Redox Reactions

SET Self Evaluation Test - 13

1. When a piece of wire of copper is dipped in $AgNO_3$ solution, the colour of the solution turns blue due to **[MP PMT 1992; JIPMER 2002]**

(a) Formation of soluble complex
(b) Oxidation of copper
(c) Oxidation of silver
(d) Reduction of copper

2. HBr and HI can reduce H_2SO_4, HCl can reduce $KMnO_4$ and HF can reduce **[IIT 1981]**

(a) H_2SO_4 (b) $KMnO_4$
(c) $K_2Cr_2O_7$ (d) None of the above

3. Consider the following statements :
In the chemical reaction
$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$
(1) Manganese ion is oxidised
(2) Manganese ion is reduced
(3) Chloride ion is oxidised
(4) Chloride ion is reduced
Which of these statements are correct **[NDA 1999]**

(a) 1 and 3 (b) 1 and 4
(c) 2 and 3 (d) 2 and 4

4. The oxide which cannot act as a reducing agent is **[CBSE PMT 1995; AIIMS 2000; JIPMER 2002; Kurukshetra CEE 2002]**

(a) SO_2 (b) NO_2
(c) CO_2 (d) ClO_2

5. In the reaction between ozone and hydrogen peroxide, H_2O_2 acts as **[RPET 2000]**

(a) Oxidising agent
(b) Reducing agent
(c) Bleaching agent
(d) Both oxidising and bleaching agent

6. The oxidation state of each oxygen atom in Na_2O_2 is **[NCERT 1971]**

(a) – 2 each (b) – 2 and zero
(c) – 1 each (d) None of the above

7. The oxidation state of sulphur in SO_4^{2-} is **[Bihar MEE 1996]**

(a) 4 (b) 2
(c) 6 (d) – 6

8. The charge on cobalt in $[Co(CN)_6]^{3-}$ is **[CPMT 1985, 93]**

(a) – 6 (b) – 3
(c) + 3 (d) + 6

9. Oxidation number of S in Na_2SO_4 is **[CPMT 1989]**

(a) – 2 (b) + 2
(c) – 6 (d) + 6

10. A metal ion M^{3+} after loss of three electrons in a reaction will have an oxidation number equal to **[CPMT 1980, 83, 84, 94, 99]**

(a) Zero (b) + 2
(c) + 3 (d) + 6

11. Oxidation number of oxygen in ozone (O_3) is **[MP PET 2000; MP PMT 2001]**

(a) + 3 (b) – 3
(c) – 2 (d) 0

12. The oxidation states of sulphur in the anions $SO_3^{2-}, S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order **[CBSE PMT 2003]**

(a) $S_2O_6^{2-} < S_2O_4^{2} < SO_3^{2-}$ (b) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$
(c) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$ (d) $S_2O_4^{2} < S_2O_6^{2-} < SO_3^{2-}$

13. The oxidation number of hydrogen in LiH is

(a) + 1 (b) – 1
(c) 2 (d) 0

14. Which of the following is not a redox reaction **[RPMT 1999]**

(a) $2Rb + 2H_2O \rightarrow 2RbOH + H_2$
(b) $2CuI_2 \rightarrow 2CuI + I_2$
(c) $2H_2O_2 \rightarrow 2H_2O + O_2$
(d) $4KCN + Fe(CN)_2 \rightarrow K_4Fe(CN)_6$

15. Which of the following equations is a balanced one **[EAMCET 1980]**

(a) $5BiO_3^- + 22H^+ + Mn^{2+} \rightarrow 5Bi^{3+} + 7H_2O + MnO_4^-$
(b) $5BiO_3^- + 14H^+ + 2Mn^{2+} \rightarrow 5Bi^{3+} + 7H_2O + 2MnO_4^-$
(c) $2BiO_3^- + 4H^+ + Mn^{2+} \rightarrow 2Bi^{3+} + 2H_2O + MnO_4^-$
(d) $6BiO_3^- + 12H^+ + 3Mn^{2+} \rightarrow 6Bi^{3+} + 6H_2O + 3MnO_4^-$

16. In the equation
$4M + 8CN^- + 2H_2O + O_2 \rightarrow 4[M(CN)_2]^- + 4OH^-$
Identify the metal M **[AFMC 1998]**

(a) Copper (b) Iron
(c) Gold (d) Zinc

17. In alkaline condition $KMnO_4$ reacts as $2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + O$. The equivalent weight of $KMnO_4$ would be (Atomic mass of K = 39, Mn = 55, O = 16) **[MP PMT 2002]**

(a) 158.0 (b) 79.0
(c) 52.7 (d) 31.6

18. In acidic medium, equivalent weight of $K_2Cr_2O_7$ $(mol.\ wt. = M)$ is **[AFMC 1988]**

(a) $M/3$ (b) $M/4$ (c) $M/6$ (d) $M/2$

Answers and Solutions

(SET -13)

1. (b) $2Ag^+ + Cu \rightarrow Cu^{++} + 2Ag^-$; $E^o_{Ag^+/Ag} > E^o_{Cu^{++}/Cu}$.

2. (d) F^- can be oxidised to F_2 only by electrolysis.

3. (c) Because the oxidation state of chlorine is – 4 to 0 while Manganese ion is reduced because its oxidation state + 4 to + 2.

4. (c) CO_2 is a acidic oxide.

5. (b) H_2O_2 acts as a reducing agent in the reaction between O_3 and H_2O_2.

6. (c) In Na_2O_2 oxygen show – 1 oxidation state.

7. (c) $\overset{*}{S}O_4^{2-}$

$x - 2 \times 4 = -2$

$x = 8 - 2 = +6$.

8. (c) In $[Co(CN)_6]^{3-}$ complex Co shows + 3 oxidation state.

9. (d) $Na_2\overset{*}{S}O_4$

$2 + x - 2 \times 4 = 0$

$x = +6$.

10. (d) $M^{3+} \rightarrow M^{6+} + 3e^-$. Thus the oxidation number of metal = + 6.

11. (d) Molecule and free atoms show zero oxidation state O_3 is a molecule shows zero oxidation state.

12. (b) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

Oxi. state of sulphur in $S_2O_4^{2-} = +3$

Oxi. state of sulphur in $SO_3^{2-} = +4$

Oxi state of sulphur in $S_2O_6^{2-} = +5$.

13. (b) $\overset{+1}{Li}\overset{-1}{H}$.

14. (d) In the reaction $4KCN + Fe(CN)_2 \rightarrow K_4Fe(CN)_6$, change in oxidation state is not taking place.

15. (b) $5BiO_3^- + 14H^+ + 2Mn^{2+} \rightarrow 5Bi^{3+} + 7H_2O + 2MnO_4^-$ is the balanced reaction.

16. (c) $4Au + 8CN^- + 2H_2O + O_2 \rightarrow 4[Au(CN)_2]^- + 4OH^-$.

17. (a) $e^- + Mn^{7+} \rightarrow Mn^{6+}$ $\therefore E = \frac{M}{1}$.

18. (c) $Cr_2O_7^{2-} + 14H^+ + 6e \rightarrow 2Cr^{3+} + 7H_2O$

Equivalent weight of $K_2Cr_2O_7$

$= \frac{\text{Molecular Mass}}{6} = \frac{294.2}{6} = \frac{M}{6}$.

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