Chemistry - Dulan Madurange

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General Certificate Of Education (Adv. Level) Examination, August 2023

| රසායන විද්‍යාව I Chemistry I | 02 | S/E | I |

Universal gas constant $R = 8.314 \, J \, K^{-1} \, mol^{-1}$ Plank's constant $h = 6.626 \times 10^{-34} J \, s$

Avogadro constant $N_A = 6.022 \times 10^{23} \, mol^{-1}$ Velocity of light $c = 3 \times 10^8 m \, s^{-1}$

Introduction to Paper Class 05 -2023 A/L

1. Which one of the following is an oxidation-reduction reaction?

   (1) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$

   (2) $CaCO_3 \rightarrow CaO + CO_2$

   (3) $N_2O \rightarrow 2NO_2$

   (4) $Ca(COO)_2 \rightarrow CaCO_3 + CO$

   (5) $CO_2 + H_2O \rightarrow H_2CO_3$

2. In the reaction between $Cr_2O_7^{2-}$ and H_2O_2 in an acidic medium, H_2O_2 is **oxidised** to O_2 and $Cr_2O_7^{2-}$ is converted to Cr^{3+} The correct equation for this reaction is

   (1) $Cr_2O_7^{2-} + 8H^+ + H_2O_2 \longrightarrow 2Cr^{3+} + 5H_2O + O_2$

   (2) $Cr_2O_7^{2-} + 8H^+ + 3H_2O_2 \longrightarrow 2Cr^{3+} + 7H_2O + 3O_2$

   (3) $Cr_2O_7^{2-} + 8H^+ + 5H_2O_2 \longrightarrow 2Cr^{3+} + 9H_2O + 5O_2$

   (4) $Cr_2O_7^{2-} + 8H^+ + 7H_2O_2 \longrightarrow 2Cr^{3+} + 11H_2O \quad 7O_2$

   (5) $Cr_2O_7^{2-} + 8H^+ + 9H_2O_2 \longrightarrow 2Cr^{3+} + 13H_2O + 9O_2$

3. Acidified MnO_4 reacts with H_2O_2 producing O_2, Mn^{2+} and H_2O only. The number of moles of MnO_4^- required for the complete reaction of one mole of H_2O_2 in an acidified medium is

   (1) 0·4   (2) 0·8   (3) 2·0

   (4) 2·5   (5) 5·0

4. The number of moles of $KMnO_4$ that is required to react completely with 1 mole of iron(II) oxalate (FeC_2O_4) in acidic medium is

   (1) 5   (2) 3   (3) $\frac{5}{3}$ (4) $\frac{3}{5}$ (5) $\frac{1}{5}$

5. which of the following conversions is/are neither an oxidation nor a reduction?

   (a) $N_2O_3 \longrightarrow N_2O$

   (b) $CrO_4^{2-} \longrightarrow Cr_2O_7^{2-}$

   (c) $ClO^- \longrightarrow Cl^-$

   (d) $SO_3 \longrightarrow SO_4^{2-}$

6. In the reaction,

$$2NO_2(g) + H_2O(l) \rightarrow HNO_3(aq) + HNO_2(aq)$$

(1) nitrogen undergoes oxidation only.
(2) nitrogen undergoes reduction only.
(3) nitrogen undergoes both oxidation and reduction.
(4) there is no change in the oxidation state of nitrogen.
(5) water acts both as an oxidising agent and as a reducing agent.

7. By treating industrial waste water with OCl^- in alkaline medium, cyanide ions in waste water are converted to N_2 and carbonate ions according to the following equation.

$$2\ CN^- + 5\ OCl^- + 2\ OH^- \longrightarrow 2CO_3^{2-} + N_2 + 5\ Cl^- + H_2O$$
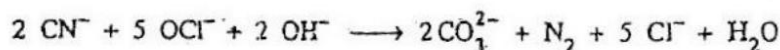
Which of the following statement(s) is/are true regarding this reaction
(a) Oxidation number of oxygen in OCl is changed from 0 to –2
(b) Oxidation number of carbon is changed from +2 to +4
(c) Oxidation number of nitrogen is changed from –3 to 0
(d) Oxidation number of chlorine is changed from + 1 to –1

8. The total number of electrons exchanged in the reaction of the oxidation of ethanol (C_2H_5OH) to acetic acid (CH_3COOH) using acidic $K_2Cr_2O_7$ solution is,
(1) 6   (2) 8   (3) 10   (4) 12   (5) 14

9. One mole of N_2H_4 forms the compound Y by removing 10 moles of electrons. If all the "N" atoms in the initial compound are present in compound Y, what is the oxidation number of a "N" atom in Y?
(1) -3   (2) -2   (3) +1   (4) +3   (5) +5

10. Products of reaction between hydroxyl amine (NH_2OH) and Fe^{3+} are given below.

$$NH_2OH + Fe^{3+} \longrightarrow N_2O + Fe^{2+} + H^+ + H_2O$$
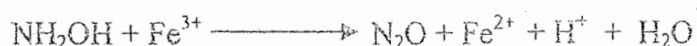
(i) Write oxidation half ionic equation.

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(ii) Write the reduction half ionic equation.

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(iii) Balance the above equation.

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*********************** **17.02.2022** ******************************