ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

WORKSHEET-31(CLASS-12)

TOPIC- ELECTROCHEMISTRY

SUBTOPIC- ELECTROCHEMICAL CELL

SUBJECT – CHEMISTRY

DURATION – 30 mins

F.M. - 15

DATE -27.06.20

1.1 **E_1, E_2 and E_3 are the e.m.f. values of the three galvanic cells respectively-**

(a) $Zn\,|\,Zn^{+2}_{1M}\,||\,Cu^{+2}_{0.1M}\,|\,Cu$

(b) $Zn\,|\,Zn^{+2}_{1M}\,||\,Cu^{+2}_{1M}\,|\,Cu$

(c) $Zn\,|\,Zn^{+2}_{0.1M}\,||\,Cu^{+2}_{1M}\,|\,Cu$

Which one of the following is true?

(a) $E_2 > E_3 > E_1$(b) $E_3 > E_2 > E_1$(c) $E_1 > E_2 > E_3$ (d) $E_1 > E_3 > E_2$

1.2 **The standard e.m.f. of galvanic cell involving 3 moles of electrons in its redox reaction is 0.59 V. The equilibrium constant for the reaction of the cell is-**

(a)10^{25}(b) 10^{20}(c) 10^{15}(d) 10^{30}

1.3 **The potential of a hydrogen electrode at pH = 10 is-**

(a) 0.59 V(b) 0.00 V(c) –0.59 V(d) –0.059 V

1.4 **For the reduction of silver ions with copper metal the standard cell potential was found to be +0.46V at 25°C. The value of standard Gibbs energy, ΔG° will be (F = 96500 C mol^{-1})-**

(a) –44.5 kJ (b) –98.0 kJ (c) –89.0 kJ (d) –89.0 J

1.5 **Which of the following statement is correct?**

(a) E_{Cell} and Δ_rG of cell reaction both are extensive properties.

(b) E_{Cell} and Δ_rG of cell reaction both are intensive properties.

(c) E_{Cell} is an intensive property while Δ_rG of cell reaction is an extensive property.

(d) E_{Cell} is an extensive property while Δ_rG of cell reaction is an intensive property.

1.6 $E^{\ominus}_{Cell}$ **= 1.1V for Daniel cell. Which of the following expressions are correct description of state of equilibrium in this cell?**

(*a*) $1.1 = K_c$

(*b*) $\frac{2.303RT}{2F} \log K_c = 1.1$

(*c*) $\log K_c = \frac{2.2}{0.059}$

(*d*) $\log K_c = 1.1$

1.**The Gibbs energy for the decomposition of Al_2O_3 at 500°C is as follows:**

$\frac{2}{3} Al_2O_3 \rightarrow \frac{4}{3} Al + O_2$, $\Delta_r G = +966$ kJ mol^{-1}

The potential difference needed for electrolytic reduction of Al_2O_3 at 500°C is at least:

a) 2.5 V b) 5.0 V c) 4.5 V d) 3.0 V

1.8 **The highest electrical conductivity of the following aqueous solutions is of-**

(a) 0.1 M acetic acid (b) 0.1 M chloroacetic acid (c) 0.1 M fluoroacetic acid(d) 0.1 M difluoroacetic acid

1.9 **Saturated solution of KNO_3 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

1.10 **For the electrochemical cell:**

M | M+ ||X- | X, E° [M+ | M] = 0.44 V and

E° [X | X-] = 0.33 V.

From the data one can deduce that-

(a) M + X → M+ + X- is the spontaneous reaction (b) M+ + X- → M + X is the spontaneous reaction
(c) Ecell = 0.77 V (d) Ecell = -0.77 V

[Given F = 96500 (mol^{-1}); R = 8.314 JK^{-1} mol^{-1}]

1.11**An electrochemical cell can behave like an electrolytic cell when –**

(a) E_{cell} = 0(b) E_{cell} >Eext(c) E_{ext} >E_{cell}(d) E_{cell} = E_{ext}

1.12**Which cell will measure standard electrode potential of copper electrode?**

(a) Pt (s) | H_2 (g,0.1 bar) | H^+ (aq.,1 M) || Cu^{2+}(aq.,1M) | Cu

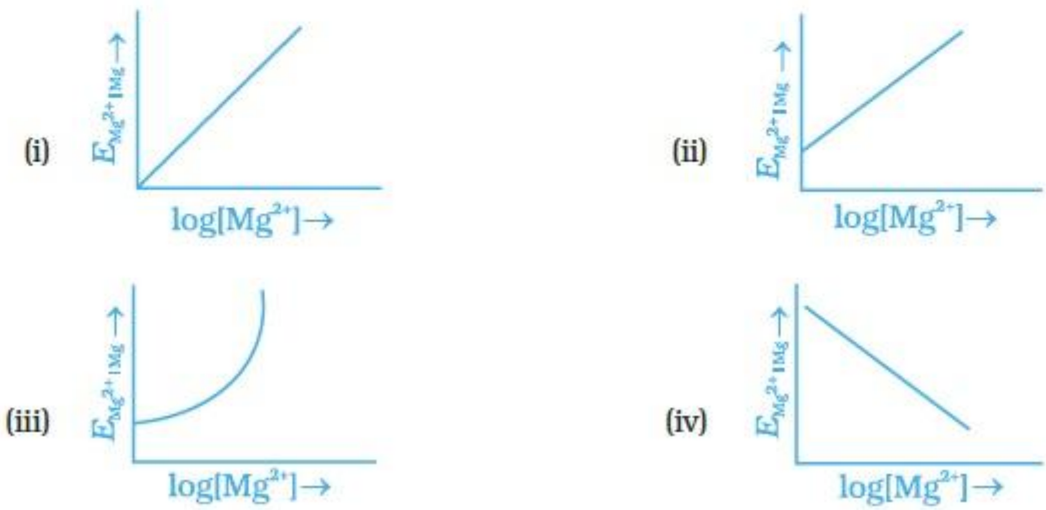
(b) Pt(s) | H_2 (g, 1 bar) | H^+ (aq.,1 M) || Cu^{2+} (aq.,2 M) | Cu

(c) Pt(s)| H_2 (g, 1 bar) | H^+ (aq.,1 M) || Cu^{2+} (aq.,1 M) | Cu

(d) Pt(s) | H_2 (g, 1 bar) | H^+ (aq.,0.1 M) || Cu^{2+} (aq.,1 M) | Cu

1.13

$E_{Mg^{2+}|Mg} = E^{\ominus}_{Mg^{2+}|Mg} - \frac{0.059}{2} \log \frac{1}{[Mg^{2+}]}$. The graph of $E_{Mg^{2+}|Mg}$ vs $\log [Mg^{2+}]$ is



1.14**Using the data given below find out the strongest reducing agent.**

$E^{\ominus}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$ $E^{\ominus}_{Cl_2/Cl^-} = 1.36V$

$E^{\ominus}_{MnO_4^-/Mn^{2+}} = 1.51V$ $E^{\ominus}_{Cr^{3+}/Cr} = -0.74V$

a) Cl^-b) Crc) Cr^{3+}d)Mn^{2+}

1.15 **The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called-**

a) Cell potentialb) Cell e.m.fc) Potential differenced)Cell voltage

PREPARED BY: MR. ARNAB PAUL CHOWDHURY