+} + Ag^{+} \Leftrightarrow Fe^{3+} + Ag$

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275. During the discharge of a lead storage battery, the density of sulphuric acid fell down from 1.294 to 1.139 g/ml. Sulphuric acid of density 1.294g/ml is 39% H_2SO_4 by weight and that of density of 1.139 g/ml is 20% H_2SO_4 by weight. The battery holds 3.5 L of acid and the volume remains practically constant during discharge. calculate the number of ampere hours for which the battery must have been used. The charging and discharging reactions are:

$Pb^{2+} + SO_4^{2-} \Leftrightarrow PbSO_4 + 2\bar{e}(Charg \in g)$

$PbO_2 + 4H^{+} + SO_4^{2-} + 2\bar{e} \Leftrightarrow PbSO_4 + 2H2O(Discharg \in g)$.

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276. A current of 4 amp was passed for 1.5 hours through a solution of copper sulphate when 3.2 g of copper was deposited. Calculate the current efficiency.

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277. Describe the following term with an example- Carnivorous animal

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278. Describe the following term with an example- Herbivorous animal

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279. State whether the statement is true or false- Cow, buffalo, sheep are carnivorous animals because they feed on other animals.

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280. Calculate ΔG and E_{cell} for the cell:

$AI / AI^{3+}(0.01M) \mid \mid Fe^{2+}(0.02M) / Fe$ given that $E^{\circ}\left(Al^{3+} / Al\right) = -1.66V$ and $E^{\circ}\left(Fe^{2+} / Fe\right) = -0.44V$

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281. Pick the animals which only eat plants- lion, tiger, cow, man, bear, sheep, buffalo, deer, leopard, crocodile.

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282. Name one plant whose one or more than one part is edible?

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283. State whether the statement is true or false- Milk is a plant product.

Watch Video Solution

284. Name three plant products that we eat?

Watch Video Solution

285. Name two most common sources of food items?

Watch Video Solution

286. Name three animal products that we eat?

Watch Video Solution

287. Which parts of the plants we eat? Give examples.

Watch Video Solution

288. Why sprouted seeds give more energy than normal seeds?

Watch Video Solution

289. What are the benefits of neem?

Watch Video Solution

290. What is the difference between herbivores and omnivores?

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291. Manu and his father went to a shop to purchase a battery for their inverter. Shopkeeper showed them two types of batteries, one with lead plates and the other with cadmium plates. The battery with cadmium plates was more expensive than the lead battery. Manuâ€™s father wanted to purchase lead battery as it was cheaper.

After reading the above passage, answer the following questions:

What are the values associated with the above decision?

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292. Rahul went with his father to buy hinges for the door. The shopkeeper showed two types of hinges: normal iron hinges and the galvanised hinges. The normal hinges were cheaper while the galvanised hinges were costlier. Rahul's father opted for the cheaper normal iron hinges. Rahul suggested father to buy galvanised hinges though they were costlier.

What was the rationale for Rahul to buy galvanised hinges?

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293. Explain the reason why pitcher plant feeds on other insects although it can perform photosynthesis?

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294. Many food producs are available in the market in tin cans. Rakesh went to the buy tinned cans of a food product. The shopkeeper gave him a can which had scratches, though it had been recently packed. Rakesh did not buy that can.

How do you agree with Rakesh's decision?

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295. Concrete has been most widely used as a building material. It is reinforced by rods which make it hard and stronger. However, it has been noticed that some old buildings are showing signs of weakness and cracks. As a student of chemistry how would yu analyse this shocking situation? is there any method to protect these buildings from further damage?

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296. Rana purchased a monumnet made of copper. It turned green after some time. As a student of chemistry, how would you explain this?

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297. The amount of silver deposited from a solution of silver nitrate when a current of 965 coulombs was passed is

A. 10.8g

B. 0.108 g

C. 1.08g

D. $1.08 \times 10^3 g$

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298. The S.I. units of molar conductivity are: Sm^2mol^{-2}, $Smmol^{-1}$, Sm^2mol^{-1}, Sm^3mol^{-1}

A. Sm^2mol^{-1}

B. $Sm^{-1}mol^{-1}$

C. $Sm^{-2}mol$

D. Sm^3mol^{-1}

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299. If the conductivity and conductance of a solution is same then its cell constant is equal to

A. 1

B. 0

C. 10

D. 1000

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300. The units of cell constant are: $ohm^{-1}cm^{-1}, cm, ohm^{-1}cm, cm^{-1}$

A. $ohm^{-1}cm^{-1}$

B. cm

C. $ohm^{-1}cm$

D. cm^{-1}

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301. The units of conductivity are

A. ohm^{-1}

B. $ohm^{-1}cm^{-1}$

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

D. $ohm^{-1}cm^{2}$

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302. Numbers of coulombs required to deposit 90 gm of aluminium, when the electrode fraction is,

$Al^{3} + 3e^{-} \rightarrow Al.....\ 9.65 \times 10^{4}, 8.68 \times 10^{5}, 9.65 \times 10^{5}, 6.95.$

A. 9.65×10^{4}

B. 8.685×10^{5}

C. 9.65×10^{5}

D. 6.955

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303. Which of the following statements is incorrect about electrochemical cell?

A. Electrons are released at anode.

B. Chemical energy is converted into electrical energy

C. Salt bridge maintains the electrical neutrality of the elecroylysis

D. Cell can work indefinitely

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304. Point our the correct statement is a cell of zinc and copper:

A. Zinc acts as cathode and copper at anode

B. Zinc acts as anode and copper as cathode.

C. the standard reducion potential of zinc is more than that of copper

D. The flow of electrons s friom copper to zinc.

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305. Write the half cell reaction and the overall cell reaction for the electrochemical cell:

$Zn|Zn^{2+}(1.0M)||Pb^{2+}(1.0M)|Pb$

Calculate the standard e.m.f. for the cell if standard electrode potentials for $Pb^{2+}|Pb$ and $Zn^{2+}|Zn$ electrodes are -0.126V and -0.763V respectively.

A. 0.637 V

B. lt0.637 V

C. gt0.637 V

D. 0.889 V

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306. Zinc rod is dipped in 0.1 M solution of ZnSO4. The salt is 95% dissociated at this dilution at 298 K. Calculate the electrode potential. [Given EZn2+/Zn = +(-0.76 V]

A. $-0.81V$

B. $-0.79V$

C. $0.81V$

D. $0.79V$

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307. for the electrorode reaction,

$M^{n+}(aq)+ne^{-} \rightarrow M(s)$

Nernst equation is: $E=E^{o}+\frac{RT}{nF}\ln\frac{1}{[M^{n+}]}$, $E=E^{o}+RT\ln[M^{n+}]$, $E=E^{o}+\frac{RT}{nF}ln[M^{n+}]$, $\frac{E}{E^{o}}=\frac{RT}{nF}ln[M^{n+}]$..

A. $E=E^{\circ}+\frac{RT}{nF}\log\left(\frac{1}{M^{n+}}\right)$

B. $E^{\circ} = E^{\circ} + RT\ln[M^{n+}]$

C. $E = E^{\circ} + \dfrac{RT}{nF}\ln[M^{n+}]$

D. $\dfrac{E}{E^{\circ}} = \dfrac{RT}{nF}\ln[M^{n+1}]$

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308. E_{cell} and $\triangle G^o$ are related as: $\triangle G^o = nFE^o$, $\triangle G^o = -nFE^o$, $\triangle G^o = -nFE^o_{cell}$, $\triangle G^o = nFE^o_{cell} = 0$.

A. $\Delta G^{\circ} = nFE^{\circ}_{cell}$

B. $\Delta g = -nFE^{\circ}_{cell}$

C. $\Delta G^{\circ} = -nFE^{\circ}_{cell}$

D. $\Delta G = nFE^{\circ}_{cell} = 0$.

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309. Rust is mixture of:

A. FeO and $Fe(OH)_3$

B. FeO and $Fe(OH)_2$

C. Fe_2O_3 and $Fe(OH)_3$

D. Fe_3O_4 and $Fe(OH)_3$

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310. When a lead storage battery is discharged:

A. SO_2 is evolved

B. $PbSO_4$ is consumed

C. Lead is formed

D. H_2SO_4 is consumed

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311. In a Leclanches dry cell, anode is:

A. Graphite rod

B. feO and $Fe(OH)_2$

C. Zinc container

D. MnO_2+C

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312. Which of the following will increase the voltage of the cell

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

A. increase in the size of silver rod

B. increase in the concentration of Sn^{2+} ions

C. increase in the concentration of Ag^{+} ions

D. None of these

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313. The resistance of 0.1N solution of acetic acid 250 ohm. When measured in a cell constant $1.15cm^{-1}$. The equilvalent conductance (in $ohm^{-1}cm^2eq^{-1}$) of 0.1 N acetic acid is

A. 18.4

B. 0.023

C. 46

D. 9.2

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314. 10800 C of electricity through the electrolyte depostited 2.977gm of metal with atomic mass 106.4a.m.u. The valency of metal cation is

A. 4

B. 3

C. 2

D. 1

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315. Find the charge in coulombs on 1g ion of N^{-3}

A. $6.00 \times 10^5 C$

B. $2.89 \times 10^5 C$

C. $3.98 \times 10^5 C$

D. $4.89 \times 10^5 C$

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316. A current of 3A was passed through a solution of $AuCl_4^-$ ions using gold electrolyte and it caused deposition of 1.234g of Au. The time for which the current was passed is

A. 20 min 8s

B. 30 min 12 s

C. 10 min 4s

D. 10 min 40s

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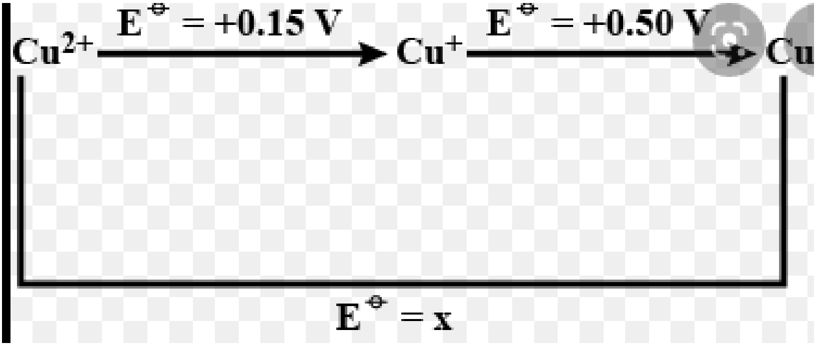
317. In the diagram given below the value of x is



A. 0.35 V

B. 0.65 V

C. 0.325 V

D. $-0.65V$

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318. By how much will the potential of a zinc electrode change if the solution of $ZnSO_4$ in which it is immersed is dilute to 10 times at 298K?

