7-OXIDATION, REDUCTION, RED-OX REACTIONS, TYPES

1) **In the reaction** $CuO + NH_3 \rightarrow Cu + N_2 + H_2O$**, the oxidation number of 'N' changes from**
1) – 2 to 0 2) 0 to + 2 3) – 3 to + 2 4) – 3 to 0

2) **In the reaction** $MnO_4^- \rightarrow MnO_2$**, the number of** OH^- **ions involved in the balanced equation is**
1) 4 2) 6 3) 3 4) 2

3) **In the reaction** $Cr_2O_7^{-2} + NO_2^- + H^+ \rightarrow Cr^{+3} + NO_3^- + H_2O$ **the stoichiometric coefficients of** $Cr_2O_7^{-2}$, NO_2^- & H^+ **respectively are**
1) 1, 3, 8 2) 1, 4, 8 3) 1, 3, 12 4) 1, 15, 12

4) **In the reaction** $NO_2 + H_2O \rightarrow NO_3^- + 2H^+ + ne^-$**, the value of 'n' is**
1) 4 2) 3 3) 2 4) 1

5) **Oxidation state of iron is zero in the complex**
1) $K_4[Fe(CN)_6]$ 2) $[Fe(H_2O)_5]SO_4$ 3) $[Fe(CO)_5]$ 4) $Na_3[Fe(CN)_6]$

6) **In which of the following pair of species, the central atom exhibits same oxidation state**
1) SO_4^{-2}, SO_3^{-2} 2) CrO_4^{-2}, CrO_5 3) MnO_2, MnO_4^{-2} 4) $Cr_2O_7^{-2}, Cr_2O_3$

7) **In the reaction** $MnO_4^- + C_2O_4^{-2} + H^+ \rightarrow Mn^{+2} + CO_2 + H_2O$ **the coefficients of** MnO_4^-, $C_2O_4^{-2}$, Mn^{+2} & CO_2 **are respectively**
1) 1, 5,1,10 2) 2, 5,2,10 3) 2,3,2,6 4) 1, 6,1,12

8) **The element which exhibits only one oxidation state in its compounds is**
1) Cs 2) Cl 3) P 4) Mn

9) **The number of electrons required to balance the following half reaction in basic medium is** $Cl_2 \rightarrow ClO_3^-$.
1) 6 2) 8 3) 10 4) 12

10) $x\ Cr(OH)_3 + y\ H_2O_2 + z\ OH^- \rightarrow a\ CrO_4^{-2} + b\ H_2O$**. The coefficients x, y & z in the above equation are**
1) 1, 2, 3 2) 2, 2, 3 3) 2, 3, 4 4) 3, 2, 4

11) **Which is not redox reaction among the following?**
1) $Cl_2 + 2KI \rightarrow 2KCl + I_2$ 2) $2KClO_3 \rightarrow 2KCl + 3O_2$
3) $H_2 + Cl_2 \rightarrow 2HCl$ 4) $K_2Cr_2O_7 + 2KOH \rightarrow 2K_2CrO_4 + H_2O$

12) **Match the following underlined elements with oxidation numbers**

LIST – I	**LIST – II**
A) H<u>C</u>N	1) + 7
B) <u>Cl</u>F_3	2) + 6
C) H<u>N</u>O_4	3) + 5
D) <u>Cr</u>O_5	4) + 3
	5) + 2

Correct match is

	A	**B**	**C**	**D**
1)	5	1	3	2
2)	4	3	1	5
3)	5	4	3	2
4)	3	1	2	4

13) **Which of the following is correct**

I) Oxidants reduce themselves

II) Reduction involve de electronation

III) Reductants oxidise others

Correct combination is

1) All are correct 2) I and II are correct

3) II and III are correct 4) I and III are correct

14) **The oxidation number of sodium in Na_2 Hg is**

1) + 1 2) + 2 3) + 3 4) Zero

15) **Oxidation numbers of nitrogen in Ammonium nitrite are respectively**

1) + 3, + 5 2) – 3, + 3 3) + 5, - 3 4) + 3, - 5

16) **Oxidation number of nitrogen in Ammonium nitrate are respectively**

1) +3, +5 2) – 3, + 3 3) – 3, +5 4) +3, - 5

17) **In which of the following hydrogen exhibits negative oxidation state**

1) NH_3 2) H_2S 3) C_6H_6 4) CaH_2

18) **The strong reducing agent is**

1) HNO_2 2) H_2S 3) H_2SO_3 4) $SnCl_2$

19) **In the reaction** $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

1) Zn is oxidised in H_2SO_4 2) Hydrogen is oxidised in H_2SO_4

3) Sulphur undergoes reduction in H_2SO_4 4) Sulphur undergoes oxidation in H_2SO_4

20) When Zn is added to $CuSO_4$ solution, Cu is precipitated. It involves

1) Oxidation of Cu^{+2} 2) Reduction of Cu^{+2}

3) Zn is reduced, Cu is oxidised 4) There is neither oxidation nor reduction

21) **Manganate ion is changed to permanganate ion. It is an example of**

1) Oxidation 2) Reduction

3) Neither oxidation nor reduction 4) Disproportionation

22) **Chlorine gas is passed through hot solution of caustic potash then chlorine in the reaction undergoes**

