CHEMISTRY

BOOKS - BRILLIANT PUBLICATION

REDOX REACTION & ELECTROCHEMISTRY

Question Redox Reaction Level I Homework

1. Oxidation number of carbon is highest in

A. $HCOO^-$

B. $H - CHO$

C. CH_3OH

D. CH_4

Answer:

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2. Which among the following is not a redox reaction?

A. $2Na + O_2 \rightarrow Na_2O_2$

B. $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$

C. $Na_2O + 2HCl \rightarrow 2NaCl + H_2O$

D. $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + H_2O$

Answer:

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3. Oxidation numbers of Mn in Mn_3O_4 are

A. $+2,\ +3$

B. $+6,\ +8$

C. $+4$ and $+2$

D. $+4$ only

Answer:

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4. HNO_3 does not act as oxidising agent in the reaction

A. $C + 4HNO_3 \rightarrow CO_2 + 2H_2O + 4NO_2$

B. $I_2 + 10HNO_3 \rightarrow 2HIO_3 + 10NO_2 + 4H_2O$

C. $Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2NO + 2H_2O$

D. $P_2O_5 + 2HNO_3 \rightarrow 2HPO_3 + N_2O_5$

Answer:

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5. Which of the following is a disproportionation

A. A. $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^+$

B. B. $NH_4NO_3 \rightarrow N_2O + 2H_2O$

C. C. $2H_2S + SO_2 \rightarrow 3S + 2H_2O$

D. D. $2H_2O_2 \rightarrow 2H_2O + O_2$

Answer:

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6. Which among the following cannot disproportionate

A. ClO_4^-

B. PO_4^{3-}

C. F^-

D. All of these

Answer:

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7. Which among the following can act as oxidant as well as reductant

A. A. SO_3^{2-}

B. B. NO_2^-

C. C. H_3PO_3

D. D. All of these

Answer:

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8. Which of the following halogens always show only one oxidation state

A. Cl

B. Br

C. I

D. F

Answer:

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9. When N_2 is converted into NH_3, the equivalent weight of nitrogen will be

A. 1.67

B. 2.67

C. 3.67

D. 4.67

Answer:

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10. The equivalent weight of Mohr's salt $FeSO_4.(NH_4)_2SO_4.6H_2O$ is equal to

A. Its molecular weight

B. Atomic weight

C. Half its molecular weight

D. One third its molecular weight

Answer:

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11. Which is the reducing agent in the following reaction

$2CuSO_4 + 4KI \rightarrow Cu_2I_2 + I_2 + 2K_2SO_4$?

A. Cu^{2+}

B. I^-

C. SO_4^{2-}

D. This is a disproportionation

Answer:

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12. Which substance serves as reducing agent in the following reaction?

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

A. H_2O

B. Ni

C. H^+

D. $Cr_2O_7^{2-}$

Answer:

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13. When SO_2 is passed into acidified $K_2Cr_2O_7$ solution, oxidation state of sulphur changes from

A. $+4$ to 0

B. $+4$ to +2

C. $+4$ to +6

D. $+6$ to +4

Answer:

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14. Oxalic acid reduces $KMnO_4$ to Mn^{2+} in acidic medium getting itself reduces to CO_2. What is the volume of CO_2 at standard conditions formed when 0.5 mol $KMnO_4$ is reduced by 5mol oxalic acid $(H_2C_2O_4)$ in acidic medium

A. 56L

B. 11.2L

C. 22.4L

D. 33.6L

Answer:

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15. What are the coefficients of H_2O, H^+ and NO_2^- in the followig reaction in the balanced state

$$NO_2^- + MnO_4^- + H^+ \rightarrow Mn^{2+} + NO_3^- + H_2O$$

A. 3,6,5

B. 2,3,5

C. 3,5,6

D. 4,5,3

Answer:

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16. $ClO^- + CrO_2^- + OH^- \rightarrow Cl^- + CrO_4^{2-} + H_2O$. The number of moles of ClO^- reacting with 1 mol CrO_2^- is

A. $\frac{3}{2}$

B. $\frac{2}{3}$

C. 1

D. 2

Answer:

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17. HNO_3 oxidises NH_4^+ to nitrogen and gets reduced to NO_2. Mols of HNO_3 reduced by one mol NH_4Cl

A. 4

B. 3

C. 2

D. 5

Answer:

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18. The standard reduction potential values of there metallic cations X, Y, Z are $0.52, \ -3, 03 - 1.18V$ respectively. What will be the order of reducing power of the corresponding metals?