A. Decreases by 30 mV

B. Increases by 30 mV

C. Increases by 60 mV

D. Decreased by 60 mV

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319. The e.m.f of the cell:

$Cu(s)|Cu^{2+}(1M)||Ag^{+}(1M)|Ag$

is 0.46V. The standard reductio potential of $Ag^{+}|Ag$ is 0.80V. The standard reduction potential of $Cu^{2+} \mid Cu$ is

A. $-0.34V$

B. $1.26V$

C. $-1.26V$

D. 0.34V

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320. In infinite dilution of aqueous solution of $BaCl_2$ molar conductivity of Ba^{2+} and Cl^- ions are =$127.32Scm^2mol^{-1}$ and $76.34Scm^2mol^{-1}$ respectively. What is Λ_m for $BaCl_2$ at same dilution?

A. $280Scm^2mol^{-1}$

B. $330.98Scm^2mol^{-1}$

C. $90.98Scm^2mol^{-1}$

D. $203.6Scm^2mol^{-1}$

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321. Specific conductance of 0.1M sodium chloride solution is 1.06×10-2 ohm-1 cm-1. Its molar conductance in ohm-1cm2 mol-1 is

A. 1.06×10^{2}

B. 1.06×10^{3}

C. 1.06×10^{4}

D. 53

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

A. velocity of K^{+} is greater than that of NO_3^{-}

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

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

D. KNO_3 is highly soluble in water

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323. Aluminium displaces hydrogen fromacids, but copper does not. A galvanic cell prepared by combining $Cu \mid Cu^{2+}$ and $Al \mid Al^{3+}$ has an emf of 2.0V at 298K. If the potential of copper electrode is +0.34V, that of aluminium electrode is

A. $-2.3V$

B. $+2.34V$

C. $-1.66V$

D. 1.66V

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324. Given that the standard electrode potentials of metals are:

$K^{+} \mid K = -2.93V, Ag^{+} \mid Ag = 0.80V, Cu^{2+} \mid Cu = 0.34V, Mg^{2+} \mid Mg =$

$Fe^{2+} \mid Fe = -0.44V.$

Arrange the metals in the increasing order of their reducing power.

A. Fe^{3+} increases

B. Fe^{3+} decreases

C. $Fe^{2+} \mid Fe^{3+}$ remains unchanged

D. Fe^{2+} decreased

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325. The standard reduction potentials for two reactions are given below:

$AgCl(s) + \bar{e} \rightarrow Ag(s) + Cl^-(aq), \quad E^\circ = 0.22V$ and

$Ag^+(aq) + \bar{e} \rightarrow Ag(s), E^\circ = 0.80V$

The K_{sp} of AgCl under standard conditions of temperature is given by

A. 1.6×10^{-5}

B. 1.5×10^{-8}

C. 3.2×10^{-10}

D. 1.5×10^{-10}

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326. An electric current is passed through silver voltameter connected to a water voltameter. The cathode of silver voltamter weighted 0.108 g more at the end of electrolysis. The volume of O_2 at STP evolved is:

A. $5.6cm^3$

B. $550cm^3$

C. $22.4cm^3$

D. $11.2cm^3$

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327. The e.m.f of the following Daniell cell at 298K is E_1.

$Zn|ZnSO_4(0.01M)||CuSO_4(1.0)|Cu$

When concentration of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01M, if e.m.f changed to E_2. What is the relationship between E_1 and E_2?

A. $E_1 > E_2$

B. $E_1 < E_2$

C. $E_1 = E_2$

D. $E_2 = 0 \neq E_1$

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328. Same amount of electric current is passed thorugh solution of $AgNO_3$ and HCl. If 1.08 g of silver is obtained in the first case, the amount of hydrogen liberated at S.T.P in the second case is:

A. $112cm^3$

B. $22400cm^3$

C. $224cm^3$

D. $1.008 cm^3$

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329. Calculate the EMF of the cell, containing nickel and copper electrodes. Given $E^\circ(NI^{2+} \mid NI) = -0.25V$ and $E^\circ(Cu^{2+} \mid Cu) = +0.34V$.

A. 1.10 V

B. 1.04V

C. 1.16V

D. 1.07V

Answer: 1.00V

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330. Given $E^{\circ}_{Fe^{3+} \mid Fe} = -0.36V$, $E^{\circ}_{Fe^{2+} \mid Fe} = -0.439V$. The value of standard electrode potential for the change,

$Fe^{3+} + \bar{e} \rightarrow Fe^{2+}$ will be

A. 0.91 V

B. 1.40V

C. 1.68 V

D. 0.63V

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331. A°_m for NaCl, HC1 and NaAc are 126.4, 425.9 and 91.0 S cm^2 mol_{-1} respectively. Calculate A° for HAc.

A. $278 Scm^2 mol^{-1}$

B. $976 Scm^2 mol^{-1}$

C. $128 S cm^2 mol^{-1}$

D. $302 S cm^2 mol^{-1}$

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332. If $\sin^6\theta + \cos^6\theta - 1 = \lambda \sin^2\theta \cos^2\theta$, find the value of λ.

A. $288.5 ohm^{-1} cm^2 gmeq^{-1}$

B. $289.5 ohm^{-1} cm^2 gmeq^{-1}$

C. $388.8 ohm^{-1} cm^2 gmeq^{-1}$

D. $59.5 ohm^{-1} cm^2 gmeq^{-1}$

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333. For spontaneity of a cell, which is correct?

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

B. $\Delta G = -ve, E^{\circ} = 0$

C. $\Delta G = +ve, E^{\circ} = 0$

D. $\Delta G = -ve, E^{\circ} = +ve$

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334. The limiting molra conductivities of HCl, CH_3COONa and NaCl are respectively 425, 90 and $125 mho cm^2 mol^{-1}$ at $25^{\circ} C$. The molar conductivity of $0.1 M CH_3COOH$ solution is $7.8 mho cm^2 mol^{-1}$ at the same temperature. The degree of dissociation of 0.1 M acetic acid solution at the same temperature is

A. 0.10

B. 0.02

C. 0.15

D. 0.03

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335. 4.5 g of aluminium is deposited at cathode from Al^{3+} solution by certain quantity of electric charge. The volume of hydrogen produced at STP from H^{+} ions in solution by the same quantity of electric point will be

A. 44.8 L

B. 22.4 L

C. 11.2 L

D. 5.6 L

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336. Given $E^{\circ}_{Fe^{3+} \mid Fe} = -0.36V$, $E^{\circ}_{Fe^{2+} \mid Fe} = -0.439V$. The value of standard electrode potential for the change,

$Fe^{3+} + \bar{e} \rightarrow Fe^{2+}$ will be

A. 1.653

B. 1.212 V

C. 0.111

D. 0.330 V

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337. The efficiency of a fuel cell is given by:

A. $\dfrac{\Delta G}{\Delta S}$

B. $\dfrac{\Delta G}{\Delta H}$

C. $\dfrac{\Delta S}{\Delta G}$

D. $\frac{\Delta H}{\Delta G}$

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338. What is the value of L for a solenoid?

A. 2.0968 V

B. 1.0968V

C. 0.0968 V

D. 1.968V

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339. On the basis of valence bond theory explain the structure and magnetic nature of $\left[Fe(H_2O)_6\right]^{3+}$ complex ion.

A. Fe^{2+}

B. Fe^{3+}

C. $\left[Fe(Cn)_6\right]^{3-}$

D. $\left[Fe(CN)_6\right]^{4-}$

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

A. infinite dilution, each ion makes definite contribution to equivalent conductance of an electrlyte depending on the nature of the other ion of the electroyte.

B. infinite dilution, each ion makes definite contribution of the other ion of the electrolyte

C. infinite dilution, each ion makes definite contribution to equivalnet conductance of an electrolyte, whatever be the nature of the other ion of the electrolyte.

D. finite dilution, each ion makes definite contribution to equivalnet conductance of an elecrrolyte, whatever be the nature of the other ion iof the electrolyte.

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341. Al_2O_3 is reduced by elecrrolysis at low potentals and high current. If 4.0×10^4 amperes of current is passed through molten Al_2O_3 for 6 hours, what mass of aluminium is produced?

A. $8.1 \times 10^4 g$

B. $2.4 \times 10^5 g$

C. $1.3 \times 10^4 g$

D. $9.0 \times 10^3 g$

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342. At 25∘C, the molar conductance of 0.007M hydrofluoric acid is 150 mho cm2 mol−1 and Λ∘m=500 mho cm2 mol−1. The value of the dissociation constant of the acid at the gas concentration at 25∘C is

A. 1.25×10^{-6}

B. 6.25×10^{-4}

C. 1.25×10^{-4}

D. 1.25×10^{-6}

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343. For the reduction of silver ions with copper metal the standard cell potential was found to be +0.46V at $25^{\circ} C$. The value of standard Gibbs energy ΔG° will be

A. $-44.5KJ$

B. $-98.0KJ$

C. $-89.0KJ$

D. $-89.0KJ$

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

A. increase in both numbers of ions and ionic mobaility of ions.

B. increased in number of ins

C. increase in ionic mobility of ions

D. 100% ionization of elecrolyte at normal dilution.

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345. E° of three metals A, B, C are -1.4 V, + 0.6V, - 3.4V respectively. The reducing power of these metals are in order :

A. YgtZgtZ

B. YgtXgtZ

C. ZgtXgtY

D. XgtYgtZ

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346. if the E°_{cell} for a given reaction has a negative value, then which of the following gives the correct relatioships for the value of ΔG° and K_{eq}

?

