



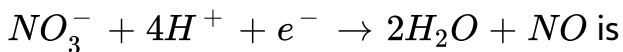
CHEMISTRY

BOOKS - MTG WBEE CHEMISTRY (HINGLISH)

REDOX EQUILIBRIA

Wb Jee Workout

1. The number of electrons required to balance the following equation ,



A. 5

B. 4

C. 3

D. 2

Answer: C



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2. The oxidation state of osmium (Os) in OsO_4 is

A. +7

B. +6

C. +4

D. +8

Answer: D



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3. when $KMnO_4$ acts as an oxidizing agent and ultimately forms MnO_4^{2-} , MnO_2 , Mn_2O_3 and Mn^{2+} then the number of electrons transferred in each case respectively is

A. 4,3,1,5

B. 1,5,3,7

C. 1,3,4,5

D. 3,5,7,1

Answer: C



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4. The average oxidation number of sulphur in $Na_2S_4O_6$

A. 1.2

B. 2.5

C. 3

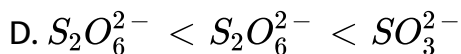
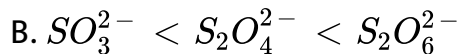
D. 2

Answer: B

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5. The oxidation states of sulphur in the anions

SO_3^{2-} , $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order

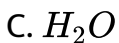
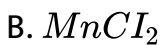
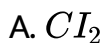


Answer: A

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6. In the reaction

$2KMnO_4 + 16HCl \rightarrow 5Cl_2 + 2MnCl_2 + 2KCl + 8H_2O$ the reduced product is

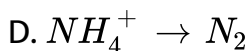
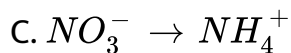
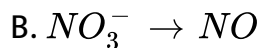
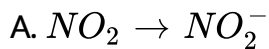


Answer: B



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7. In which one of the following reactions, nitrogen is not reduced?

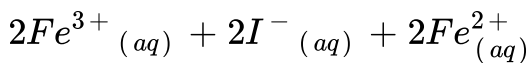


Answer: D



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8. In the following reaction, which is the species being oxidized?



Answer: B

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9. The brown complex obtained in the detection of nitrate radical is formulated as $[Fe(H_2O)_5NO]SO_4$. What is the oxidation number of Fe in this complex?

A. +1

B. +2

C. +3

D. 0

Answer: A

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10. Which of the following statements is not correct?

A. Potassium permanganate is a powerful oxidising substance.

B. Potassium permanganate on treatment with conc. H_2SO_4 forms manganese heptoxide.

C. The equivalent mass of $K_2Cr_2O_7$, in acidic medium is 73.5.

D. Potassium dichromate oxidizes a secondary alcohol into a ketone.

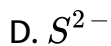
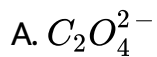
Answer: C



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11. $Cr_2O_7^{2-} + X \xrightarrow{H^+} Cr^{3+} + H_2O + \text{oxidised product of X}$, X

in the above reaction cannot be

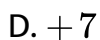
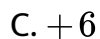
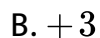
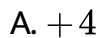


Answer: C



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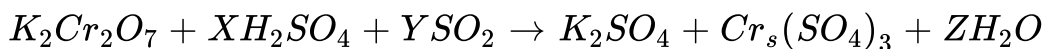
12. When a manganous salt is fused with a mixture of KNO_3 and solid NaOH the oxidation number of Mn changes from +2 to



Answer: C

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13. In the reaction



X,Y,Z are

A. 1,3,1

B. 4,1,4

C. 3,2,3

D. 2,1,2

Answer: A

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14. Which of the following is a redox reaction?

A. H_2SO_4 with NaOH

B. in atmosphere , O_3 from O_2 by lightning

C. Nitrogen oxides from nitrogen and oxygen by lightning

D. Evaporation of H_2O

Answer: C



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15. The oxidation number of sulphur in S_8 , S_2 , F_2 , H_2S respectively are

A. 0,+1 and -2

B. +2, + 1 and - 2

C. 0, + 1 and + 2

D. - 2, + 1 and - 2

Answer: A



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16. The reaction $3\text{ClO}^-_{(aq)} \rightarrow \text{ClO}^-_{(aq)} + 2\text{Cl}^-_{(aq)}$ is an example of