1) Oxidation 2) Reduction

3) Oxidation & Reduction 4) Neither oxidation nor reduction

23) $MnO_4^- + H^+ + S^{-2} \rightarrow Mn^{+2} + H_2O + S$ **, the number of electrons involved during the above transformation**

1) 8 2) 6 3) 10 4) 5

24) **The number of moles of oxalate ions oxidised by one mole of** MnO_4^- **ion is**

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

25) **For the redox reaction** $Cr(OH)_3 + OH^- + IO_3^- \rightarrow CrO_4^{-2} + H_2O + I^-$ **. The correct coefficients of the reactants for the balanced equation are respectively**

1) 1, 5, 1 2) 2, 4, 1 3) 1, 2, 1 4) 2, 6, 2

26)

List – I	**List – II**
A) $P_4 \rightarrow H_2PO_2^-$	I) 2 electrons are involved
B) $CrO_4^{-2} \rightarrow CrO_5$	II) 6 electrons are involved
C) $IO_3^- \rightarrow I^-$	III) 4 electrons are involved
D) $Cl_2 \rightarrow ClO_3^-$	IV) 10 electrons are involved
	V) No electrons are involved

The correct match is

1) A – III, B – V, C – II, D – IV 2) A – IV, B – I, C – V, D – II

3) A – I, B – II, C – III, D – IV 4) A – II, B – III, C – IV, D – V

27) $Cr \xrightarrow{OH^-} \left[Cr(OH)_4\right]^-$ **for the balanced oxidation half reaction the number of electrons and OH^- ions required respectively**

1) 4, 4 2) 4, 3 3) 3, 4 4) 2, 2

28) The oxidation number of iron in the brown ring complex is

1) + 3 2) + 2 3) + 4 4) +1

29) a $KMnO_4 + b\ H_2SO_4 + c\ FeSO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + H_2O$ **. In this un balanced stoichiometric equation, the values of a, b and c are respectively**

1) 2, 8 and 10 2) 1, 4 and 10 3) 2, 10 and 8 4) 2, 8 and 16

30) **The number of moles of $_{FeSO4}$ In balanced equation of** $K_2Cr_2O_7 + H_2SO_4 + FeSO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + Fe_2(SO_4)_3 + H_2O$ **is**

1) 1 2) 7 3) 6 4) 2

31) **In the equation** $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2$ **the numbers of moles of H+ ions involved in the balanced equation are**

1) 9 2) 16 3) 6 4) 12

32) **In the reaction,** $Cl_2 + \overline{O}H \rightarrow C\overline{l} + \overline{O}Cl$ **the number of moles of** $\overline{O}H$ **ions involved in the above equation is**

1) 2 2) 3 3) 4 4) 5

33) **In the equation** p NH_3 + q O_2 → r H_2O + s NO **, the stoichometric coefficient of which species is 4.**

I) NH_3 II) O_2 III) H_2O IV) NO

The correct answer is

1) I, II and III 2) I and IV 3) II, III and IV 4) II and III

34) **Assertion: (A): The oxidation state of Iron in Fe_3O_4 is +3**
Reason: (R): Fe always shows +3 in all its compounds.

1) Both A and R are true, R is correct explanation of A.

2) Both A and R are true, R is not the correct explanation of A.

3) A is true but R is false 4) both A and R are false

35) **In the conversion of BaO_2 to BaO, the oxidation number of**

1) Barium increases 2) Oxygen increases 3) Oxygen decreases 4) Barium decreases

36. **Oxidation state of Ni in Ni $(CO)_4$ is**

1) 0 2) 4 3) 8 4) 2

37. **Oxidation state of Fe in $K_4[Fe(CN)_6]$**

1) +6 2) +4 3) +2 4) +5

38 **.In which of the following the oxidation state of chlorine is +5?**

1) $HClO_4$ 2) $HClO_3$ 3) $HClO_2$ 4) HCl

39. **All elements commonly exhibit an oxidation state of**

1) +1 2) –1 3) zero 4) +2

40. **The maximum oxidaton state that fluorine exhibits is**

1) –1 2) zero 3) +1 4) +2

41. **The element that always exhibits a negative oxidation state in its compounds is**

1) Nitrogen 2) Oxygen 3) Fluorine 4) Chlorine

42) **The oxidation number of Nitrogen is fractional in**

1) NH_3 2) N_3H 3) N_2H_4 4) NH_2OH

KEY

1)4	**2)1**	**3) 1**	**4) 4**	**5) 3**	**6) 2**	**7)2**	**8) 1**	**9) 3**	**10) 3**
11)4	**12)3**	**13)2**	**14)4**	**15)2**	**16) 3**	**17)4**	**18)2**	**19) 1**	**20)2**
21) 1	**22)3**	**23)3**	**24)4**	**25)2**	**26)1**	**27)2**	**28) 4**	**29) 1**	**30) 3**
31)2	**32)1**	**33) 2**	**34)4**	**35)3**	**36) 1**	**37) 3**	**38) 2**	**39) 3**	**40)2**
41) 3	**42)2**								