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

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

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

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

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347. The electrode potentiasl for

$Cu^{2+}(aq) + \bar{e} \rightarrow Cu^{+}(aq)$ and $Cu^{+}(aq) + \bar{e} \rightarrow Cu(s)$ are +0.15V and 0.50V respectively. The value of $E_{Cu^{2+} \mid Cu}$ will be

A. 0.500 v

B. 0.325 V

C. 0.650 V

D. 0.150 V

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348. Give the standard electrode potentials: $M\frac{g^2+}{M}g = -2.37V$, $Cr^3\frac{+}{C}r = -0.74V$. Arrange these metals in their increasing order of reducing power.

A. $+1.19V$

B. $+0.89v$

C. $+0.18V$

D. $+1.83V$

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349. Limiting molar conductivity of NH_4OH is equal to

A. $\Lambda^\circ_{m(NH_4Cl)} + \Lambda^\circ_{m(NaCl)} - \Lambda^\circ_{m(NaOH)}$

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

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

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

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350. At $25^{\circ}C$ molar conductance of 0.1 molar aqueous solution of ammonum hydroxide is $9.54 ohm^{-1} cm^2 mol^{-1}$ and at infinite dilute it molar conductacne is $239 ohm^{-1} cm^2 mol^{-1}$. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is

A. 4.008%

B. $40.800^{\%}$

C. 2.080%

D. 20.800%

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351. In the button cell widely used for watches and other devices, the following reaction takes place:

$Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^{-}(aq)$

Determine the value of K_c for the above reaction using the following data?

$AgO_2(s) + H_2O(l) + 2\overline{e} \rightarrow 2Ag(s) + 2Oh^{-}(aq)$

$(E^{\circ} = 0.344V)$

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

$(E^{\circ} = -0.76V)$

A. 0.84 V

B. 1.34 V

C. 1.10 V

D. 0.42 V

352. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH=10 and by passing hydrogen gas around the platimum wire at one atm pressure. The oxidation potential of electrode would be?

A. 0.118V

B. 1.18V

C. 0.059V

D. 0.59V

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353. When 0.1 mol MnO_4^{2-} is oxidised, the quantity of electricity required to completely oxdise MnO_4^{2-} to MnO_4^{-} is

A. 96500 C

B. $2 \times 96500C$

C. 9650 C

D. 96.50 C

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354. The weight of silver displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be

A. 5.4 g

B. 10.8 g

C. 54.0 g

D. 108.0 g

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355. The device that converting energ into mechanical energy is called.... .

A. dyname

B. Ni-Cd cell

C. fuel cell

D. electrolytic cell.

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356. What pressure of H_2 would be required to make the e.m.f of hydrogen elecrode zero in pure water at $25^\circ C$?

A. `10^-10 atm

B. $10^{-4} atm$

C. $10^{-14} atm$

D. $10^{-12} atm$

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357. The molar conductivity of a 0.5 mol/dm3 solution of AgNO3 with electrolytic conductivity of 5.76 x 10-3 S cm-1 at 298 K is

A. 2.88

B. 11.52

C. 0.086

D. 28.8

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358. During the eletrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 ampere is

A. 55 min

B. 110 min

C. 220 min

D. 330 min

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359. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is

A. 6×10^{23}

B. 6×10^{20}

C. 3.75×10^{20}

D. 7.48×10^{23}

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360. if the E°_{cell} for a given reaction has a negative value, then which of the following gives the correct relatioships for the value of ΔG° and K_{eq} ?

A. $\Delta G > 0 > K_{eq} < 1$

B. $\Delta G^{\circ} > 0, K > 1$

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

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

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361. Zinc can be coatd on iron to produce galvanized iron but the reverse is not possible. It is because

A. zinc is lighter than iron

B. zinc has lower melting point than iron

C. zinc has lower negative electrode potential than iron

D. zinc has higher negative electrode potential than iron.

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362. The equilibrium constant of the following redox reaction is 298K is 1×10^8

$2Fe^{3+}(aq) + 2I^{-(aq)} \Leftrightarrow 2Fe^{2+}(aq) + I_2(s)$

If the standard reduction potential of iodine becoming iodide is +0.54V, what is the standard reduction potential of $F\frac{e^{3+}}{F}e^{2+}$?

A. $+1.006V$

B. $-1.006V$

C. $+0.77V$

D. $-0.77V$

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363. A solution of nickel sulphate in which nickel rod is dpped is dilute 10 times. The reduction potential of Ni at 298K

A. Decreases by 60 mV

B. Decreases by 30 mV

C. Decreases by 30 V

D. Increases by 30 mV

Answer: Increases by 30 V

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364. When molten magnesium oxide was electrolysed for a certain period, 150 mg of Mg was deposited on the cathode. The volume of oxygen gas in cm^3 at STP conditions liberated at the anode during the same period is

A. 140

B. 280

C. 70

D. 120

Answer: 240

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365. The standard reduction potentials for two reactions are given below:

$AgCl(s) + \bar{e} \rightarrow Ag(s) + Cl^{-}(aq), \quad E^{\circ} = 0.22V$ and

$Ag^{+}(aq) + \bar{e} \rightarrow Ag(s), E^{\circ} = 0.80V$

The K_{sp} of AgCl under standard conditions of temperature is given by

A. $+8.612$

B. -37.83

C. -16.13

D. -8.12

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366. Resistance of a conductivity cell filled with a solution of an electrolyte of concentration 0.1M is 100Ω. The conductivity of this solution is $1.29Sm^{-1}$. Resitance of the same cell when filled with 0.2 M of the same solution is 520Ω. The molar conductivity of 0.2 M solution of the electrolyte will be

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

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

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

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

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367. The cell $Zn|Zn^{2+}(1M)||Cu^{2+}(1M)|Cu$

$\left(E^\circ_{cell} = 1.10V\right)$ was allowed to be completely discharged at 298K. The relative concentration of $Zn\%^{2+}$ to Cu^{2+} $\left(\frac{[Zn^{2+}]}{[Cu^{2+}]}\right)$ is:

A. 37.3

B. $10^{37.3}$

C. 9.65×10^4

D. antilog(24.8)

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368. Write NERNST equation also Calculate the cell e.m.f. and ΔG for the cell reaction at $25^\circ C$

$Cr(s)/Cr^{3+}(0.1M)//Fe^{2+}(0.01M)/Fe(s)$

Given $E^0_{Cr^{3+}/Cr} = -0.75V$, $E^0_{Fe^{2+}/Fe} = -0.45V$

A. $-0.26V$

B. $0.26V$

C. $0.339V$

D. $-0.339V$

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369. Given $E^{\circ}_{Fe^{3+}|Fe} = -0.36V$, $E^{\circ}_{Fe^{2+}|Fe} = -0.439V$. The value of standard electrode potential for the change,

$Fe^{3+} + \bar{e} \rightarrow Fe^{2+}$ will be

A. $-0.072V$

B. $0.385V$

C. $0.770V$

D. $-0.270V$

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370. The Gibbs energy for the decomposition of Al_2O_3 at $500^\circ C$ is as follows:

$$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + 2O_2$$

The potential difference needed for electrolytic reduction of Al_2O_3 at $500^\circ C$ at least

A. 2.5V

B. 5.0V

C. 3.0V

D. 4.5V

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

A. $p(H_2) = 2atm \text{ and } [H^+] = 1.0M$

B. $p(H_2) = 2atm \text{ and } [H^+] = 2.0M$

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

D. $p(H_2) = 1atm$ and $[H^+] = 1.0M$

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

A. $6.25 \times 10^{-4} Sm^2 mol^{-1}$

B. $625 \times 10^{-4} Sm^2 mol^{-1}$

C. $2.5 Sm^2 mol^{-1}$

D. $6250 Sm^2 mol^{-1}$

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373. The standard reduction potentials for $Zn^{2+} \mid Zn$, $Ni^{2+} \mid Ni$ and $Fe^{2+} \mid Fe$ are -0.76, -0.23 and -0.44V respectively. The reaction $X + Y^2 \rightarrow X^2 + Y$ will be spontaneous when

A. X=Ni, Y=Zn

B. X=Fe, Y=Zn

C. X=Zn, Y=Ni

D. X=Ni, Y=Fe

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374. Given

$E^\circ_{Cr^{3+} \mid Cr} = -0.74V, E^\circ_{MnO_4^- \mid Mn^{2+}} = 1.51V$ and $E^\circ_{Cr_2 \frac{O_7^-}{C} r^{3+}} = 1.33V, E^\circ_{Cl \mid Cl^-} = 1.36V$, Based on the data above, strongest oxidising agent will be

A. MnO_4^-

B. Cl^{-}

C. Cr^{3+}

D. Mn^{2+}

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

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

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

$Mn^{2+}(aq) + 2e^{-} \rightarrow Mn(s), E^{\circ} = -1.185V$`

A. `-0.33V, the reaction will occur

B. $2.69V$, the reaction will not occur

C. $-2.69V$, the reaction will occur

D. $-0.33V$, the reaction will not occur.

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376. The equilvalnet conductances of NaCl at concentration C and at inifnite dilution are λ_c and λ_∞ respectively. The correct rltionship between λ_c and λ_∞ is given as

A. $\lambda_c = \lambda_\infty + (B)\sqrt{C}$

B. $\lambda_c = \lambda_\infty + (B)C$

C. $\lambda_c = \lambda_\infty - (B)C$

D. $\lambda_c = \lambda_\infty - (B)\sqrt{C}$

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377. Resistance of 0.2 M solution of an electrolyte is 50Ω. The specific conductance of the solution is $1.3 Sm^{-1}$. If resistance of the 0.4 M solution of the same electrolyte is 280Ω, its molar conductivity is:

A. 5×10^2

B. 5×10^{-4}

C. 5×10^{-3}

D. 5×10^3

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378. Two faraday of electricity is passed through a solution of $CuSO_4$.

The mass of copper deposited at the cathode is : (at mass of Cu=63.5 u)

A. 2g

B. 127 g

C. 0 g

D. 63.5 g

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379. Galvanisation is applying a coating of

A. Pb

B. Cr

C. Cu

D. Zn

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380. An alloy Pb-Ag weighing 1.08g was dissolved in dilute HNO_3 and the volumne made to 100 mL. A silver electrode was dipped in the solution and the e.m.f of the cell set up

$Pt(s), H_2(g)|H^+(1M)||Ag^+(aq)|Ag(s)$ was 0.62V. If $E^\circ_{cell} = 0.80V$, what is the percentage of Ag in an alloy?