A. $Y > Z > X$

B. $X > Y > Z$

C. $Y > X > Z$

D. $X > Z > Y$

Answer:

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19. $Zn^{2+} \rightarrow Zn_{(s)}, E^{\circ} = -0.76V$

$Cu^{2+} \rightarrow Cu_{(s)}, E^{\circ} = -0.345V$

Which of the following is spontaneous?

A. $Zn^{2+} + Cu \rightarrow Zn + Cu^{2+}$

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

C. $Zn^{2+} + Cu^{2+} \rightarrow Zn + Cu$

D. None of the above

Answer:

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20. Given $E^{2+}_{Ni/Ni} = -0.23V, E^{\circ}_{Zn^{2+}/Zn} = -0.76V, E^{\circ}_{Fe^{2+}/Fe} \pm 0.44V.$ The reaction $X + Y^{2+} \rightarrow X^{2+} + Y$ is spontaneous if

A. $X = Ni, Y = Fe$

B. $X = NI, Y = Zn$

C. $X = Fe, Y = Zn$

D. $X = Zn, Y = NI$

Answer:

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Question Redox Reaction Level Ii

1. In which of the following oxyacids, phosphorus shows highest oxidation state?

A. $H_4P_2O_7$

B. H_3PO_3

C. $H_4P_2O_5$

D. $H_4P_2O_6$

Answer:

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2. In which of the following , iron has oxidation state of $+1$?

A. FeO

B. $Fe(CO)_5$

C. $K_4\left[Fe(CN)_6\right]$

D. $\left[Fe(H_2O)_5NO\right]SO_4$

Answer:

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3. Oxidation numbers of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order

A. $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

B. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

C. $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

D. $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

Answer:

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4. In which of the following rections H_2O_2 is not an oxidising agent?

A. $4H_2O_2 + PbS \rightarrow 4H_2O + PbSO_4$

B. $Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$

C. $2FeSO_4 + H_2SO_4 + H_2O_2 \rightarrow Fe_2(SO_4)_3 + 2H_2O$

D. $I_2 + H_2O_2 + 2KOH \rightarrow 2Kl + 2H_2O + O_2$

Answer:

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5. Which among the following is not a disproportionation?

A. $2H_3PO_2 \rightarrow 2H_3PO_3 + PH_3$

B. $2H - CHO + OH^- \rightarrow HCOO^- + CH_3OH$

C. $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$

D. $3MnO_4^{2-} + 4H^+ \rightarrow MnO_2 + 2MnO_4^- + O_2$

Answer:

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6. In which of the following molecules, the same element doesnot exhibit two different oxidation states

A. C_3O_2

B. $Na_2S_4O_6$

C. CrO_5

D. OsO_4

Answer:

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7. Sulphur does not exhibit +6 oxidation state in

A. Caro's acid

B. Marshall's acid

C. Hypo

D. Oleum

Answer:

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8. In the reaction $As_2S_3 + NO_3^- + H_2O \rightarrow AsO_4^{3-} + SO_4^{2-} + H^+ + NO$ the equivalent weight of As_2S_3 is (M=Mol. Wt).

A. $\frac{M}{14}$

B. $\frac{M}{4}$

C. $\frac{M}{7}$

D. $\frac{M}{28}$

Answer:

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9. In the disproportionation reaction $H_3PO_2 \rightarrow H_3PO_3 + PH_3$ (atomic mass of P=31)

Equivalent weight of H_3PO_2

1. As an oxidising agent is 16.5

2. As a reducing agent is 33

3. Net equivalent weight of H_3PO_2 is 49.5

4. As an acid is 66

A. 1 & 4 only

B. 2 & 4 only

C. 2 & 3 only

D. 1,2,3,4 are correct

Answer:

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10. Consider each equation given in the balanced form. In which case the number of electrons transferred in the equation when balanced, does not agree with the value given?

A. $2Mn^{2+} + 5S_2O_8^{2-} + 8H_2O \rightarrow 2MnO_4^- + 10SO_4^{2-} + 16H^+$

16

B. $P_4 + 3OH^- + 3H_2O \rightarrow PH_3 + 3H_2PO_2^-$ 3

C. $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 2H^+$ 6

D.

Answer:

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11. To an aq. Solution containing anions a few drops of acidified $KMnO_4$ are added Which one of the following anions if present will not decolourise the $KMnO_4$ solution?