HINTS

1. In NH_3 oxidation state of N is x+3=0, x=-3

In elementary state ox, no is zero

2. $MnO_4^- \rightarrow MnO_2$,

Balancing oxygen $MnO_4^- \rightarrow MnO_2+2H_2O$

Balancing H; $MnO_4^- +4H_2O \rightarrow MnO_2+2H_2O +4OH^-$

Balancing charge : $MnO_4^- +2H_2O +3e \rightarrow MnO_2+4OH^-$

3. The stoichiometric equation is

$Cr_2O_7^{-2} + 3NO_2^- + 8H^+ \rightarrow 2Cr^{+3} + 3NO_3^- + 4H_2O$

4. $NO_2 + H_2O \rightarrow NO_3^- + 2H^+ + ne^-$,

Total charge in reactants side=0

Total charge in products side=-1+2 =+1. Hence n=1

5. Ox.state of metal in metal carbonyl is zero.

6. O.s of Cr in CrO_4^{-2} is x+4(-2)=-2, x=+6

In CrO_5 , one normal and 4 peroxy oxygen atoms are present. X+4(-1)+(-2)=0,x=+6

7. Balanced equation is $2MnO_4^- + 5C_2O_4^{-2} + 16H^+ \rightarrow 2Mn^{+2} + 10CO_2 + 8H_2O$

8. Elements of IA always show +1 in their compounds.

9. $Cl_2 \rightarrow 2ClO_3^-$

Balancing oxygen $Cl_2 + 6H_2O \rightarrow 2ClO_3^-$

Balancing H; $Cl_2 + 6H_2O + 12OH^- \rightarrow 2ClO_3^- + 12H_2O$

Balancing charge: $Cl_2 + 12OH^- + 10e \rightarrow 2ClO_3^- + 6H_2O$

10. Balanced equation is $x\ 2Cr(OH)_3 + 3\ H_2O_2 + 4\ OH^- \rightarrow 2\ CrO_4^{-2} + 8\ H_2O$

11. Ox.S of Cr is same (+6) in both sides.

12. in HNO_4 ,two peroxy O atoms present.

+1 +X+2(-2)+2(-1)=0,X= +5

14. O.S of metal in an alloy is zero.

15. NH_4NO_2 contains $NH_4^+$and NO_2^- ions. In NH_4^+ O.S of N is -3 and in NO_2^- is +3

16. NH_4NO_3 contains $NH_4^+$and NO_3^- ions. In NH_4^+ O.S of N is -3 and in NO_3^- is +5.

17. 'H' shows +ve oxidation state in metallic hydrides.

18. As 'S' is in its lowest oxidation state.

19. O.S of Zn increases from 0 to +2.

20. O.S of Cu decreases from +2 to 0.

21. O.S of Mn increases from +6 to +7.

22. $6NaOH + 3Cl_2 \rightarrow 5NaCl + NaClO_3 + 3H_2O$**, O.S of changes from 0 to -1 and 0 to +5.**

23. $2MnO_4^- + 16H^+ + 5S^{-2} \rightarrow 2Mn^{+2} + 8H_2O + 5S$

Mn gains 10e and S^{-2} looses 10e

24. $2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 10CO_2 + 8\ H_2O$

As per equation 2moles $KMnO_4$ oxidises 5 moles of Oxallic acid.

1mole $KMnO_4$ oxidises 5/2 moles of Oxallic acid

25. $K_2Cr_2O_7 + H_2SO_4 + FeSO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + Fe_2(SO_4)_3 + H_2O$

26. $2Cr(OH)_3 + 4OH^- + IO_3^- \rightarrow I^- + 2\ CrO_4^{-2} + 5H_2O$

27. $Cr \rightarrow [Cr(OH)_4]^-$

Balance oxygen atoms $Cr + 4H_2O \rightarrow [Cr(OH)_4]^-$

Balance hydrogen atoms $Cr + 4H_2O + 4OH^- \rightarrow [Cr(OH)_4]^- + 4H_2O$

Balance the charge $Cr + 4H_2O + 4OH^- \rightarrow \left[Cr(OH)_4\right]^- + 4H_2O + 3e^-$

28: **The brown ring complex compound is [Fe (H_2O)$_5$ NO] SO_4.**

The complex ion is [Fe (H_2O)$_5$ NO]$^{2+}$

Oxidation numbers of H_2O is zero and NO is+1.

Oxidation state of Fe is +1

29. Balanced equation is $2\ KMnO_4 + 8\ H_2SO_4 + 10\ FeSO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8H_2O$

30. Balanced equation is

$K_2Cr_2O_7 + 7H_2SO_4 + 6FeSO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + 3Fe_2(SO_4)_3 + 7H_2O$

31. $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

32. **Cl_2+2 $OH^- \rightarrow Cl^-$+ ClO^-+H_2O**

33. $4\ NH_3 + 5O_2 \rightarrow 6\ H_2O + 4\ NO$

34. Fe_3O_4 is a mixed oxide of FeO and Fe_2O_3. Thus Fe shows +2 and +3 OX.States

35. OX.ST of oxygen decreases from -1 to -2.