A. 25

B. 2.5

C. 10

D. 1

Answer: 5

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381. Calculate the reductoin potential of a half cell consisting of a platinum electrode immersed in 2.0M Fe^{2+} and 0.02M Fe^{3+} solution $\left(E^{\circ} Fe^{3+} \mid Fe^{2+} = 0.771V\right)$.

A. 0.653V

B. 0.889V

C. 0.683V

D. 2.771V

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382. One Faraday of electricity is passed through molten Al_2O_3, aqueous solution of $CuSO_4$ and molten NaCl taken in three different electrolyti cells connected in series. The mole ratio of Al, Cu and Na deposited at the respective cathode is

A. $2:3:6$

B. $6:2:3$

C. $6:3:2$

D. $1:2:3$

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383. Consider the following four electrodes,

$P = Cu^{2+}(0.001M) \mid Cu_s$

$Q = cu^{2+}(0.1M) \mid Cu_s$

$R = Cu^{2+}(0.01M) \mid Cu_s$

$S = cu^{2+}(0.001M) \mid Cu_s$

If the standard reduction potential of $Cu^{2+} \mid Cu$ is +0.34V, the reductio potentials in volts of the above electrodes follow the order:

A. P>S>R>Q

B. S>R>Q>P

C. R>S>Q>P

D. P>Q>R>S

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384. When same quantity of electricity is passed for half an hour, the amount of Cu and Cr deposited are respectively 0.375g and 0.30g. Ratio of electrochmical equivalent of Cu and Cr is

A. 0.8

B. 1.25

C. 2.5

D. 1.62

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385. The electrode potentials of a hydrogen, electrode at pH=10 is

A. 0.59v

B. 0.00V

C. $-0.59V$

D. $-0.059V$

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386. E_1, E_2 and E_3 are the emfs of the following three galvanic cells respectively.

$Zn(s)|Zn^{2+}(0.1M)||Cu^{2+}(1M)|Cu(s)$

$Zn(s)|Zn^{2+}(1M)||Cu^{2+}(1M)|Cu(s)$

$Zn(s)|Zn^{2+}(1M)||Cu^{2+}(0.1M)|Cu(s)$ Which one of the following is true?

A. $E_2 > E_1 > E_3$

B. $E1 > E_2 > E_3$

C. $E_3 > E_1 > E_2$

D. $E_3 > E_1 > E_2$

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387. The standard redox potentials for the reacitons $Mn^{2+} + 2\bar{e} \rightarrow Mn$ and $Mn^{3+} + \bar{e} \rightarrow Mn^{2+}$ are -1.18V and 1.51V respectively. What is the redox potential for the reaction $Mn^{3+} + 3\bar{e} \rightarrow Mn/$

A. 0.33V

B. 1.69V

C. $-0.28V$

D. $-0.85V$

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388. A current is passed through two cells connected in series. The first cell contains $X(NO_3)_3(aq)$ and the second cell contains $Y(NO_3)_2$. The relative atomic masses of X and Y are in the ratio 1:2. what is the ratio of liberated mass of X to that of Y?

A. $3:2$

B. $1:2$

C. $1:3$

D. $3:1$

Answer: $2:1$

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389. A weak electrolyte having the limiting equivalent conductance of $400 Scm^2 geq^{-1}$ at 298K isa 2% ionized in its 0.1 N solution. The resistance of this solution in an electrolytic cell of cell constant $0.4 cm^{-1}$ at this temeprature is

A. 200

B. 300

C. 600

D. 500

Answer: 400

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390. Which of the following cannot be expressed as Nm^{-2} ?

A. The overall cell reaction is a spntaneous reaction

B. The standard EMF of the cell is -0.27V

C. The standard EMF of the cell is 0.77V

D. The standard EMF of the cell is -0.77V

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391. The approximate time duration in hours to electropole 30 g of calcium from molten calcium chloride using a current a 5 amp is

A. 8

B. 80

C. 10

D. 16

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392. 1 M solution each of $Cu(NO_3)_2$, $AgNO_3$, $Hg(NO_3)_2$ and $Mg(NO_3)_2$ is electrolysed using Pt electrons. The values of standard reduction electrode potentials in volts are:

$Ag^+|Ag = +0.80V, Cu^{2+}|Cu = +0.34V$

$Hg^{2+}|Hg = +0.79V, Mg^{2+}|Mg = -2.37V$ The sequence of deposition of metals on the cathode will be

A. Mg, Ag, Cu

B. Mg, Cu, Ag

C. Ag, Hg, Cu

D. Cu, Hg, Ag

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393. For the following data at $25^\circ C$

$Cr^{3+}(aq)+1\bar{e}\rightarrow Cr^{2+}(aq), E^\circ = -0.424V,$

$Cr^{2+}(aq)+2\bar{e}\rightarrow Cr(s), E^\circ = -0.900V$ Find E° at 25° for the reaction:

$Cr^{3+}+3\bar{e}\rightarrow Cr(s)$

A. $-0.741V$

B. $-1324V$

C. $-0.476V$

D. $+0.741V$

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394. Equilvalent conductivity at infinite dilution for sodium potassium oxalate $\left[(COO^-)_2Na^+K^+\right]$ will be

A. $271.8scm^2eq^{-1}$

B. $67.95 Scm^2 eq^{-1}$

C. $543.6 Scm^2 eq^{-1}$

D. $135.9 Scm^2 eq^{-1}$

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395. A conductivity cell has been calcibrated with a 0.01 M 1:1 eletrolyte solution in the cell and the measured resistance was 800 ohm at $25^{\circ} C$. The cell constant will be

A. $1.02 cm^{-1}$

B. $0.102 cm^{-1}$

C. $1.00 cm^{-1}$

D. $0.5 cm^{-1}$

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396. A current strength of 9.65 amperes is passed through excess fused $AlCl_3$ for 5 hours. How many litres of chlorine will be liberated at STP?

A. 2.016

B. 1.008

C. 11.2

D. 20.16

Answer: 10.08

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397. When the total cell emf of the voltaic cell is greater than zero, which of the following is true about the reaction quotient Q and free energy change ΔG for the cell reaction?

A. Q is less than one and ΔG is greater than zero

B. Q is greater than one and ΔG is greater than zero

C. Q is less than one and ΔG is less than zero

D. Q is zero and ΔG is greater than zero.

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398. The quantity of electricity needed to separately electrolysis 1 M solution of $ZnSO_4$, $AlCl_3$ and $AgNO_3$ completeley is in the rati of

A. $2:3:1$

B. $2:1:1$

C. $2:1:3$

D. $2:2:1$

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399. At 25∘C, the molar conductance of 0.007M hydrofluoric acid is 150 mho cm2 mol−1 and Λ∘m=500 mho cm2 mol−1. The value of the dissociation constant of the acid at the gas concentration at 25∘C is

A. $7 \times 10^{-4} M$

B. `

C. 7xx10^-5 M`

D. $9 \times 10^{-3} M$

Answer: $9 \times 10^{-4} M$

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400. The change in potential of the half cell $Cu^{2+} \mid Cu$, when aqueous Cu^{2+} solution is diluted 100 times at 298K?

A. Increases by 120 mV

B. Decreases by 120 mV

C. Increases by 60 mV

D. Decreases by 60 mV

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401. The values of limiting ionic conductance of H+ and HCOO- ions are respectively 347 and 53 S cm2 mol−1 at 298K. If the molar conductance of 0.025M methanoic acid at 298K is 40 S cm2 mol-1 the dissociation constant of methanoic acid at 298K is

A. 1×10^{-5}

B. 2.5×10^{-4}

C. 2.5×10^{-5}

D. 2×10^{-5}

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402. Conductivity of a saturated solution sparingly solution salt AB at 298K is $1.85 \times 10^5 Sm^{-1}$. Solubility product of the salt AB at 298K is

A. 5.7×10^{-12}

B. 1.32×10^{-12}

C. 7.5×10^{-12}

D. 1.74×10^{12}

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403. Consider the reaction: $Cr_2O_7^2 - + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

What is the quantity of electricity in coulombs needed to reduce 1 mol of $Cr_2O_7^{2-}$?

A. 2

B. 3

C. 5

D. 4

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404. Which among the following solution is NOT used determination of the cell constant?

A. $10^{-2}MKCl$

B. $10^{-1}MKCl$

C. 1 M KCl

D. Saturated KCl

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405. The ratio of specific charge of a proton and an alpha-particle is :

A. $10^5 cm^3$

B. $10^3 cm^3$

C. $10 cm^2$

D. $10^5 cm^2$

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406. How many coulombs of electricity are required for the oxidation of one mol of water to dioxygen?

A. $1.93 \times 10^4 C$

B. $19.3 \times 10^5 C$

C. $9.65 \times 10^4 C$

D. $1.93 \times 10^5 C$

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407. True or false:

In an electrolytic cell reduction occurs at cathode.

A. $O_2(g) + 2H_2O(l) + 4\bar{e} \rightarrow 4OH^-$

B. $H^+(aq) + O_2(g) \rightarrow 2H_2O(l)$

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

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

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408. In the lead acid battery during charging the cathode reaction is

A. formation of PbO_2

B. formation of $PbSO_4$

C. reduction of Pb^{2+} to Pb

D. decompositiojn of Pb at anode.

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409. What pressure of H_2 would be required to make the e.m.f of hydrogen elecrode zero in pure water at $25^\circ C$?

A. $10^{-7} atm$

B. `10^-14 atm

C. 1 atm

D. 0.5 atm

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410. The e.m.f of the cell:

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

is 0.46V. The standard reductio potential of $Ag^{+}|Ag$ is 0.80V. The standard reduction potential of $Cu^{2+} \mid Cu$ is

A. Pb

B. Pb^{2+}

C. Ag

D. Ag^{+}

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411. How many Faradays of electricity are required to deposit 10 g of calcium from molten calcium chloride using intert electrode?

A. 0.5 F

B. 1F

C. 0.25 F

D. 2F

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412. In a dry cell, what acts as negative electrode?

A. Zinc

B. Graphite

C. Ammonium chloride

D. Magnanese dioxide

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413. Which of the following is incorrect in a galvanic cell?