A. Br^-

B. CO_3^{2-}

C. S^{2-}

D. Cl^-

Answer:

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12. Consider the reaction $Cl_2O_7 + H_2O_2 \xrightarrow{OH^-} ClO_2^- + O_2$. The coefficient of H_2O_2, OH^- and H_2O in the balanced equation are

A. 3,2,5

B. 4,2,5

C. 5,4,2

D. 4,4,5

Answer:

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13. MnO_4^- is reduced to Mn^{2+} in acidic medium and to MnO_2 in neutral medium when MnO_4^- acts as oxidant 20 ml of a solution of Fe^{2+} required 30 ml MnO_4^- solution in acidic medium. What volume of this aq MnO_4^- is needed for the same Fe^{2+} solution if 30 ml is used in neutral medium

A. 40ml

B. 20ml

C. 75ml

D. 60ml

Answer:

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14. A standard solution of $K_2Cr_2O_7$ (mol. Mass 294) contains 2.94 g dissolved to make 250 ml solution 20 ml of this solution with excess of 5% Kl solution liberate iodine which when titrated with $Na_2S_2O_3$ solutioin using starch indicator changes blue colour to colourless just at the addition of 18 ml $Na_2S_2O_3$ solution. The average oxidation number of sulphur in the product of titration and the molarity of $Na_2S_2O_3$ are

A. $\frac{+5}{2}, 0.04M$

B. $\frac{+5}{2}, 0.27M$

C. $+2, 0.54M$

D. $+6, 0.54M$

Answer:

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15. $V_1 mL$ of $0.1MK_2Cr_2O_7$ is needed for complete oxidation of $0.678gN_2H_4$ in acidic medium. The volume of $0.3MKMnO_4$ needed for same oxidation in acidic medium will be

A. $\frac{2}{5}V_1$

B. $\frac{5}{2}V_1$

C. $113V_1$

D. Cannot be determined

Answer:

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16. In the balanced equation $xCu_2O + yNO_3^- + H^+ \rightarrow Cu^{2+} + NO + H_2O$. What is x and y?

A. 2,3

B. 3,4

C. 4,3

D. 3,2

Answer:

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17. 0.1 mol of $KMnO_4$ in acid medium can oxidise

1. 0.5 mol Mohr's salt 2. 0.25 mol oxalic acid

3. 0.25 mol H_2O_2 4. 1 mol KCl

A. 1,4

B. 2,4

C. 3,4

D. 1,2,3

Answer:

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18. The number of moles of $KmnO_4$ reduced by 1 mol of Kl in alkaline medium is

A. 1

B. 2

C. 0.05

D. $1/5$

Answer:

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19. What is the mass of benzyl alcohol that can be oxidised to benzoic acid using 1 g of an oxidising agent of equivalent mass 31.6 (assuming complete conversion to products)?

A. 3.4g

B. 0.85g

C. 1.08g

D. 6.32g

Answer:

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20. x moles of potassium dichromate oxidises 1 mole of ferrous oxalate in acidic medium .Here x is

A. 3

B. 1.5

C. 0.5

D. 1

Answer:

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21. It requires 40.0mL of $0.50MCe^{4+}$ to titrate 10 mL of $1.0MSn^{2+}$ to Sn^{4+}. What is the oxidation state of cerium in the reduced product?

A. 1

B. 2

C. 3

D. 4

Answer:

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22. HNO_3 oxidised NH_4^+ ions to nitrogen and itself gets reduced to NO_2. The moles of HNO_3 required by 1 mole of $(NH_4)_2SO_4$ is

A. 4

B. 5

C. 6

D. 2

Answer:

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23. How many electrons are donated by 0.16g of CH_3OH on oxidation to HCOOH by excess of acidified $K_2Cr_2O_7$

A. 2.4×10^{23}

B. 1.2×10^{22}

C. 2×10^{20}

D. 1.2×10^{20}

Answer:

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24. Aldehydes reduce Fehling's solution to red ppt of Cu_2O and Tollens reagent to silver

i. $CH_3 - CHO + Ag^+ + OH^- \rightarrow CH_3COO^- + Ag + H_2O$

(ii)

$CH_3 - CH_2 - CHO + Cu^{2+} + OH^- \rightarrow CH_3 - CH_2 - COO^- + Cu_2C$

The number of mols of OH^- taking part in the balanced equation in reaction (i) and (ii) are respectively

