Saitech Informatics

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REDOX REACTIONS

Class 11 - Chemistry

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 45**

1. Define reduction reaction. **[1]**
2. Following cell is set up between copper and silver electrodes. **[1]**

   $Cu|Cu^{2+}(aq)||Ag^{+}(aq)|Ag$

   If its two half-cells work under standard conditions, calculate the emf of the cell.

   [Given $E^{\circ}_{Cu^{2+}/Cu}$ = +0.34 V, $E^{\circ}_{Ag^{+}/Ag}$ = +0.80V]
3. Name one strongest oxidizing agent? **[1]**
4. What is the most essential condition that must be satisfied in a redox reaction? **[1]**
5. Define disproportionation reaction. **[1]**
6. Define oxidation reaction. **[1]**
7. Define an oxidizing agent. Name the best oxidizing agent. **[1]**
8. Does the oxidation number of an element in any molecule or any polyatomic ion represent the actual charge on it? **[1]**
9. What is the oxidation number of Mn in $KMnO_4$? **[1]**
10. Represent a galvanic cell in electrode and ions containing Cu electrode dipped in molar solution of copper sulphate and silver electrode dipped in molar solution of silver nitrate. **[1]**

    [Given $E^{\circ}_{Cu^{2+}/Cu(s)}$ = 0.34 V, $E^{\circ}_{Ag^{+}/Ag(s)}$ = 0.80 V]
11. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^{+}(aq) \longrightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place, Further show: **[3]**

    i. which of the electrode is negatively charged,

    ii. the carriers of the current in the cell, and

    iii. individual reaction at each electrode.
12. Using Stock notation, represent the following compounds: $HAuCl_4$, Tl_2O, FeO, Fe_2O_3, CuI, CuO, MnO, and MnO_2. **[3]**
13. In the reactions given below, identify the species undergoing oxidation and reduction. **[3]**

    i. $H_2S(g) + CI_2(g) \rightarrow 2HCl(g) + S(s)$

    ii. $3Fe_3O_4(s) + 8\ AI(s) \rightarrow 9\ Fe(s) + 4Al_2O_3(s)$

    iii. $2Na\ (s) + H_2(g) \rightarrow 2NaH(s)$
14. Decide whether each of the following reaction involves oxidation reduction reaction or not. If it does, identify which species is oxidised and which gets reduced? **[3]**

    i. $4CH_3\overset{O}{\overset{||}{C}}CH_3 + LiAIH_4 + 4H_2O \rightleftharpoons 4\,CH_3\overset{O}{\overset{||}{C}}HCH_3 + LiOH + AI(OH)_3$

ii. $CH_3CH_2OH \xrightarrow{H_2O_4} CH_2 = H_2 + H_2O$

iii. $CH_3\overset{O}{\overset{||}{C}}OH + CH_3NH_2 \rightleftharpoons CH_3\overset{O}{\overset{||}{C}}O^- + CH_3NH_3^+$

15. Justify giving reactions that among halogens, fluorine is the best oxidant and among hydrohalic compounds, hydroiodic acid is the best reductant. **[3]**

16. Using the standard electrode potentials given below, predict if the reaction between the following is feasible or not. **[5]**

i. Fe^{3+} (aq) and I^- (aq)

ii. Ag^+ (aq) and Cu(s)

iii. Fe^{3+} (aq) and Cu(s)

iv. Ag(aq) and Fe^{3+} (aq)

v. Br_2(aq) and Fe^{2+} (aq)

17. Suggest a scheme of classification of the following redox reactions **[5]**

a. N_2 (g) + O_2 (g) $\longrightarrow$ 2 NO (g)

b. $2Pb(NO_3)_2(s) \longrightarrow 2PbO(s) + 4\ NO_2\ (g) + O_2\ (g)$

c. $NaH(s) + H_2O(l) \longrightarrow NaOH(aq) + H_2\ (g)$

d. $2NO_2(g) + 2OH^-\ (aq) \longrightarrow NO_2^-(aq) + NO_3^-(aq) + H_2O(l)$

18. Chlorine is used to purify drinking water. Excess of chlorine is harmful. The excess of chlorine is removed by treating with sulphur dioxide. Present a balanced equation for this redox change taking place in water. **[5]**

19. Suggest a list of the substances where carbon can exhibit oxidation states from -4 to +4 and nitrogen from -3 to +5. **[5]**