A. oxidation reaction

B. reduction reaction

C. disproportionation reaction

D. decomposition reaction.

Answer: C



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17. For decolouration of 1 mole of $KMnO_4$, the moles of H_2O_2 required is

A. $1/2$

B. $3/2$

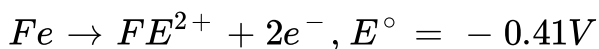
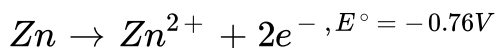
C. $5/2$

D. $7/2$

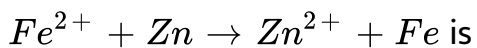
Answer: C

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18. The standard reduction potential E° for half reactions are



the EMF of the cell reaction



A. $-0.35V$

B. $+0.35V$

C. $+1.17V$

D. $-1.17V$

Answer: B



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19. Oxidation state of sulphur in H_2S is

A. -1

B. $+1$

C. $+2$

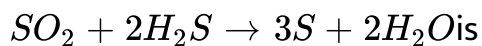
D. - 2

Answer: D



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20. Equivalent mass of oxidising agent in the reaction



A. 32

B. 64

C. 16

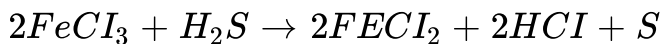
D. 8

Answer: C



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21. In the reaction



- A. $FeCl_3$ acts as an oxidising agent
- B. both H_2S and $FeCl_3$ are oxidised
- C. $FeCl_3$ is oxidised while H_2S is reduced
- D. H_2S acts as an oxidising agent

Answer: A



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22. The oxidation state of chromium in $[Cr(PPH_3)_3(CO)]$ is

- A. +3
- B. +8

C. 5

D. 6

Answer: C



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23. Consider a titration of $K_2Cr_2O_7$ solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is

A. 3

B. 4

C. 5

D. 6

Answer: D



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24. Equivalent weight of MnO_4^- in acidic, weakly basic and neutral medium are in the ratio of

A. 3:5:15

B. 5:3:1

C. 5:1:3

D. 3:5:5

Answer: D



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25. The reaction of $KMnO_4$ and HCl results in

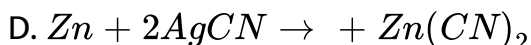
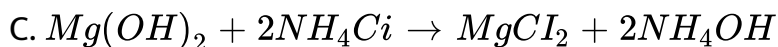
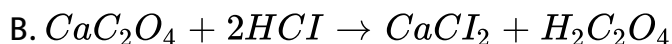
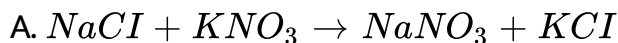
- A. oxidation of Mn in $KMnO_4$ and production of Cl_2
- B. oxidation of Mn in $KMnO_4$ and production of H_2
- C. reduction of Mn in $KMnO_4$ and production of Cl_2
- D. none of these

Answer: C



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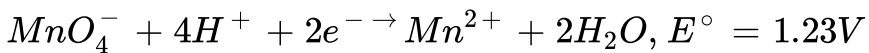
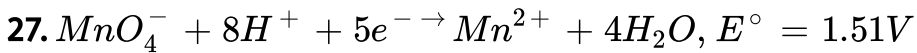
26. Which of the following is a redox reaction ?



Answer: D



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$E_{\text{MnO}_4^- | \text{MnO}_2}$ is

A. 1.70V

B. 0.91V

C. 1.37V

D. 0.548V

Answer: A



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28. The standard reduction potential values of three metallic cations X, Y and Z are 0.52 V, -3.03 V and -1.18 V respectively. The order of reducing power of the corresponding metal is

A. $Y > Z > X$

B. $X > Y > Z$

C. $Z > Y > X$

D. $Z > X > Y$

Answer: A



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29. The equivalent weight of potash alum

$(K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O)$ is

A. M

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

C. $\frac{M}{6}$

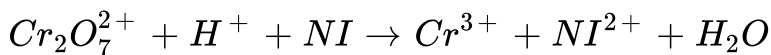
D. $\frac{M}{8}$

Answer: D

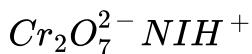


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30. For the redox reaction



the correct coefficients of the reactants for the balanced reaction are



A. 1 3 14

B. 2 3 14

C. 1 1 16

D. 3 3 1 2

Answer: A

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31. Consider the following reaction,

