DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 6

Topic :- Electro Chemistry

1 **(b)**

Electrode potential of cell must be positive for spontaneous reaction.

$Zn^{2+} \longrightarrow Zn$; $E^{\circ} = -0.76\ V$

$Cu^{2+} \longrightarrow Cu$; $E^{\circ} = -0.34\ V$

Redox reaction is

$$\begin{array}{ll} Zn \rightarrow Zn^{2+} + 2e^{-} & \text{(oxidation)} \\ Cu^{2+} + 2e^{-} \rightarrow Cu & \text{(reduction)} \\ \hline Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu & \\ \hline \end{array}$$

$E_{\text{cell}} = E^{\circ}_{\text{cathode}} - E^{\circ}_{\text{anode}}$

$= -0.34 - (-0.76)$

$= +0.42\ V$

E_{cell} is positive , so above reaction is feasible.

2 **(c)**

Among given elements, D has the minimum reduction potential (- 2.37 V) hence, it can displace all other from their salts.

3 **(a)**

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

Oxidation half-cell; $Cr \rightarrow Cr^{3+} + 3e^{-} \times 2$

Reduction half-cell; $Fe^{2+} + 2e^{-} \rightarrow Fe \times 3$

Net cell reaction;

$2Cr + 2Fe^{2+} \rightarrow 2Cr^{3+} + 3Fe \quad (n = 6)$

$E^{\circ}_{\text{cell}} = E^{\circ}_{\text{oxidation}} - E^{\circ}_{\text{reduction}}$

$= 0.72 - 0.42$

$= 0.30\ V$

$$E^{\circ}_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0591}{n} \log \frac{[Cr^{3+}]^2}{[Fe^{2+}]^3}$$

$$= 0.30 - \frac{0.0591}{6} \log \frac{(0.1)^2}{(0.01)^3}$$

$$= 0.30 - \frac{0.0591}{6} \log \frac{10^{-2}}{10^{-6}}$$

$$= 0.30 - \frac{0.0591}{6} \log 10^4$$

$$E_{\text{cell}} = 0.2606\ V$$

4 **(c)**

A thin film of Cr_2O_3 is formed on Cr Surface.

5 **(b)**

The unit of electrochemical equivalent (Z) is g/C.

$$w = Z.i.t$$

$$\therefore \quad Z = \frac{w}{i.t} \text{ g}/C$$

6 **(d)**

The elements which are below H_2 in electrochemical series, cannot displace H_2 .

$\because$Out of Li^+, Sr^{2+}, Al^{3+} and Ag^+, Ag^+ is below H_2 in electrochemical series,

so Ag^+ cannot displace H_2.

7 **(b)**

As the reduction potential of Zn is less than that of Ag, hence Zn will act as anode when Acell is made using them.

Hence , the correct reaction will be

$$\text{Zn(s)} \rightarrow \text{Zn}^{2+}\text{(aq)} + 2\text{e}^- \quad \text{(oxidation)}$$

$$2\text{Ag}^+ (aq) + 2e^- \rightarrow 2\text{Ag} (s)$$

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

8 **(a)**

$W \propto i \times t$ and $W = Z \times i \times t$.

9 **(b)**

$$\text{Cell constant} = \frac{k}{\text{C}} = 0.0212 \times 55$$

$$= 1.166 \text{ cm}^{-1}$$

10 **(c)**

Reducing power, *ie*, the tendency to lose electrons increases as the reduction potential decreases

11 **(a)**

1. Reducing character $\propto \dfrac{1}{\text{reduction potentials}}$
2. Oxidizing power of halogen decreases from F_2 to I_2 because their reduction potentials decreases from fluorine to iodine.
3. The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide since, the stability of the $H - X$ bond decreases in the same order. Hence, all statements are correct.

12 **(d)**

If $E^\circ = 0$, then $\Delta G^\circ = -nE^\circ F = 0$.

13 **(d)**

$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$

$\therefore \quad 2.46 = (+0.80) - E^\circ_{\text{Al}^{3+}/\text{Al}}$

Or $E^\circ_{\text{Al}^{3+}/\text{Al}} = 0.80 - 2.46 = -1.66$ V

14 **(d)**

$E°$ for reaction in (d) $= E^{\circ}_{OP_{\text{Br}}} + E^{\circ}_{RP_1} = -1.09 + (-0.54)$

$= -1.63\ \text{V}$

Since, $E°$ is negative and thus, reaction is non-spontaneous.

16 **(b)**

$\Delta G° = -nFE°$

$\Delta G° = -2.303\ RT\ \log K_c$

$\therefore nFE° = 2.303\ RT \log K_c$

$$\log K_c = \frac{nFE°}{2.303\ RT}$$

$$= \frac{2 \times 96500 \times 0.295}{2.303 \times 8.314 \times 298}$$

$\log K_c = 9.97$

$\therefore K_c = 1 \times 10^{10}$

17 **(c)**

The molar conductivity of potassium hexacyanoferrate (II)

i.e., $K_4[Fe(CN)_6]$ is highest because it gives maximum number of ions on ionization.

$K_4[Fe(CN)_6] \longrightarrow 4K^+ + [Fe(CN)_6]^{4-}$

19 **(a)**

The metals having higher negative value of standard reduction potential are placed above hydrogen in electrochemical series. The metals places above hydrogen has a great tendency to donate electrons or oxidising power. The metals having great oxidizing power are strongest reducing agent. Zn has higher negative value of standard reduction potential. Therefore, it is the strongest reducing agent.

20 **(d)**

$w = 60\ \text{g}$

$i = 5\text{A}$

Equivalent weight of Ca $= \frac{\text{atomic weight}}{\text{valency}}$

$$= \frac{40}{2} = 20$$

According to first law of Faraday electrolysis

$$w = Zit = \frac{\text{equivalent weight}}{96500} \times i \times t$$

$$\therefore 60 = \frac{20}{96500} \times 5 \times t$$

$$t = \frac{96500 \times 60}{20 \times 5}\ s$$

$$= \frac{96500 \times 60}{20 \times 5 \times 60 \times 60}\ \text{h}$$

$= 16.08\ \text{h}$

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**B**	**C**	**A**	**C**	**B**	**D**	**B**	**A**	**B**	**C**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**A**	**D**	**D**	**D**	**C**	**B**	**C**	**A**	**A**	**D**