A. 3,3

B. 2,3

C. 3,5

D. 3,2

Answer:

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25. In SHE the pH of the acid solution should be

A. 7

B. 1

C. 0

D. 14

Answer:

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26. $E^{\circ}_{Mg\,/\,Mg^{2+}} = 2.37V$

$E^{\circ}_{Al^{3+}\,/\,Al} = 1.66V$

E°_{cell} and the cell reaction is

A. $0.71V, 3Mg + 2Al^{3+} \rightarrow 3Mg^{2+} + 2Al$

B. $0.71V, 2Al + 3Mg^{2+} \rightarrow 3Mg + 2Al^{3+}$

C. $-0.71V, 3Mg + 2Al^{3+} \rightarrow 3Mg^{2+} + 2Al$

D. $4.03V, 2Al + 3Mg^{2+} \rightarrow 3Mg + 2Al^{3+}$

Answer:

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Question Redox Reaction Level Ii Assertion Reason

1. Assertion: In the balanced redox reaction

$xAs_2S_3 + yNO_3^- + 4H_2O \rightarrow aAsO_4^{3-} + bNO + cSO_4^{2-} + 8H^+$ the

n-factor of As_2S_3 and NO_3^- is 28 and 3 respectively.

Reason: Molar ratio is reciprocal of n factor's ratio So x:y is 3:28.

A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but the Reason is false

D. If both Assertion and Reason are false

Answer:

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2. Assertion:SO_2 can decolourise aq $KMnO_4$ in acidic medium.

Reason: SO_2 is a reducing agent and product are all colourless.

A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but the Reason is false

D. If both Assertion and Reason are false

Answer:

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3. Assertion:$Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$ is thermodynamically feasible.

Reason: Chromium can show variable oxidation states. A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion. B.If both Assertion and Reason are true but Reason is not the correct explanation of Assertion C. If Assertion is true but the Reason is false D. If both Assertion and Reason are false

A. A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. B.If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. C. If Assertion is true but the Reason is false

D. D. If both Assertion and Reason are false

Answer:

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Question Electrochemistry Level I Homework

1. KCl can be used in salt bridge in which of the following cells?

A. A. $Zn|ZnCl_2|AgNO_3 \mid Ag$

B. B. $Pb|Pb(NO_3)_2||Cu(NO_3)_2|Cu$

C. C. $Cu|CuSo_4||AuCl_3|Au$

D. D.$Fe|FeSO_4||Pb(NO_3)_2|Pb$

Answer:

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2. Which of the following will increase the voltage of the cell with folowing reaction?

$Sn + 2Ag^+ \rightarrow Sn^{2+} + 2Ag$

A. Increase in the size of silver rod

B. Increase in the concentration of Ag^+ ions

C. Increase in the concentration of Sn^{2+} ions

D. Decreases in the concentration of Ag^+ ions

Answer:

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3. The reduction potential of hydrogen electrode will be negative if :

A. $pH_2 = 2$ atm, $\left[H^+\right] = 1.0M$

B. $pH_2 = 2$ atm, $\left[H^+\right] = 2.0M$

C. $pH_2 = 1$ atm, $\left[H^+\right] = 2.0M$

D. $pH_2 = 1$ atm $\left[H^+\right] = 1.0M$

Answer:

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4. $Pt: H_2(P_1)\left[H^+(1M)\right]\left[\left|H^+(1M)\right|H_2P_2\right], Pt$ (Where P_1 and P_2 are pressure). Cell reaction will be spontaneous if:

A. $P_1 = P_2$

B. $P_1 > P_2$

C. $P_2 > P_1$

D. $P_1 = 1$ atm

Answer:

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5. Change in electrode potential of the half cell Al^{3+}/Al when Al^{3+} solution is diluted 10 times

A. A. increase by 60mV

B. B. decreases by 120 mV

C. C. increases by 20 mV

D. D. decreases by 20 mV

Answer:

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6. The emf of a Daniel cell $Zn\left|Zn^{2+}(0.001M)\right|\left|Cu^{2+}(1M)\right|Cu$ at 298 K is E_1. When concentration of $ZnSO_4$ is 1 M and concentration of $CuSO_4$ is 0.001M, emf changes to E_2. Relation between E_1 and E_2 is

A. $E_1 = E_2$

B. $E_1 > E_2$

C. $E_1 < E_2$

D. $E_1 = \frac{E_2}{2}$

Answer:

