ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

SOLUTION-29(CLASS-12)

TOPIC- ELECTROCHEMISTRY

SUBTOPIC- ELECTROCHEMICAL CELL

SUBJECT – CHEMISTRY **F.M. - 15**

DURATION – 30 mins **DATE -25.06.20**

1.1 **Li occupies higher position in the electrochemical series of metals as compared to Cu since-**

(a) The standard reduction potential of 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^+/Li

(c) The standard oxidation potential of Li/Li^+ is lower than that of Cu/Cu^{2+}

(d) Li is smaller in size as compared to Cu

Ans. a

1.2 **The standard reduction potential E^o for half reactions are-**

$Zn = Zn^{2+} + 2e$ $E^o = +0.76$ V

$Fe = Fe^{2+} + 2e$ $E^o = +0.41$ V

The EMF of the cell reaction $Fe^{2+} + Zn = Zn^{2+} + Fe$ is-

(a) – 0.35 V (b) + 0.35 (c) + 1.17 V (d) – 1.17 V

Ans. b

1.3 **Consider the following cell reaction:**

$2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$; $E° = 1.67$ V

At $[Fe^{2+}] = 10^{-3}$ M, P (O_2) = 0.1 atm and pH = 3, the cell potential at 25°C is-

Ans. d

(a) 1.47 V (b) 1.77 V (c) 1.87 V (d) 1.57 V

1.4 **The reduction potential of hydrogen half-cell will be negative if:**

(a) $p(H_2) = 2$ atm and $[H+] = 2.0$ M

(b) $p(H_2) = 1$ atm and $[H+] = 2.0$ M

(c) $p(H_2) = 1$ atm and $[H+] = 1.0$ M

(d) $p(H_2) = 2$ atm and $[H+] = 1.0$ M

Ans. d

1.5 **Given $E^{\circ}_{Fe^{3+}/Fe} = -0.036$ V, $E^{\circ}_{Fe^{2+}/Fe} = -0.439$ V . The value of standard electrode potential for the change, $Fe^{3+} + e^- \longrightarrow Fe^{2+}$ will be-**

(a) –0.072 V (b) 0.385 V (c) 0.770 V (d) –0.270 V

Ans. c

1.6 **Hydrogen gas is not liberated when the following metal is added to dilute HCl-**

a) Mg b) Sn c) Ag d) Zn

Ans. c

1.7 **Given** $E^{\circ}_{Cr^{3+}/Cr} = -0.72V, E^{\circ}_{Fe^{2+}/Fe} = -0.42$ **V**

The potential for the cell

Cr / Cr^{3+} (0.1 M) || Fe^{2+} (0.01 M) | Fe is-

(a) –0.26 V (b) 0.26 V (c) 0.339 V (d) –0.339 V

Ans. b

1.8 **Given the data at 25°C, Ag + I– → AgI + e– ; E^{o} = 0.152 V**

Ag → Ag^{+} + e–; E^{o} = –0.800 V What is the value of log K_{sp} for AgI?

$\left(2.303\frac{RT}{F} = 0.059V\right)$

(a) –8.12 (b) +8.612 (c) –37.83 (d) –16.13

Ans. d

1.9 **The hydrogen electrode is dipped in a solution of pH 3 at 25°C. The potential would be (the value of 2.303 RT/F is 0.059 V)** -

(a) 0.177 V (b) 0.087 V (c) 0.059 V (d) –0.177 V

Ans. d

1.10 **The rusting of iron takes place as follows:**

$2H^{+}$ + 2e- + $0.5O_2$ $\longrightarrow H_2O$ (l); E° = +1.23 V

Fe^{2+} + 2e- $\longrightarrow$ Fe(s); E° = -0.44 V

Calculate ΔG° for the net process-

a) -322 kJ mol^{-1} b) -161 kJ mol^{-1} c) -152 kJ mol^{-1} d) -76 kJ mol^{-1}

Ans. a

1.11 **Zn | Zn^{2+} (a = 0.1M) || Fe^{2+} (a = 0.01M)|Fe. The emf of the above cell is 0.2905 V. Equilibrium constant for the cell reaction is-**

a) $10^{0.32/0.0591}$ b) $10^{0.32/0.0295}$ c) $10^{0.26/0.0295}$ d) $e^{0.32/0.295}$

Ans. b

1.12 **The** $E^{\circ}_{M^{3+}/M^{2+}}$ **values of Cr, Mn, Fe and Co are -0.41, + 1.57, +0.77 and +1.97 V respectively. For which one of these metals the change in oxidation state from +2 to +3 is easiest?**

a) Cr b) Mn c) Fe d) Co

Ans. a

1.13 **In case of gaseous components during an electrochemical cell reaction-**

(a) Partial pressure is considered

(b) Molarity is considered

(c) Normality is considered

(d) None of these

Ans. a

1.14 **Function of an electrolytic cell is to-**

a) Convert chemical energy into electrical energy
b) Convert electrical energy into chemical energy
c) Convert kinetic energy into potential energy
d) None of these
Ans. b

1.15 **Example of an electrochemical cell-**
a) Voltaic cell
b) Daniel cell
c) Voltameter
d) Both a and b
Ans. d

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