A. Oxidation occurs at anode

B. Reduction occurs at cathode

C. The electrode at which electrons are gained is called cathode

D. The electrode at which electrons are lost is called cathode.

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414. A secondary cell is one which

A. can be recharged

B. can be recharged by passing current through it I the same direction

C. can be recharged by passing curren through it in the opposite direction

D. cannot be recharged

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415. The amount of current in Faraday solution required for the reduction of 1 mol of $Cr_2O_7^{2-}$ ions to Cr^{3+} is

A. 1F

B. 2F

C. 6F

D. 4F

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416. Define the following term with an example- Carnivorous plants.

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417. The rusting of iron takes places as follows:

$$2H^{+} + 2\bar{e} + \frac{1}{2}O_3 \rightarrow H_2(l)$$

$Fe^{2+} + 2\bar{e} \rightarrow Fe(s)$ cAlculate the ΔG° for the net process

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

B. $-161kJml^{-1}$

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

D. $-76kJmol^{-}$

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418. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 miliampere current. The time required to liberate 0.01 mol of H_2 gas at the cathdoe is

A. 9.65×10^4 sec

B. 19.3×10^4 sec

C. 28.95×10^4 sec

D. 38.6×10^4 sec

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419. Consider the following cell reaction:

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

At $[Fe^{2+}] = 10^{-3}M, \rho(O_2) = 0.1atm$ and pH=3, the cel potential at $25^\circ C$ is

A. 1.47V

B. 1.77V

C. 1.87V

D. 1.57V

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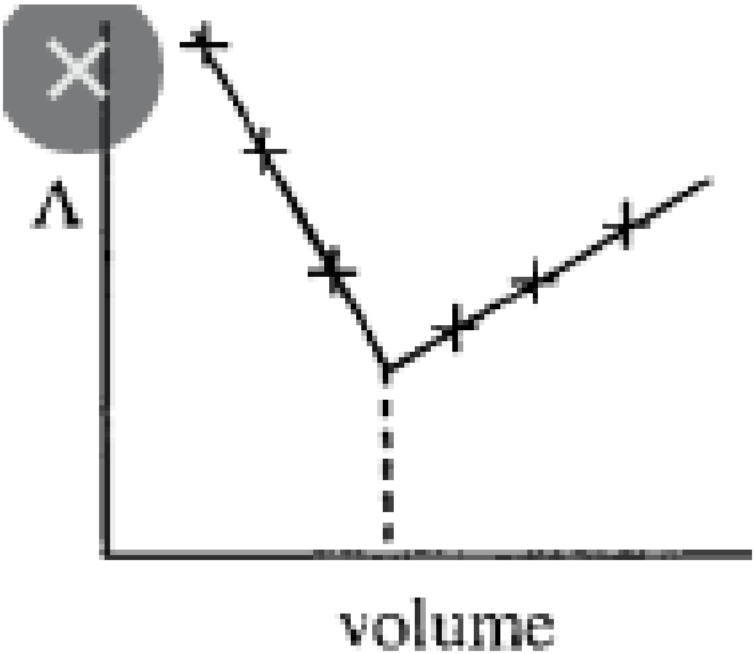
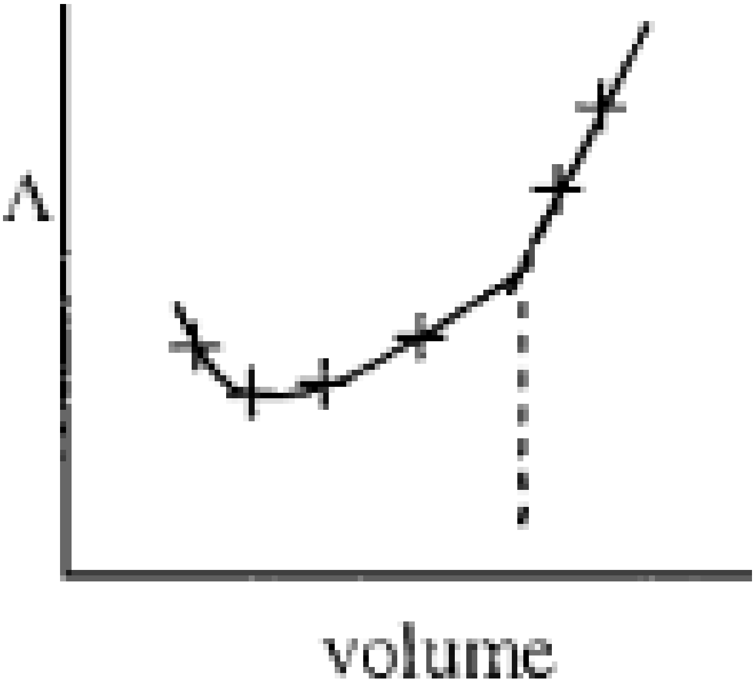
420. $AgNO_3$ was added to an aqueous KCl solution gradually and the conductivity of the solution was measured. The plot of conductance versus of the volum of $AgNO_3$ is:



A.



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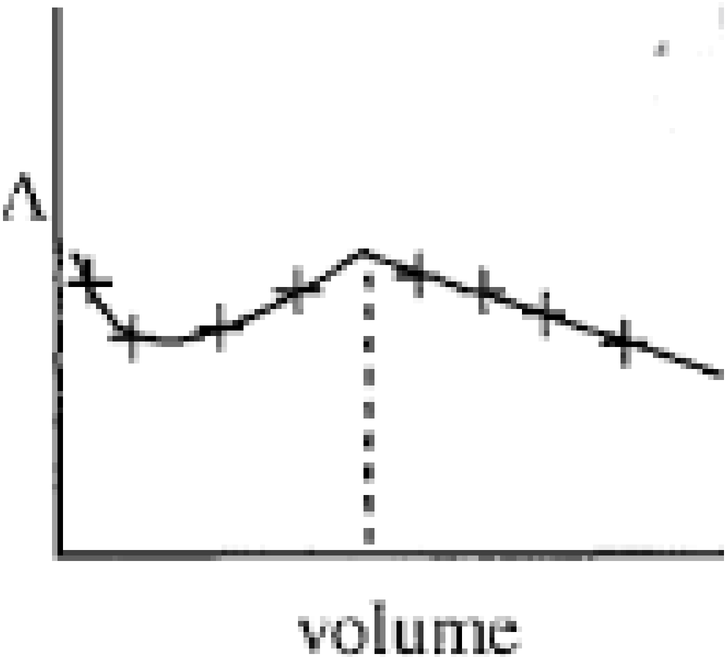
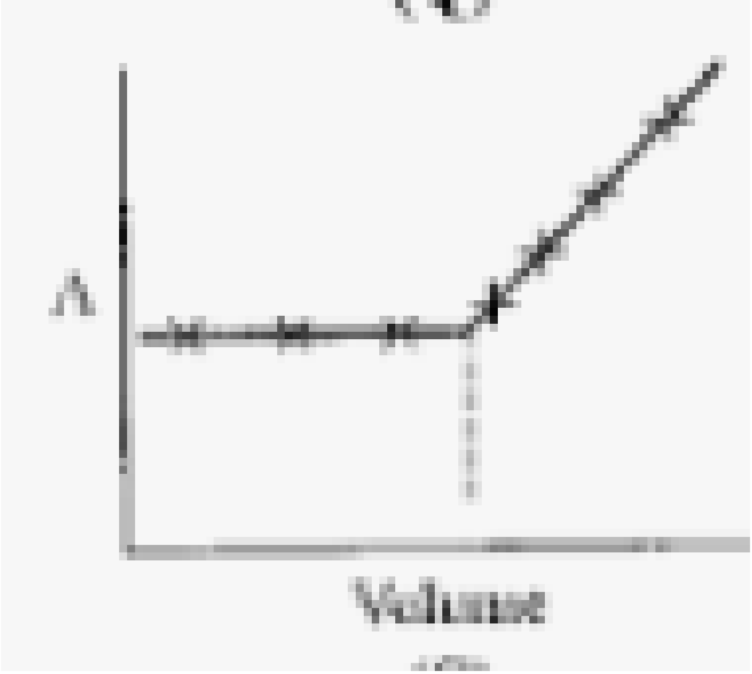


C.

D. 

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421. For the following electrochemical cell at 298K,

$Pt(s)|H_2(g)(1^-)||H^+_{aq},(1M)|M^{4+}_{aq},M^{2+}_{aq} \mid Pt(s)$

$E_{cell}=0.092V$ when $\dfrac{\left[M^{2+}_{aq}\right]}{\left[M^{4+}_{aq}\right]}=10^x$. Given: $E^{\circ}_{\frac{M^{4+}}{M^{2+}}}=0.151V$,

$2.303\dfrac{RT}{F}=0.059V$. The value of x is

A. -2

B. -1

C. 1

D. 2

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422. Which of the following relations are not correct?

A. $\Lambda_m = \frac{k \times 1000}{M}$

B. $k = C \times \frac{a}{l}$

C. $R = \rho \frac{1}{a}$

D. $\frac{l}{a}(cellcons \tan t) = k \times \frac{1}{R}$

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423. Which of the following statements are not true?

A. Molar conductivity of weak electrolyte is low as compared to that of strong electrolysis.

B. Molar conductance of an electrolyte increases with increased in concentration of electrolyte

C. Conductivity of an electrolyte increases with decreases in temperautre

D. Conductivity of an electrolyte increases with increase in concentraton of elelctrolyte.

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424. Fill in the blanks- ________ give mainly energy to our body.

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425. For the cell, $Tl|Tl^{+}(0.001)||Cu^{2+}(0.1M)|Cu$, E_{cell} at $25^{\circ}C$ is 0.826V. The e.m.f can be increased

A. by increasing $[Tl^{+}]$

B. by decreasing $[Tl^{+}]$

C. by increasing $[Cu^{2+}]$

D. by decreasing $[Cu^{2+}]$

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426. Which of the following increases with dilution?

A. Conductance

B. Specific coductance

C. Molar conductance

D. None of these

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427. Fill in the blanks- _______ is the nutrient which is needed for growth and maintenance of the body.

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428. Which of the following statements are correct regarding dry cell?

A. Zinc container acts as anode.

B. zinc container is in touch with a paste of MnO_2 and carbon

C. Dry cell can easily be charged.

D. Graphite rod acts as cathode

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429. Given E° values as:

$Zn^{2+}\left|Zn = -0.76, Ni^{2+}\right|Ni \mid 0.25, Ag^{+}\left|Ag = 0.80\right.$ and $Cu^{2+} \mid Cu = 0.34$. Which of the following reactions under standard condictions will take place in the specific direction?