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7. Given $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$, $E^{\circ}_{Fe^{2+}/Fe} = -0.44V$ and $E^{\circ}_{Ni^{2+}/Ni} = -0.236V$. A galvanic cell cannot produce current by a spontaneous reaction $X + Y^{2+} \rightarrow X^{2+} + Y$ if

A. X=Zn and Y=Fe

B. X=Zn and Y=Ni

C. X=Fe and Y=Ni

D. X=Ni and Y=Zn

Answer:

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8. Given that $Ni^{2+}|Ni = -0.25V, Cu^{2+}|Cu = 0.34V\, Ag^{+}|Ag = 0.80V$ and $Zn^{2+} \mid Zn = -0.76V$. Which of the following reactions under standard conditions can take place in the specified direction?

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

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

C. C. $Zn + 2H^{+} \rightarrow Zn^{2+} + H_2$

D. D. $Cu + 2H^{+} \rightarrow Cu^{2+} + H_2$

Answer:

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9. Standard oxidation potential of Ni/NI^{2+} is 0.236V. This is combined with hydrogen electrode in acidic solution. At what pH will the solution show measured emf zero at $25^{\circ}C$ asuming $\left[Ni^{2+}\right] = 1M$?

A. 2

B. 3

C. 1

D. 4

Answer:

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10. What is the emf of the following cell

$Pt: H_2(1\text{atm})|H^+(0.1M)||Cl_2(1\text{atm})|Cl^-(0.01M)$ at $298K\left(E^\circ_{Cl_2} \mid Cl^- = 1.36V\right)D$

A. 1.45V

B. 1.54V

C. 1.42V

D. $-1.54V$

Answer:

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11. Given $E^\circ_{Fe^{3+}/Fe} = -0.036V$ and $E^\circ_{fe^{2+}/Fe} = -0.44V$. What is the value of $E^\circ_{Fe^{3+}/Fe^{2+}}$

A. A. 0.672V

B. B. $-0.476V$

C. C. $0.77v$

D. D. $0.476V$

Answer:

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12. $Cd^{2+} + 2e^- \rightarrow Cd, E^\circ = -0.40V$

$Ag^+ + Ie^- \rightarrow Ag, E^\circ = 0.80V$

Therefore ΔG° of the reaction $Cd + 2Ag^+ \rightarrow Cd^{2+} + 2Ag$ is

A. A. $116kJ$

B. B. $-116kJ$

C. C. $232kJ$

D. D. $-232kJ$

Answer:

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13. A galvanic cell is made of two hydrogen electrodes, one of which is the standard hydrogen electrode, in which of the following solutions should the other electrode be set up to get maximum emf?

A. A.$0.1MCH_3COOH$

B. B. $0.1MHCl$

C. C. $0.1MH_2SO_4$

D. D. $0.1MNH_4OH$

Answer:

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14. Conductivity of 0.02 M KCl $25^\circ C$ is $4 \times 10^{-3} ohm^{-1} cm^{-1}$. The resistance of this solution at $25^\circ C$ when meaured with a particular cell was 200 ohms. The resistance of 0.01 $MCuSO_4$ at $25^\circ C$ measured with

the same cell was 8×10^3 ohms. WHat is molar conductivity of he copper sulphate solution?

A. 8

B. 16

C. 24

D. $10\left(ohm^{-1}cm^2mol^{-1}\right)$

Answer:

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15. Which of the following statements are correct?

1. The oxidising power of halogens decreases from chlorine to iodine

2. Equivalent conductance increase with dilution for an electrolyte solution while its specific conductance decreases

3. For a weak electrolyte, the plot of λm against $\sqrt{c}$ is nearly linear.

4. Ametal M for which E° for the half reaction $Mn^+ + \mathrm{ne}(-) \rightarrow$ M is very negative will be a good reducing agent

A. A. 1,2,3,4

B. B. 1,2,4

C. C. 1,2

D. D. 1

Answer:

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16. The standard emf of the cell $Mg|Mg^{2+}||Al^{3+}|Al$ is 0.71V at 298 K. Equilibrium constant of the reaction $3Mg^{2+} + 2Al \rightarrow 3Mg + 2Al^{3+}$ is

A. 10^{36}

B. 10^{72}

C. 10^{-72}

D. 10^{-36}

Answer:

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17. At $25^{\circ}C$ the molar conductances at infinite dillution for the strong electrolytes NaOh, NaCl and $BaCl_2$ are $248 \times 10^{-4}, 126 \times 10^{-4}$ and $280 \times 10^{-4} Sm^2 mol^{-1}$ respectively λ° of $Ba(OH)_2$ is $Sm^2 mol^{-1}$ is

A. 52.4×10^{-4}

B. 524×10^{-4}

C. 402×10^{-4}

D. 262×10^{-4}

Answer:

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18. A certain current liberates 0.5 g of hydrogen in 2 hours. How many grams of copper can be liberated by the same current flowing for the same time in a copper sulphate solution?