$5H_2O_2 + xClO_2 + 2OH^- \rightarrow xCl^- + yO_2 + H_2O$ the reaction is balanced if

A. $x = 5, y = 2$

B. $x = 2, y = 5$

C. $x = 4, y = 10$

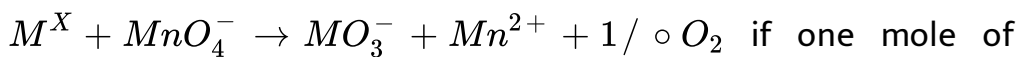
D. $x = 5, y = 5$

Answer: B



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32. For the reaction



MnO_4^- oxidises 1.67 moles of M^+ to MO_3^- then the value of x in

the reaction is

A. 5

B. 3

C. 2

D. 1

Answer: C



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33. A mole of N_2H_4 loses ten moles of electrons to form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y? (There is no change in the oxidation number of hydrogen.)

A. -1

B. -3

C. +3

D. +5

Answer: C



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34. The number of electrons involved in the reduction of nitrate ion to hydrazine is

A. 8

B. 7

C. 5

D. 3

Answer: B



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35. A compound of Xe and F is found to have 53.3% Xe (atomic weight=133). Oxidation number of Xe in this compound is

A. +2

B. 0

C. +4

D. +6

Answer: D

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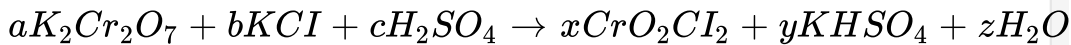
36. A cell is represented by $Zn|Zn^{++}_{(aq)}||Cu^{++}_{(aq)}|Cu$ given $Cu^{++} + 2e^{-} \rightarrow Cu, E^{\circ} = + 0.35V$ and $Zn^{++} + 2e^{-} \rightarrow Zn, E^{\circ} = - 0.763V$ Calculate emf of the cell and state whether the cell reaction will be spontaneous or non-spontaneous ?

- A. 1.113, spontaneous
- B. $- 0.567$, non-spontaneous
- C. $- 1.113$, non-spontaneous
- D. 5.678 spontaneous

Answer: A

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37.



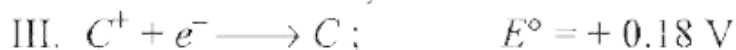
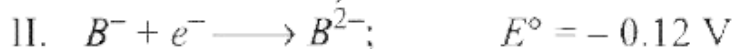
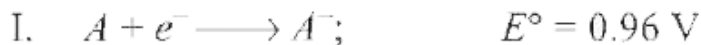
the above equation balances when

- A. $a=2$, $b=4$, $c=6$ and $x=2$, $y=6$, $z=3$
- B. $a=4$, $b=2$, $c=6$ and $x=6$, $y=2$, $z=3$
- C. $a = 6$, $b=4$, $c = 2$ and $x = 6$, $y = 3$, $z = 2$
- D. $a = 1$, $b = 4$, $c = 6$ and $x=2$, $y = 6$, $z = 3$

Answer: D

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38. Consider the following half-cell reactions.



What combination of two half-cells would result in a cell with the largest potential?

A. I and II

B. I and III

C. I and IV

D. II and IV

Answer: C



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39. MnO_4^- ions are reduced in acidic condition to Mn^{2+} ions whereas they are reduced in neutral condition to MnO_2 . The oxidation of 25 mL of a solution X containing Fe^{2+} ions required in acidic condition 20 mL of a solution Y containing MnO_4^- ions. What volume of solution Y would be required to oxidise 25 mL of solution X containing Fe^{2+} ions in neutral condition?

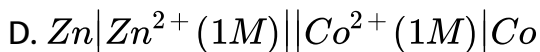
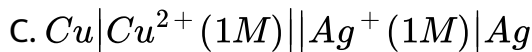
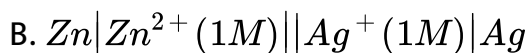
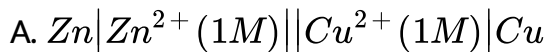
- A. 11.4 mL
- B. 12.0 mL
- C. 33.3 mL
- D. 35.0 mL

Answer: C



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40. The standard reduction potential of Ag, Cu, Co and Zn are 0.799, 0.337, -0.277 and 0.762 V respectively. Which of the following cells will have maximum cell emf?