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

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

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

D. $Cu(s) + 2H^{+}(aq) \rightarrow Cu^{2+} + H_2(g)$

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430. Which of the following reaction are not correct?

A. $E_{cell} = \frac{\log(2.303RT)}{nF} \log K_c$

B. $\Delta G^{\circ} = nFE^{\circ}$

C. $\Delta G^{\circ} = Rt\ln K_c$

D. $\log K_c = \frac{nE^\circ_{cell}}{0.059}$ at 298K

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

A. does not participate chemically in the cell reactions

B. stops the diffusion of ions from one electrode to another

C. is necessary for the occurrence of the cell reacton

D. ensures mixing of the two electrolytic solution.

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432. Fuel cells convert the energy produced during the combustion of fuels cells directly into electrical energy. Probably the most successful fuel cell so far is hydrogen oxygen fuel cell, which has ben used in spacecraft.

The electrodes consist of porous screens of titanium coated with a layer of platinum catalyst. concentrated KOH or NaOH soloution is placed beween the electrodes to serve the as electrolyte. hydrogen and oxygen gases are bubbled through the porous electrodes into the electrolyte solution

The following electrodes reactions occur:

At anode: $2H_2(g) + 4OH^-(aq) \rightarrow 4H_2O(l) + 4\bar{e}$

At cathode: $O_2(g) + 2H_2O(l) + 4\bar{e} \rightarrow 4Oh^{-(aq)}$

Overall reaction: $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

In this cell, the gaseous materials are consumed and continously supplied. The thermodynamic properties of fuel cell reaction at $25^\circ C$ are:

$\Delta G^\circ = -285.8kJmol^{-1}, \Delta G^\circ = -237.2kJmol^{-1}, E^\circ = 1.23V$

The value of ΔS° for the fuel cell reaction at $25^\circ C$ is

A. $1944JK^{-1}$

B. $163JK^{-1}$

C. $1630JK^{-1}$

D. $1.944kJK^{-1}$

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At anode: $2H_2(g)+4OH^-(aq)\rightarrow 4H_2O(l)+4\bar{e}$

At cathode: $O_2(g)+2H_2O(l)+4\bar{e}\rightarrow 4Oh^{-(aq)}$

Overall reaction: $2H_2(g)+O_2(g)\rightarrow 2H_2O(l)$

In this cell, the gaseous materials are consumed and continously supplied. The thermodynamic properties of fuel cell reaction at $25^{\circ}C$ are:

$\Delta H^{\circ}=-285.8kJmol^{-1}, \Delta G^{\circ}=-237.2kJmol^{-1}, E^{\circ}=1.23V$

If the potential of the half cell reaction is at cathode is, $E^{\circ} = 0.41V$, then E° for the half cell reaction at anode is

A. 1.64V

B. 0.82v

C. $-0.82V$

D. $-1.64V$

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At cathode: $O_2(g) + 2H_2O(l) + 4\bar{e} \rightarrow 4Oh^{-(aq)}$

Overall reaction: $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

In this cell, the gaseous materials are consumed and continously supplied. The thermodynamic properties of fuel cell reaction at $25^\circ C$ are:

$\Delta G^\circ = -285.8 kJmol^{-1}, \Delta G^\circ = -237.2 kJmol^{-1}, E^\circ = 1.23V$

The volume of H_2 when combined with excess O_2 in the fuel cell at $25^\circ C$ and 1 atm needd to produced 47.4kJ of work under ideal conditions is

A. 4.89L

B. 2.45L

C. 7.35L

D. 2.0L

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Overall reaction: $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

In this cell, the gaseous materials are consumed and continously supplied. The thermodynamic properties of fuel cell reaction at $25^\circ C$ are:

$\Delta H^\circ = -285.8 kJmol^{-1}, \Delta G^\circ = -237.2 kJmol^{-1}, E^\circ = 1.23V$

If the potential of the half cell reaction is at cathode is, $E^\circ = 0.41V$, then E° for the half cell reaction at anode is

A. become will

B. be reduced to 1/2

C. become four times

D. remains unchanged

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Overall reaction: $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

In this cell, the gaseous materials are consumed and continosly supplied. The thermodynamic properties of fuel cell reaction at $25^\circ C$ are:

$\Delta G^\circ = -285.8 kJmol^{-1}, \Delta G^\circ = -237.2 kJmol^{-1}, E^\circ = 1.23V$

The thermodynamic efficiency of $H_2 - O_2$ fuel cell is

A. 9.5%

B. 89%

C. 83%

D. 95%

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437. Tollen's test is given by aldehydes:

$Ag^+ + \bar{e} \rightarrow Ag, E^\circ_{red} = +0.800V$ and

$C_6H_{12}O_6 + H_2O \rightarrow C_6H_{12}O_7 + 2H^+ + 2\bar{e}, E^\circ_{\otimes} = -0.05V$

$[Ag(NH_3)_2] + \bar{e} \rightarrow Ag + 2NH_3, E^\circ_{red} = +0.373V$ use

$$\frac{F}{RT} = 38.9V^{-1}$$

Calculate(ln K) for

$$C_6H_{12}O_6 + 2Ag^+ + H_2O \rightarrow C_2H_{12}O_7 + 2H^+ + 2Ag$$

A. 55.6

B. 29.6

C. 66

D. 58.35

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438. Tollen's test is given by aldehydes:

$Ag^+ + \bar{e} \rightarrow Ag, E^\circ_{red} = +0.800V$ and

$C_6H_{12}O_6 + H_2O \rightarrow C_6H_{12}O_7 + 2H^= + 2\bar{e}, E^\circ_{\otimes} = -0.05V$

$\left[Ag(NH_3)_2\right] + \bar{e} \rightarrow Ag + 2NH_3, E^\circ_{red} = +0.373V$ use

$$\frac{F}{RT} = 38.9V^{-1}$$

On adding NH_3, pH for the solution increases to 11 then identity the effect on potential of half cell

A. $E_{\otimes}$ increased by $E^{\circ}_{\otimes}$ by 0.65V

B. $E_{\otimes}$ decreased by $E^{\circ}_{\otimes}$ by 0.65V

C. E_{red} increased by E°_{red} by .65V

D. E_{red} decreased by E°_{red} by 0.65V

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$Ag^{+} + \bar{e} \rightarrow Ag, E^{\circ}_{red} = +0.800V$ and

$C_6H_{12}O_6 + H_2O \rightarrow C_6H_{12}O_7 + 2H^{=} + 2\bar{e}, E^{\circ}_{\otimes} = -0.05V$

$\left[Ag(NH_3)_2\right] + \bar{e} \rightarrow Ag + 2NH_3, E^{\circ}_{red} = +0.373V$ use

$\frac{F}{RT} = 38.9V^{-1}$

NH_4 is used in this reaction rather than any other base, what is the correct reason for this?

A. $Ag(NH_3)_2]^+$ is a weaker oxidising agent than Ag^+.

B. NH_3 prevents the decomposition of glucnic acid.

C. Ag precipitated gluconic acid as a silver salt.

D. NH_3 changes the standard reduction potenital of $[Ag(NH_3)_2]$.

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440. The concentration of potassium ions inside a biological cell is at least twenty times higher than the outside. The resulting potential differences across the cell is important in several processes such as transmision of nerve impulses and maintaining the ion balance. a simple model for such a concentration cell involving a metal M is:

$M(s)|M^+(aq)||M^+(aq, 1molar)|M(s)$

For the above the electrolytic cell the magnitude of the cell potential

$|E_{cell}| = 70mV$

For the above cell

A. $E_{cell} < 0; \Delta G > 0$

B. $E_{cell} > 0; \Delta G < 0$

C. $E_{cell} < 0; \Delta G^\circ > 0$

D. $E_{cell} > 0; \Delta G^\circ < 0$

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441. State whether the given statement is true or false- Carbohydrates is used for the growth and development of our body.

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442. The value of $\Delta G(kJmol^{-1})$ for the given cell is $(take 1F = 96500 C mol^{-1})$

A. -5.7

B. 5.7

C. 11.4

D. -11.4

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443. The solubility product of MX_2 at 298K based on the information available for the given concentration cell is

A. 1×10^{-15}

B. $4XX10^{-15}$

C. $1XX10^{-12}$

D. $4XX10^{-12}$

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444. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion: Equivalent conductance of all electrolyts decreases with increasing concentration.

Reason: Lesser number of ions are available per gram equivalent at higher concentration.

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445. Which nutrient is called as fuel for the body?

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446. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion: Chromium is used for coating iron.

Reason: Chromium is non corrodng metal which forms a protective layer on iron.

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447. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion: Zinc can liberate H_2 from aqueous solution of HCl.

Reason: Zinc has +ve reduction potentail.

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448. Fill in the blanks- _______ and ______ are the examples of carbohydrate rich foods

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449. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion:For CH_3COOH, the molar conductance of $0.1MCH_3COOH$ and equivalent conductance of $0.1NCH_3COOH$ is same.

Reason: These do not depend upon concentration.

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450. Fill in the blanks- ______ is the nutrient which helps to repair the damaged cells and tissues and create new ones.

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451. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion: E° for $Mn^{3+} \mid Mn^{2+}$ is more positive than $Cr^{3+} \mid Cr^{2+}$.

Reason: The third ionistation energy of Mn is larger that than of Cr.

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452. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion:According to Kohlrausch law the molar conductivity of a strong electrolyte at infinite dilution is sum of molar conductivities of its ions.

Reason: The current carried by cation and anion is always equal.

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453. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following

Match the electrochemical behavior of metals in column I with the examples listed in column II

Column I	Column II
(A) can liberate H_2 from dil HCl	(p) Mg
(B) cannot liberate H_2 from dil HCl	(q) Al
(C) metals more active than zinc	(r) Cu
(D) metals less reactive than zinc	(s) Fe

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454. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following

Match the type of cell in column I with the elelctroyte used in the cell listed in column II.

Column I	Column II
(A) Lead storage cell	(p) Potassium hydroxide
(B) Nickel-cadmium cell	(q) Ammonium chloride
(C) Fuel cell	(r) Aqueous H_2SO_4
(D) Dry cell	(s) Zinc chloride

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455. Here each question contains statements given in two columns which have to the matched statements in column I are labelled as A,B, C and D where as statement in column II are labelled as p,q,r and s. the answer to these questions are to be bubbled 4 x 4 matrix. if the correct matched are A-p,A-s,B-q,C-p, and D-p then the correctly bubbled matrix should look like the following

Match the units in column I with the quantity given in column II

in Column II.

Column I	Column II
(A) m^{-1}	(p) Molar conductivity
(B) $S\ m^2\ mol^{-1}$	(q) S
(C) $S\ m^{-1}$	(r) Cell constant
(D) Conductance	(s) Conductivity

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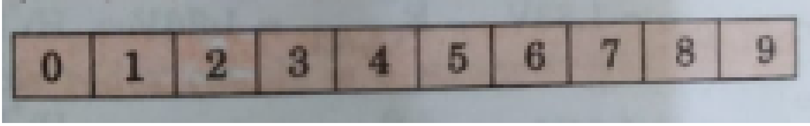
456. The number of metals which can liberated H_2 from dil HCl is:

Zn,Cu,K,Al,Hg,Na,Ni,Ag,Au



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457. The e.m.f of the cell

$Mg(s)|Mg^{2+}(0.1M)||Cu^{2+}(1\times10^{-x}M)|Cu$ is 2.651 V. The standard e.m.f of the cell is 2.71 V. the value of x is

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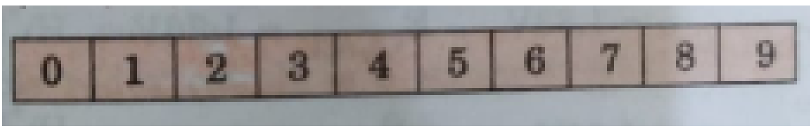
458. In the cell reaction:

$2Al(s)+3NI^{2+}(aq)\rightarrow2Al^{3+}(aq)+3Ni(s)$

The value of n is



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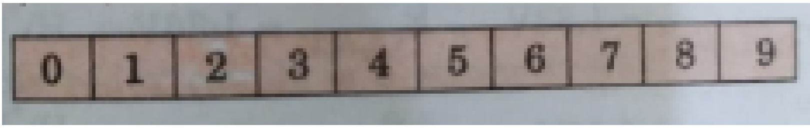
459. The number of Faradays of electricity required is deposte 81 g of Al from electrolysis of $AlCl_3$ is



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460. In an electrolysis of acidulated water, 4.48 L of hydrogen was produced by passing a current of 2.14A. How many hours the current was passed?

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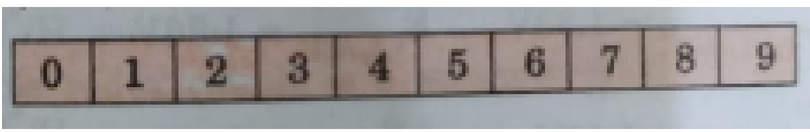
461. Two litres of 0.5 M $KMnO_4$ solution have to be completely reduced in acidic medium. The number of Faradarys of electricity required will be



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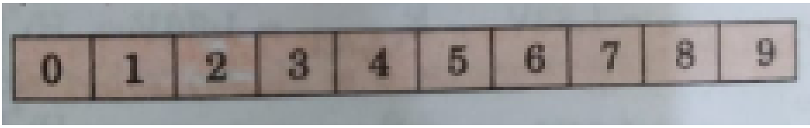
462. The e.m.f of the cell

$Cu|Cu^{2+}(aq)||Ag^{+}(aq)|Ag$ is 0.46V. The e.m.f for the following cell reaciton:

$3Cu + 6Ag^{+}(aq) \rightarrow 3Cu^{2+} + 6Ag$ is 0.46y V. The value of y is



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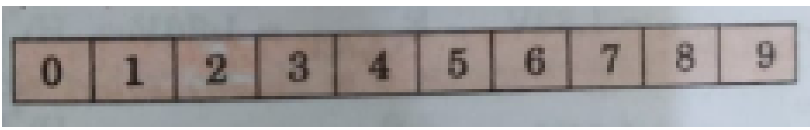
463. A cell consists of two hydrogen electrodes. The negative electrode is in contact with a solution having pH=6. the positive electrode is in contact with a solution of pH=x. calculate the value of x if the e.m.f of the cell is found to be 0.118V at 298K



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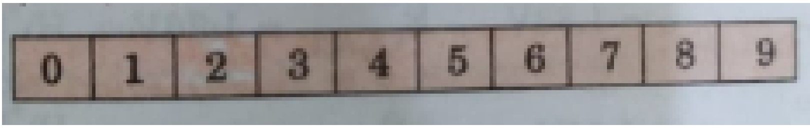
464. The molar conductivity of a solution of a weak acid HX(0.01M) is 10 times smaller than the molar conductivity of a solution of a weak acid HY(0.10M). If $\lambda_X^\circ = \lambda_Y^\circ$, the difference in their pK_a values, $pK_a(HX) - pK_a(HY)$



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465. Which cell will measure standard electrode potential of copper electrode?

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

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

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

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

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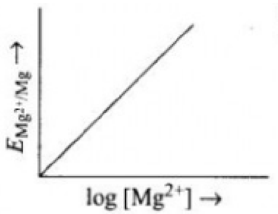
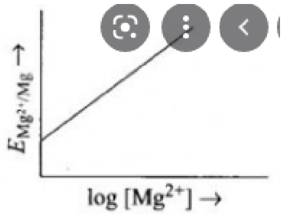
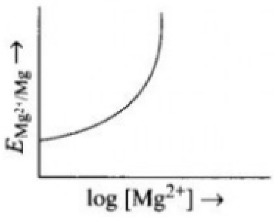
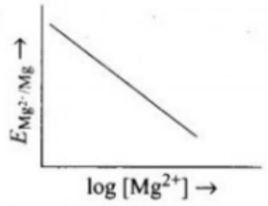
466. Electrode potential for Mg electrode varies according to the equation:

$E_{Mg^{2+}\,|\,Mg} = E^{\circ}_{Mg^{2+}\,|\,Mg} - \frac{0.059}{2}\frac{\log 1}{Mg^{2+}}$, The graph of $E_{Mg^{2+}\,|\,Mg} Vs \log$ [Mg^(2+)]` is

A. 

B. 

C. 

D. 

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467. Which of the following statement is correct?

A. E_{cell} and $\Delta_r G$of cell reaction both are extensive properties.

B. E_{cell} and $\Delta_r G$of cell reaction both are intensive properties.

C. E_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an extensive property.

D. E_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an intensive property.

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468. The differences between the electrode potentials of two electrodes when no current is drawn through the cell is called..........

A. Cell potential

B. Cell emf

C. Potential difference

D. Cell voltage

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469. Which of the following statement is not correct about inert electrode in a cell

A. It does not participate in te cell reation

B. It provides surface either for oxidation or for reaction reaction.

C. it provides surface for conduction of electrons

D. It provides surface for redox reaciton.

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470. In an electrochemical cell,

A. $E_{cell} = 0$

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

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

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

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471. Which is not correct

A. Conductivity of solution depends upon size of ions.

B. conductivity depends upon viscosity of soluton

C. conductivity does not depend upon solvation of ione present in solutions

D. conductivity of solution increases with temperature.

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472. Using the given data ,find the strongest reducing agent

$E^{\circ}Cr^{6+}/Cr^{3+} = 1.33V, E^{\circ}Cl_2/Cl^- = 1.36V$

$E^{\circ}Mn^{7+}/Mn^{2+} = 1.51V, E^{\circ}Cr^{3+}/Cr = -0.74V.$

A. Cl^-

B. Cr

C. Cr^{3+}

D. Mn^{2+}

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473. Which of the following is the strongest oxidizing agent?

A. Cl^{-}

B. Mn^{2+}

C. `MnO_4^-

D. Cr^{3+}

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474. Using this data given in Q.8 find out the which option the order of reducing power is correct:

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475. Use the data given in Q.8 and find out the most stable in its reduced form

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476. Fill in the blanks- ______ is an example of protein rich food.

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477. The quantity of charge requird to obtain one mole of aluminium from Al_2O_3 is

A. 1F

B. 6F

C. 3F

D. 2F

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478. Express the reation between among the conductivity of a solution in the cell, the cell constant and the resistance of the solution in the cell.

A. changes with change of elelctrolyte

B. changes with concentration of electrolyte

C. changes with temperature of electrolyte

D. remains constant for a cell.

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479. Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

A. $PbSO_4$ anode is reduced Pb.

B. $PbSO_4$ is cathode is reduced to Pb.

C. $PbSO_4$ cathode to oxidised to Pb.

D. $PbSO_4$ anode is oxidised to PbO_2

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480. $\Lambda_m^\circ(NH_4OH)$ is equal to

A. $\Lambda^\circ_{m(NH_4OH)} + \Lambda^\circ_{m(NH_4Cl^-)} - \Lambda^\circ_{m(HCl)}$

B. $\Lambda^\circ_{m(NH_4Cl)} + \Lambda^\circ_{m(NaOH)} - \Lambda^\circ_{m(NaCl)}$

C. $\Lambda^\circ_{m(NH_4Cl)} + \Lambda^\circ_{m(NaOH)^-} - \Lambda^\circ_{m(NaOH)}$

D. none of these

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481. In the electrolysis of aq. NaCl solution which half-cell reaction will occurs at anode

A. $Na^{+}(aq) + \bar{e} \rightarrow Na(s), E^{\circ}_{cell} cell = -2.71V$

B. $2H_2O(l) \rightarrow O_2(g) + 4H^{+}(aq) + 4e^{-}, E^{\circ}_{cell} = 1.23V$

C. $H^{+}(aq) + \bar{e} \rightarrow \frac{1}{2}H_2(g), E^{\circ}_{cell} = 0.00V$

D. $Cl^{-1}(aq) \rightarrow \frac{1}{2}Cl_2(g) + \bar{e}, e^{\circ}_{cell} = 1.36V$

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482. Calculate the electrode potential at copper electrode dipped in a 0.1 M solution of copper sulphate at 298K, assuming $CuSO_4$ to be completely ionised. The standard electrode potential of $Cu^{2+} \mid Cu$ is 0.34V at 298K.

A. this redox couple is a stronger reducing agent than the $H^{+} \mid H_2$ couple

B. this redox couple is a stronger oxidising agent than $H^+ \mid H_2$.

C. Cu can displace H_2 from acid

D. Cu cannot displace H_2 from acid.

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483. Fill in the blanks- _______ is an important vitamin which helps to maintain good eyesight.

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484. $E^\circ_{cell} = 1.1V$ for Daniell cell. Which of the following expressions are correct description of state of equilibrium in this cell?

A. $1.1 = K_c$

B. $(2.303RT)?(2f)\log K_c = 1.1$

C. $\log K_c = \dfrac{2.2}{0.059}$

D. $\log K_c = 1.1$

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485. Conductivity of an electrolytic solution depends on

A. nature of electrolyte.

B. concentration of electrolyte.

C. power of AC source.

D. distance between the electrodes.

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486. $\Lambda^{\circ}_m H_2O$ is equal to

A. $\Lambda^{\circ}_{m(HCl)} + \Lambda^{\circ}_{m(NaOH)} - \Lambda^{\circ}_{m(NaCl)}$

B. $\Lambda^{\circ}_{m(HNO_3)} + \Lambda^{\circ}_{m(NaNO_3)} - \Lambda^{\circ}_{m(NaOH)}$

C. $\Lambda^{\circ}_{m(HNO_3)} + \Lambda^{\circ}_{m(NaOH)} - \Lambda^{\circ}_{m(NaNO_3)}$

D. $\Lambda^{\circ}_{m(HNO_3OH)} + \Lambda^{\circ}_{m(HCl)} - \Lambda^{\circ}_{m(NH_3Cl)}$

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487. Predict the products of electrolysis in each of the following: A dilute solution of H_2SO_4 with platinum electrodes.

A. copper will deposit at cathode.

B. copper will deposit at anode.

C. copper will deposite at anode.

D. copper will dissolve at anode.

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488. What will happen during the electrolysis of aqueous solution of $CuSO_4$ in the presence of Cu electrodes?

A. Copper will deposit at cathode

B. Copper will dissolve at anode

C. Oxygen will be released at anode.

D. Copper will deposit at anode.

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489. Conductivity is equal to.............

A. $\frac{1}{R}\frac{l}{a}$

B. $\frac{G}{R}$

C. Λ_m

D. $\frac{l}{a}$

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490. Define molar conductivity or molar conductance?

A. temperature

B. distance between electrodes

C. concentration of electrolytes in solutoin

D. surface area of electrodes.

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491. Calculate ΔG° for the following cell:

$Fe|Fe^{2+}||Cu^{2+}|Cu.$

Given that: `E^(@)(Cu^(2+)//Cu)=+0*34V,E^(@)(Fe^(2+)//Fe)=-0*44V.

A. Mg is cathode

B. Cu is cathode

C. The cell reaction is $Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$

D. Cu is the oxidising agent.

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492. Fill in the blanks- ______ is rich in vitamin-A.

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493. Match the terms given in column I with the items given in column II

in Column II.

Column I	Column II
(a) Λ_m	(i) intensive property
(b) $E^{\ominus}_{cell}$	(ii) depends on number of ions / volume
(c) G	(iii) extensive property
(d) $\Delta_r G_{Cell}$	(iv) increases with dilution

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494. Match the items of column I with column II.

Column I	Column II
(a) Lead storage battery	(i) maximum efficiency
(b) Mercury cell	(ii) prevented by galvanisation
(c) Fuel cell	(iii) gives steady potential
(d) Rusting	(iv) Pb is anode, PbO_2 is cathode

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495. Fill in the blanks- __________ is the disease caused by the deficiency of vitamin A.

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496. Match the items of column I with column II.

Column I	Column II
(a) Lechlanche cell	(i) cell reaction $2H_2 + O_2 \rightarrow 2H_2O$
(b) Ni–Cd cell	(ii) does not involve any ion in solution and is used in hearing aids.
(c) Fuel cell	(iii) rechargeable
(d) Mercury cell	(iv) reaction at anode, $Zn \rightarrow Zn^{2+} + 2e^-$
	(v) converts energy of combustion into electrical energy

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497. Match the items of column I with column II on the basis of data given below:

$$E^{\circ}_{F_2 \mid F^-} = 2.87V, E^{\circ}_{Li^+ \mid Li} = -3.5V$$

$E^{\circ}_{Au^{3+} \mid Au} = 1.4V, E^{\circ}_{Br_2 \mid Br^-} = 1.09V$

Column I	Column II
(a) F_2	(i) metal is the strongest reducing agent
(b) Li	(ii) metal ion which is the weakest oxidising agent
(c) Au^{3+}	(iii) non metal which is the best oxidising agent
(d) Br^-	(iv) unreactive metal
(e) Au	(v) anion that can be oxidised by Au^{3+}
(f) Li^+	(vi) anion which is the weakest reducing agent
(g) F^-	(vii) metal ion which is an oxidising agent

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498. Fill in the blanks- To keep our bones strong, we need _______ in our daily diet.

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499. Fill in the blanks- Spinach cabbage carrot contains _______ in them which is important for good eyesight.

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500. Both assertion and reason are true and the reason is the correct explanation of assertion.

Both asertion and reason are true and the reason is not the correct explanation of assertion

Assertion is true but the reason in false.

Both assertion and reason is false.

Assertion is false but reason is true.

Assertion: Conductivity of all electrolytes decreases on dilution.

Reason: On dilution number of ions per unit volume.

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501. Assertion: Λ_m for weak electrolyte shows a sharp increases when the electrolytic solution is diluted.

Reason: For weak elelctrolytes degree of dissociatin increases with dilution of solution.

A. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

B. (b) Both asertion and reason are true and the reason is not the correct explanation of assertion

C. (c) Assertion is true but the reason in false

D. (d) Assertion is false but reason is true.

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502. Assertion: Mercury cell does not give steady potential.

Reason: In the cell reaction, ions are not involved in solution.

A. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

B. (b) Both asertion and reason are true and the reason is not the correct explanation of assertion

C. (c) Assertion is true but the reason in false.

D. (d) Both assertion and reason is false.

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503. Assertion: Electrolysis of NaCl solution gives chlorine at anode instead of O_2.

Reason: Formation of oxygen at anode requires overvoltage.

A. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

B. (b) Both asertion and reason are true and the reason is not the correct explanation of assertion

C. (c) Assertion is true but the reason in false.

D. (d) Assertion is false but reason is true.

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504. Assertion: For measuring resistance of an ionic solution on AC source is used.

Reason: concentration of ionic solution will change if DC source is used.

A. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

B. (b) Both assertion and reason are true and the reason is the correct explanation of assertion.

C. (c) Assertion is true but the reason in false.

D. (d) Assertion is false but reason is true.

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505. Both assertion and reason are true and the reason is the correct explanation of assertion.

Both asertion and reason are true and the reason is not the correct explanation of assertion

Assertion is true but the reason in false.

Both assertion and reason is false.

Assertion is false but reason is true.

Assertion: Current stops flowing when $E_{cell} = 0$.

Reason: Equilibrium of the cell reaction is attained.

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506. Both assertion and reason are true and the reason is the correct explanation of assertion.

Both asertion and reason are true and the reason is not the correct explanation of assertion

Assertion is true but the reason in false.

Both assertion and reason is false.

Assertion is false but reason is true.

Assertion: $E_{Ag^+ \mid Ag}$ increases with increase in concentration of Ag^+ ions.

Reason: $E_{Ag^+ \mid Ag}$ has a positive value.

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507. Both assertion and reason are true and the reason is the correct explanation of assertion.

Both asertion and reason are true and the reason is not the correct explanation of assertion

Assertion is true but the reason in false.

Both assertion and reason is false.

Assertion is false but reason is true.

Assertion: Copper sulphate can be stored in zinc vessel.

Reason: Zinc is less reactive than copper.

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508. The units of conductivity are

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509. Write the overall cell reaction for lead storage battery.

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510. Define Faraday's second law of electrolysis.

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511. What is role of $ZnCl_2$ in a dry cell?

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512. Out of copper and zinc vessels, which vessel would be suitable for storing 1 M HCl?

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513. Predict the products of electrolysis in each of the following: An aqueous solution of $AgNO_3$ with silver electrodes.

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514. Predict the products of electrolysis in each of the following: A dilute solution of H_2SO_4 with platinum electrodes.

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515. How much electricity in terms of Faraday is required to produce : 40.0 g of Al from molten A1203?

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516. Conductivity of 0.00241M acetic acid is $7.896 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity and if Λ° for acetic acid is $390.5 Scm^2 mol^{-1}$. What is its dissociation constant?

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517. Write cell reactions which occur in lead storage battery

When battery in use.

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518. Write the cell reactions which occur in lead storage battery

when the batteyr is on charging.

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519. What is the difference between e.m.f. and potential diffrence?

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520. Write the Nernst equation and calculate the e.m.f. of the following cell at 298K.

$Sn_{(s)}\left|Sn^{2+}_{(0.050M)}\right|\left|H^{+}(0.020M)\right|H_2(1atm/Pt)$

Given $E^{\circ}_{Sn/Sn^{2+}} = -0.14V$

$$EMF = \left(E^{\circ}_{H^{+}/1/2H_2} - E^{\circ}_{Sn^{2+}/Sn}\right) - \frac{0.0591V}{2}\log\frac{[Sn^{2+}]}{[H^{+}]^2}.$$

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521. Explain the following:

Electrical protectin for preventing rusting of iron pipes in underground water.

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522. Can you store copper sulphate solutions in a zinc pot?

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523. Explain the following:

Effect of dilution of molar conductivity.

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524. Explain why does alkaline medium inhibits the rusting of iron.

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525. State Kohlrausch law of independent migration of ions. Mention one application of the law.

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526. List main differences between the electrochemical cells and electrolytic cells?

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527. The cell in which the following reaction occurs:

$2Fe^{3+}(aq)+2I^{-}(aq)\rightarrow 2Fe^{2+}(aq)+I_2(s)$ has $E^o_{cell}=0.236V$ at 298 K. Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.

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528. What are fuel cells ? Give example.

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529. Give the units of cell constant.

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