A. 12.7g

B. 15.9g

C. 31.8g

D. 63.5g

Answer:

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19. A current of 5 amp is passed through molten salt of a metal for one hour. The mass of metal deposited is 11g. What is the oxidation state of the metal in the salt. (Atomic mass of metal =119)

A. 3

B. 2

C. 1

D. 4

Answer:

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20. Aq. $CuSO_4$ is electrolysed using Pt electrodes. The volume of O_2 gas (as STP) formed at the anode when 2A current is passed for 193 seconds is

A. 11.2cc

B. 33.6cc

C. 1.12L

D. 22.4cc

Answer:

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Question Electrochemistry Level Ii

1. Reduction potential of hydrogen using dil sulphuric acidof pH=5 at a pressure of hydrogen gas of 1 bar is

A. A. 0.059V

B. B. $-0.295V$

C. C. $-0.059V$

D. D. $-2.95V$

Answer:

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2. In acidic medium $E^{\circ}_{MnO_4^-}$ is 1.51v.When $\left[H^+\right]$ is decreased 100 times, keeping all other ions at same concentration, the electrone potential will

A. A. decrease by 95 mV

B. B.increase by 24 mV

C. C.decrease by 189 mV

D. D. decrease by 100 mV

Answer:

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3. The voltage of a cell consisting of $Ca(s)$ and $Cl_2(g)$ is 4.23V under standard conditions at 298 K. What is the voltage if the electrolyte consists of 2M $CaCl_2$ solution?

A. 4.186V

B. 4.219V

C. 4.316V

D. 4.212V

Answer:

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4. Consider the cell reaction k

$2Fe(s) = O_2(g) + 4H^+_{aq} \rightarrow 2Fe^{2+} + 2H_2O(l).\ E^\circ_{\text{cell}} = 1.67V.$

At $\left[Fe^{2+}\right] = 10^{-3}M$, $P_{O_2} = 0.1$ atm and pH=3, the cell potential at 298 K is

A. 1.57V

B. 1.77V

C. 1.87V

D. 1.47v

Answer:

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5. A galvanic cell is constructed as follows. A half ceil consists of a platinum wire immersed in a solution containing 1.0M of Sn^{2+} and 1.0 M of Sn^{4+} and another half cell has a thallium rod immersed in a 1.0 M solution to TI^+

Given : $Sn^{4+} + 2e^- \rightarrow Sn^{2+}, E^\circ = +0.13V$

and $TI^{+} + e^{-} \rightarrow T, , E^{\circ} = -0.34V$

What is the cell voltage if the TI^{+} concentration is increased tenfold?

A. 0.592V

B. 0.411V

C. 0.459V

D. 0.47V

Answer:

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6. Given the standard electrod potentials $E^{\circ}_{Cu^{2+}/Cu} = 0.34v$ and $E^{\circ}_{Cu^{+}/Cu} = 0.52V.$ What is K_c for the disproportion $2Cu^{+} \rightarrow Cu + Cu^{2+}$

A. 6.1

B. e^6

C. 10^6

D. $e^{-6.1}$

Answer:

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7. When a Galvanic cell produce current by a spontaneous reaction

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

B. $\Delta G^{\circ} = 0, E^{\circ}_{\text{cel}} > 1, Q > K_{eq}$

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

D. $\Delta G^{\circ} < 0, Q < K, E^{\circ}_{\text{cell}} < 0$

Answer:

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8. A cell contains two copper electrodes. The negative electrode is in contact with a solution of $10^{-6}M\left[Cu^{2+}\right]$ ions. The emf of the cell is 0.118V at $25^{\circ}C$. Calculate the $\left[Cu^{2+}\right]$ at positive electrode.