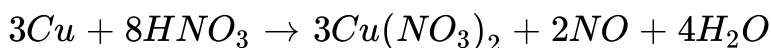


Answer: B



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41. The equivalent weight of HNO_3 (molecular weight = 63) in the following reaction is



A. $\frac{4 \times 68}{3}$

B. $\frac{63}{5}$

C. $\frac{63}{3}$

D. $\frac{63}{8}$

Answer: A



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42. Consider the following experimental facts. I. When Cl_2 gas is passed into KI solution containing $CHCl_3$, violet colour appears in $CHCl_3$ layer. II. When Cl_2 gas is passed into KBr solution containing $CHCl_3$, orange colour appears in $CHCl_3$ layer. III. When Br_2 gas is passed into KI solution containing $CHCl_3$, violet colour appears in $CHCl_3$ layer. Select the correct experimental facts.

A. I and II

B. I and III

C. II and III

D. I, II and III

Answer: D



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43. Li occupies higher position in the electrochemical series of metals as compared to Cu since

A. the standard reduction potential Li^+/Li is lower than that of Cu^{2+}/Cu

B. the standard reduction potential of Cu^{2+}/Cu is lower than that of Li^{2+}/Li

- C. the standard oxidation potential of Li^{2+}/Li is lower than that of Cu/Cu^{2+}
- D. Li is smaller in size as compared to Cu.

Answer: A



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44. The emf of the cell,

$Zn|Zn^{2+}(0.05M)||Fe^{2+}(0.002M)Fe$ at $298K$ is 0.2957 V then the value of equilibrium constant for the cell reaction is

- A. $e^{\frac{0.34}{0.0295}}$
- B. $10^{\frac{0.34}{0.0295}}$
- C. $10^{\frac{0.25}{0.0295}}$
- D. $10^{\frac{0.25}{0.0591}}$

Answer: B



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45. 3.92 g//L of a sample of ferrous ammonium sulphate reacts completely with 50 mL $\frac{N}{10}$ $KMnO_4$ solution the percentage purity of the sample is

A. 50

B. 78.4

C. 80.0

D. 39.2

Answer: A



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46. Which of the following statements is/are correct regarding the given reaction?



A. Cu in Cu_3P is oxidised to Cu^{2+} and P in Cu_3P is also oxidised to PO_4^{3-}

B. Cu in Cu_3P is oxidised to Cu^{2+} whereas P in Cu_3P is reduced to H_3PO_4

C. 11 electrons are involved in the conversion of Cu_3P to Cu^{2+} and H_3PO_4

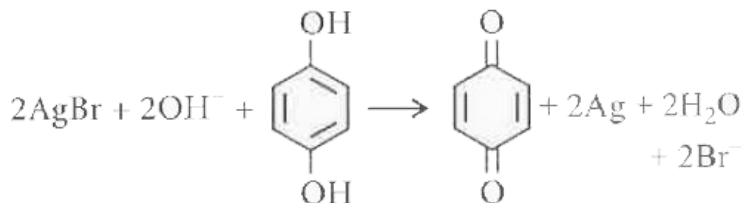
D. the value of X is 6.

Answer: A::C::D



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47. Photographic paper is developed with alkaline hydroquinone.



select the correct statements

- A. Hydroquinone is the oxidant.
- B. Ag^+ is the oxidant.
- C. Br is the oxidant.
- D. Ag^+ is the reductant.

Answer: B



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48. Which of the following elements show fractional oxidation state in any of their compounds?

A. P

B. Cl

C. I

D. N

Answer: C::D



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49. When Cl_2 is passed through hot NaOH, oxidation number of Cl changes from

A. -1 "to" 0

B. 0 to -1

C. 0 to +7

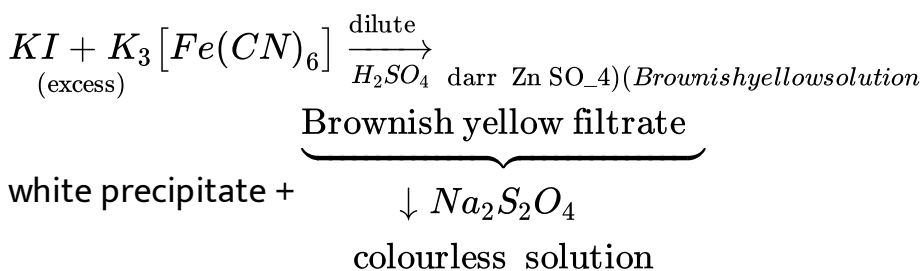
D. 0 to +5

Answer: B::D



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50. For the given reactions, which of the following statements are true?



A. The first reaction is a redox reaction.

B. White precipitate is of $Zn_3 [Fe(CN)_6]_2$

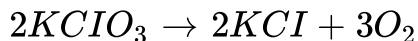
C. Addition of starch solution to filtrate gives blue colour.

D. White precipitate is soluble in NaOH solution.

Answer: A::C::D

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51. Which of the following statements are not true about the following decomposition reaction?



A. Potassium is undergoing oxidation.

B. Chlorine is undergoing oxidation.

C. Oxygen is reduced

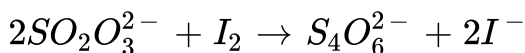
D. None of the species are undergoing oxidation or reduction.

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



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52. Consider the follow redox reaction and select the correct option (s).



A. $S_2O_3^{2-}$ gets reduced to $S_4O_6^{2-}$

B. $S_2O_3^{2-}$ gets oxidised to $S_4O_6^{2-}$

C. I_2 gets reduced to I^-

D. I_2 gets oxidised to I^-

Answer: B::C



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53. The oxidation number of Mn is +2 in

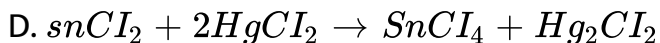
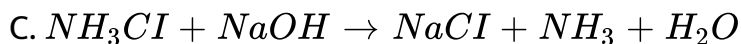
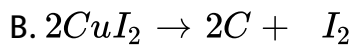
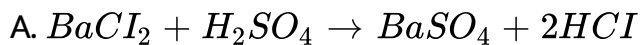
- A. manganese oxide
- B. manganese chloride
- C. manganese sulphate
- D. potassium permanganate

Answer: A::B::C



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54. Which of the following are redox reactions?



Answer: B::D

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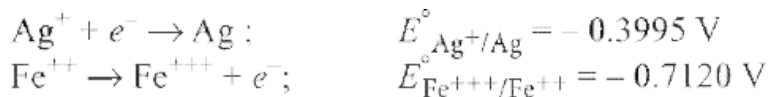
55. Oxidation number of carbon is correctly given for

- A. Compound O.No.
 $HN \equiv C$ +2
- B. Compound O.No.
 $H - C \equiv N$ +4
- C. Compound O.No.
 CCl_4 +4
- D. Compound O.No.
 $C_6H_{12}O_6$ 0

Answer: A::C::D

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1. The two half cell reactions of an electrochemical cell is given as



the value of cell EMF will be

A. $-0.3125V$

B. $0.3125V$

C. $1.114V$

D. $-1.114V$

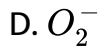
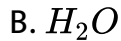
Answer: B



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2. In aqueous alkaline solution, two electron reduction of HO_2^-

gives



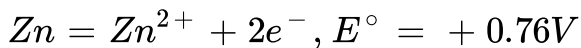
Answer: A



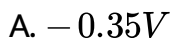
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3. given the standard half -cell potentials (E°) of the following as

:



then the standard e,m,f of the cell with the reaction



B. $+0.35V$

C. $+1.17V$

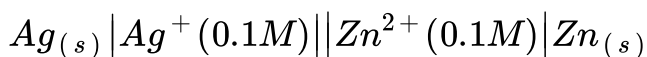
D. $-1.17V$

Answer: B



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4. At temperature of 298 K the emf of the following electrochemical cell



will be (given $E_{cell}^{\circ} = -1.562V$)

A. $-1.532V$

B. $-1.503V$

C. $1.532V$

D. $-3.06V$

Answer: A



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5. The formal potential of Fe^{3+} / Fe^{2+} in a sulphuric acid and phosphoric acid mixture ($E^\circ = +0.61V$) is much lower than the standard potential ($E^\circ = +0.77V$). This is due to

- A. formation of the species $[FeHPO_4]$
- B. lowering of potential upon complexation
- C. formation of the species $[FeSO_4]^+$
- D. high acidity of the medium

Answer: A::B



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