A. $10^{-6}M$

B. $10^{-4}M$

C. $10^{-5}M$

D. $10^{-2}M$

Answer:

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9. The emf of the cell $Pt, \underset{1atm}{H_{2(g)}}\left|\underset{.01M}{HA}\right|\left|\underset{1M}{HCl}\right|H_{2(g)}, Pt$ is 0.295V. Dissociation constant of the acid HA is ...

A. 1×10^{-4}

B. 1×10^{-6}

C. 1×10^{-8}

D. 1×10^{-5}

Answer:

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10. For the cell $Zn|Zn^{2+}(0.01M)||M^{2+}_{(0.001M)}|M$, $E_{\text{cell}} = 0.29V$. When $Q = K_{eq}$, which of the following is true?

A. $E_{\text{cell}} > E_{\text{cell}^\circ}$, $K_{eq} = e^{11}$, $\Delta G^\circ = 62kJ$

B. $E_{\text{cell}} = E^2_{\text{cell}}$, $K_{eq} = e^{11}$, $\Delta G^\circ = -62kJ$

C. $E_{\text{cell}} = 0$, $K_{eq} = 10^{11}$, $\Delta G^\circ = -62kJ$

D. $E_{\text{cell}} < E^\circ_{\text{cell}}$, $K_{eq} = 1$, $\Delta G = 0$

Answer:

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11. Pt, H_2 (1bar)$|HCl_{aq}|AgCl(s)$ | Ag has cell potential 0.92V at $25^\circ C$ when $10^{-6}MHCl$ is used. What is the standard free energy change for the reaction $H_{2(g)} + 2AgCl_{(s)} \rightarrow 2Ag_{(s)} + 2H^+_{aq} + 2Cl^-_{aq}$?

A. A.$-19.3kJ$

B. B. $96.5kJ$

C. C. $-9.65kJ$

D. D. $-38.6kJ$

Answer:

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12. The equilibrium constant of the reaction $2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$ is 1×10^8 at 298 K. If $E^\circ_{I_2/I^-}$ is 0.54 V. what is $E^\circ_{Fe^{3+}/Fe^{2+}}$?

A. $-0.65V$

B. $0.77V$

C. $-0.77V$

D. $1.2V$

Answer:

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13. Which of the following is/are true

a.Specific conductance denotes conductances of $1cm^3$ of a substance

b. Specific conductance as well as molar conductance of a solution of an electrolyte increases upon dilution.

c. Limiting molar conductivity of a weak electrolyte cannot be determined by extrapolation of the plot of λ_m against $\sqrt{c}$

d. Conductance of metals is by movement of free electrons

A. A. All

B. B. a,b,d

C. C. b,c,d

D. D. a,c,d

Answer:

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14. Molar conductivity of a 0.01 M solution of a weak monobasic acids HA is $156 cm^2 mol^{-1}$ at 298 K. What is the pH of this solution if λ_m° of HA $390 S cm^2 mol^{-1}$

A. 3

B. 2.4

C. 4.3

D. 6.2

Answer:

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15. 0.025 M aq. Solution of methanoic acid has molar conductivity $46S.\,cm^2.\,mol^{-1}.\,\lambda^{\circ}_{H^+} = 349.6, \lambda^2_{HCOO^-} = 54.4.$ What is ΔG° for the reaction $H^+_{aq} + HCOO^-_{aq} \rightarrow HCOOH_{aq}$ (Given log 3=0.48)

A. $80KJ.\,mol^{-1}$

B. $-56KJ.\,mol^{-1}$

C. $-20KJmol^{-1}$

D. $-80KJmol^{-1}$

Answer:

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16. From the following molar conductivities at infinite dilution

λ°_m for $Ba(OH)_2 = 457.6ohm^{-1}cm^2mol^{-1}$

λ°_m for $BaCl_2 = 240.6ohm^{-1}cm^2mol^{-1}$ λ°_m for

$NH_4Cl = 129.8 ohm^{-1} cm^2 mol^{-1}$

Calculate λ_m° for NH_4OH

A. 238.3

B. 183.5

C. 268.3

D. 138($ohm^{-1} cm^2 mol^{-1}$)

Answer:

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17. Ionisation constant of acetic acid is 2×10^{-6}. Molar conductivity of 1500 ppm acetic acid if $\lambda_{H^+}^2 = 249.6$ and $\lambda_{CH_3COO^-}^\circ = 40.4$

A. 39

B. 1000

C. 21.8

D. 10.9

Answer:

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18. $0.04M$ solution of a weak dibasic acid is $4.23 \times 10^{-4} S.\, cm^{-1}$ The degree of dissociation at this concentration of 0.061. The limiting equivalent conductance of this acid is

A. 174

B. 10.6

C. 87

D. 212

Answer:

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19. At 298 K, the conductivity of a saturated solutioni of Agcl in water is $2.6 \times 10^{-6} ohm^{-1} cm^{-1}$ givem $\lambda_m^{\infty}\left(Ag^{+}\right) = 63 ohm^{-1} cm^2 mol^{-1}$ and $\lambda_m^{\infty}\left(Cl^{-}\right) = 67 ohm^{-1} cm^2 mol^{-1}$

The solubility product of $AgCl$ is

A. 2×10^{-5}

B. 4×10^{-10}

C. 4×10^{-5}

D. 8×10^{-5}

Answer:

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20. One faraday current is passed through molten Na_2O, MgO and Al_2O_3. Moles of Na, Mg and Al formed at the cathode in each electrolytic cell are in the ratio

A. $1:2:3$

B. $3:2:1$

C. $2:1:2$

D. $6:3:2$

Answer:

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21. Consider the electrochemical cell between Ag(s) and $Cl_2(g)$ electrodes in 1L of 0.1 M KCl aq. Solution. Solubility product of AgCl(s) is 1.8×10^{-10} and F=96500C.mol^{-1} At $1\mu A$ current. Calculate the time required to start observing AgCl precipitation in the Galvanic cell

A. 195s

B. 173s

C. 346s

D. 390s

Answer:

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22. How many cc of oxygen is released by a current of 2A flowing for 3 minutes and 13 seconds in acidulated water?

A. 11.2cc

B. 33.6cc

C. 1.12cc

D. 22.4cc

Answer:

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23. A 250 mL sample of $0.20MCr^{3+}$ is electrolysed with a current of 96.5 A. If the remaining concentration of Cr^{3+} ions is 0.1 M, the duration of

electrolysis is (Atomic mass of Cr=52)

A. 25sec

B. 150sec

C. 225sec

D. 75sec

Answer:

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24. 0.02F current is drawn from a lead storage battery. Change in the mass of H_2SO_4 and $PbSO_4$ are (mol. mass of $PbSO_4$=303 $gmol^{-1}$):

A. 1.96g, 6.06g

B. 0.04g,3.2g

C. 9.8g, 3.03g

D. 0.98g, 0.303g

Answer:

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25. A fuel cell involves combustion of methane at 1atm and 298 K

$CH_{4(g)} + 2O_2 \rightarrow CO_{2(g)} + 2H_2O_{(l)}, \Delta H^\circ = -890kJ$.Calculate the efficiency $\left(E^\circ_{\text{cel}} = 1.09V\right)$

A. 0.94

B. 0.85

C. 0.74

D. 0.58

Answer:

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26. Select the correct statements

1. Cathode reaction in Ni-Cd cell is

$NiO_{2(s)} + 2H_2O_{(l)} + 2e^- \rightarrow Ni(OH)_2 + 2OH^-_{aq}$

2. The electrolyte used in Hg cell is mixture of $ZnCl_2$ and NH_4Cl

3. Chemical reaction during rusting of iron is

$2Fe_{(s)} + O_{2(g)} + 4H^+_{aq} \rightarrow 2Fe^{2+}_{aq} + 2H_2O_{(l)}$

4. In electrical protection, metal used for preventing corosion become anode.

A. 1,2,3,4

B. 2,3,4

C. 1,3,4

D. 2,4

Answer:

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Question Electrochemistry Level Ii Assertion Reason

1. Assertion: After the electrolysis of aqueous $CuSO_4$ solution pH decreases.

Reason: Sulphuric acid is formed.

A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but the Reason is false

D. If both Assertion and Reason are false

Answer:

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2. Assertion: KCl is not used in the salt bridge of a cell containign Ag_{aq}^{+}.

Reason: Salt bridge contains a saturated solution of an inert electrolyte like KCl,KNO_3 or NH_4NO_3 in agar -agar.

A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but the Reason is false

D. If both Assertion and Reason are false

Answer:

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3. Assertion: One faraday can deposit one mol each of Ag, Cu and Al.

Reason: Number of electrons in one coulomb of current is not a constant.

A. If both Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

C. If Assertion is true but the Reason is false

D. If both Assertion and Reason are false

Answer: