CHEMISTRY

Redox Reactions

Speed TEST 36 Chapter-wise

No. of Questions	Maximum Marks	Time
45	180	1 Hour

GENERAL INSTRUCTIONS

- This test contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solutions provided at the end of this book.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

1. The brown ring complex is formulated as $[Fe(H_2O)_5\ NO]SO_4$. The oxidation number of iron is
(a) 1 (b) 2 (c) 3 (d) 0

2. In which of the following reactions, there is no change in valency ?
(a) $4KClO_3 \rightarrow 3KClO_4 + KCl$
(b) $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$
(c) $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$
(d) $2BaO + O_2 \rightarrow 2BaO_2$

3. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is:
(a) +3 (b) +2 (c) +6 (d) +4

4. In which of the following pairs, there is greatest difference in the oxidation number of the underlined elements ?
(a) $\underline{N}O_2$ and $\underline{N}_2O_4$ (b) $\underline{P}_2O_5$ and $\underline{P}_4O_{10}$
(c) $\underline{N}_2O$ and $\underline{N}O$ (d) $\underline{S}O_2$ and $\underline{S}O_3$

5. A compound of Xe and F is found to have 53.5% of Xe. What is oxidation number of Xe in this compound ?
(a) −4 (b) 0 (c) +4 (d) +6

6. Atomic number of an element is 22. The highest O.S. exhibited by it in its compounds is
(a) 1 (b) 2 (c) 3 (d) 4

7. The reaction in which hydrogen peroxide acts as a reducing agent is
(a) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$
(b) $2KI + H_2O_2 \rightarrow 2KOH + I_2$
(c) $2FeSO_4 + H_2SO_4 + H_2O_2 \rightarrow Fe_2(SO_4)_3 + 2H_2O$
(d) $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

8. Of the following reactions, only one is a redox reaction. Identify it
(a) $Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$
(b) $BaCl_2 + MgSO_4 \rightarrow BaSO_4 + MgCl_2$
(c) $2S_2O_7^{2-} + 2H_2O \rightarrow 4SO_4^{2-} + 4H^+$
(d) $Cu_2S + 2FeO \rightarrow 2Cu + 2Fe + SO_2$

9. Arrange the following in the order of their decreasing electrode potentials : Mg, K, Ba and Ca
(a) K > Ca > Ba > Mg (b) Ba > Ca > K > Mg
(c) Ca > Mg > K > Ba (d) Mg > Ca > Ba > K

RESPONSE GRID				
1. (a)(b)(c)(d)	2. (a)(b)(c)(d)	3. (a)(b)(c)(d)	4. (a)(b)(c)(d)	5. (a)(b)(c)(d)
6. (a)(b)(c)(d)	7. (a)(b)(c)(d)	8. (a)(b)(c)(d)	9. (a)(b)(c)(d)	

Space for Rough Work

10. Which of the following statements are correct concerning redox properties?
(i) A metal M for which E° for the half life reaction $M^{n+} + ne^- \rightleftharpoons M$ is very negative will be a good reducing agent.
(ii) The oxidizing power of the halogens decreases from chlorine to iodine.
(iii) The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide
(a) (i), (ii) and (iii) (b) (i) and (ii)
(c) (i) only (d) (ii) and (iii)

11. A negative E° means that redox couple is a ___A___ than the H^+/H_2 couple

A positive E° means that the redox couple is a ___B___ than H^+/H_2 couple
(a) A = stronger reducing agent
B = weaker reducing agent
(b) A = stronger oxidising agent
B = weaker oxidising agent
(c) A = weaker oxidising agent
B = stronger oxidising agent
(d) Both (a) and (c)

12. If equal volume of reactants are used, then no. of moles of $KMnO_4$ (moles per litre) used in acidic medium required to completely oxidise 0.5 M $FeSO_3$?
(a) 0.3 (b) 0.1
(c) 0.2 (d) 0.4

13. If rod of a metal (x) is put in a metal ion solution which is blue in colour , solution turn colourless. The metal rod and solution respectively are?
(a) Zinc and Cu(II) (b) Zinc and Ni(II)
(c) Aluminium and Cu(II) (d) Both (a) and (c)

14. In the reaction between SO_2 and O_3 the equivalent weight of sulphur in product is
(a) the same as its molecular weight
(b) half of the molecular weight
(c) one-third of the molecular weight
(d) one-fourth of the molecular weight

15. When $KMnO_4$ reacts with acidified $FeSO_4$
(a) $FeSO_4$ is oxidised and $KMnO_4$ is reduced
(b) only $KMnO_4$ is oxidised
(c) only $FeSO_4$ is oxidised
(d) None of these

16. Consider the following reaction :

$$xMnO_4^- + yC_2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

The value's of x, y and z in the reaction are, respectively :
(a) 5, 2 and 16 (b) 2, 5 and 8
(c) 2, 5 and 16 (d) 5, 2 and 8

17. When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from :
(a) zero to +1 and zero to –5
(b) zero to –1 and zero to +5
(c) zero to –1 and zero to +3
(d) zero to +1 and zero to –3

18. Oxidation state for nitrogen is incorrectly given for compound oxidation state
(a) $[Co(NH_3)_5Cl]Cl_2$ 0
(b) NH_2OH –1
(c) $(N_2H_5)_2SO_4$ –2
(d) Mg_3N_2 –3

19. Standard electrode potentials of redox couples A^{2+}/A, B^{2+}/B, C^{2+}/C and D^{2+}/D are 0.3V, – 0.5V, – 0.75V and 0.9V respectively. Which of these is best oxidising agent and reducing agent respectively –
(a) D^{2+}/D and B^{2+}/B (b) B^{2+}/B and D^{2+}/D
(c) D^{2+}/D and C^{2+}/C (d) C^{2+}/C and D^{2+}/D

20. MnO_4^{2-} (1 mole) in neutral aqueous medium disproportionates to
(a) 2/3 mole of MnO_4^- and 1/3 mole of MnO_2
(b) 1/3 mole of MnO_4^- and 2/3 mole of MnO_2
(c) 1/3 mole of Mn_2O_7 and 1/3 mole of MnO_2
(d) 2/3 mole of Mn_2O_7 and 1/3 mole of MnO_2

21. In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is
(a) (molecular weight)/2 (b) (molecular weight)/6
(c) (molecular weight)/3 (d) same as molecular weight

RESPONSE GRID					
	10. (a)(b)(c)(d)	**11.** (a)(b)(c)(d)	**12.** (a)(b)(c)(d)	**13.** (a)(b)(c)(d)	**14.** (a)(b)(c)(d)
	15. (a)(b)(c)(d)	**16.** (a)(b)(c)(d)	**17.** (a)(b)(c)(d)	**18.** (a)(b)(c)(d)	**19.** (a)(b)(c)(d)
	20. (a)(b)(c)(d)	**21.** (a)(b)(c)(d)			

Space for Rough Work

22. The species that undergoes disproportionation in an alkaline medium are
(a) Cl_2 (b) MnO_4^{2-}
(c) NO_2 (d) All of these

23. One mole of N_2H_4 loses 10 moles of electrons to form a new compound y. Assuming that all nitrogen appear in the new compound, what is the oxidation state of nitrogen in y (There is no change in the oxidation state of hydrogen)
(a) –1 (b) –3 (c) +3 (d) +5

24. Phosphorus, sulphur and chlorine undergo disproportion in the ...A... medium.
Here, A refers to
(a) acidic (b) alkaline
(c) neutral (d) Both (a) and (b)

25. In which of the following compounds oxygen has highest oxidation state and in which it has lowest oxidation state?
OF_2, H_2O_2, KO_2, O_2F_2
(a) Highest = KO_2, lowest = H_2O_2
(b) Highest = OF_2, lowest = H_2O_2
(c) Highest = OF_2, lowest = KO_2
(d) Highest = KO_2, lowest = H_2O_2

26. The most powerful oxidizing agent from the following is
(a) H_3BO_3 (b) HPO_3 (c) H_3PO_4 (d) H_2SO_4

27. When SO_2 is passed through acidified solution of potassium dichromate, then chromium sulphate is formed. The change in valency of chromium is
(a) +4 to +2 (b) +5 to +3 (c) +6 to +3 (d) +7 to +2

28. Standard reduction potentials of the half reactions are given below :
$F_2(g) + 2e^- \rightarrow 2F^-(aq)$; $E^\circ = +2.85$ V
$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq)$; $E^\circ = +1.36$ V $Br_2(l) + 2e^- \rightarrow 2Br^-(aq)$; $E^\circ = +1.06$ V $I_2(s) + 2e^- \rightarrow 2I^-(aq)$; $E^\circ = +0.53$ V
The strongest oxidising and reducing agents respectively are :
(a) F_2 and I^- (b) Br_2 and Cl^-
(c) Cl_2 and Br^- (d) Cl_2 and I_2

29. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25°C. If the reduction potential is Z > Y > X, then
(a) Y will oxidise X and not Z
(b) Y will oxidise Z and not X
(c) Y will oxidise both X and Z
(d) Y will reduce both X and Z

30. The violent reaction between sodium and water is an example of
(a) Reduction (b) Oxidation
(c) Redox reaction (d) Neutralization reaction

31. The equivalent weight of Mohr's salt,
$FeSO_4(NH_4)_2SO_4.6H_2O$ is equal to
(a) its molecular weight
(b) its atomic weight
(c) half-its molecular weight
(d) one-third its molecular weight

32. The set of numerical coefficients that balances the equation
$K_2CrO_4 + HCl \rightarrow K_2Cr_2O_7 + KCl + H_2O$
(a) 1, 1, 2, 2, 1 (b) 2, 2, 1, 1, 1
(c) 2, 1, 1, 2, 1 (d) 2, 2, 1, 2, 1

33. Thiosulphate reacts differently with iodine and bromine in the reactions given below:
$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$
$S_2O_3^{2-} + Br_2 + 5H_2O \rightarrow 2SO_4^{2-} + 2Br^- + 10H^+$
Which of the following statements justifies the above dual behaviour of thiosulphate?
(a) Bromine is a stronger oxidant than iodine.
(b) Bromine is a weaker oxidant than iodine.
(c) Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reactions.
(d) Bromine undergoes oxidation and iodine undergoes reduction in these reactions.

34. The chemical that undergoes self oxidation and self reduction in the same reaction is
(a) benzyl alcohol (b) acetone
(c) formaldehyde (d) acetic acid

RESPONSE GRID

22. ⓐⓑⓒⓓ	**23.** ⓐⓑⓒⓓ	**24.** ⓐⓑⓒⓓ	**25.** ⓐⓑⓒⓓ	**26.** ⓐⓑⓒⓓ
27. ⓐⓑⓒⓓ	**28.** ⓐⓑⓒⓓ	**29.** ⓐⓑⓒⓓ	**30.** ⓐⓑⓒⓓ	**31.** ⓐⓑⓒⓓ
32. ⓐⓑⓒⓓ	**33.** ⓐⓑⓒⓓ	**34.** ⓐⓑⓒⓓ		

Space for Rough Work

35. The oxidation number of an element in a compound is evaluated on the basis of certian rules. Which of the following rules is not correct in this respect?
(a) The oxidation number of hydrogen is always + 1.
(b) The algebraic sum of all the oxidation numbers in a compound is zero.
(c) An element in the free or the uncombined state bears oxidation number zero.
(d) In all its compounds, the oxidation number of fluorine is – 1.

36. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because
(a) Zn acts as an oxidising agent when it reacts with HNO_3
(b) HNO_3 is weaker acid than H_2SO_4 and HCl
(c) In electrochemical series, Zn is above hydrogen
(d) NO_3^- is reduced in preference to hydronium ion

37. Which of the following elements does not show disproportionation tendency?
(a) Cl (b) Br
(c) F (d) I

38. The oxidation number of sulphur in S_8, S_2F_2, H_2S respectively, are
(a) 0, +1 and –2 (b +2, +1 and –2
(c) 0, +1 and +2 (d) –2, +1 and –2

39. Stronger is oxidising agent, more is :
(a) standard reduction potential of that species
(b) the tendency to get it self oxidised
(c) the tendency to lose electrons by that species
(d) standard oxidation potential of that species

40. Which of the following statement(s) is/are correct for the given reaction?
$2HgCl_2(aq) + SnCl_2(aq) \rightarrow Hg_2Cl_2(s) + SnCl_4(aq)$
(i) Mercuric chloride is reduced to Hg_2Cl_2
(ii) Stannous chloride is oxidised to stannic chloride
(iii) $HgCl_2$ is oxidised to Hg_2Cl_2
(iv) It is an example of redox reaction
(a) (i), (ii) and (iv) (b) (i) and (ii)
(c) (iii) and (iv) (d) (iii) only

41. The standard reduction potentials for Cu^{2+}/Cu; Zn^{2+}/Zn; Li^+/Li; Ag^+/Ag and H^+/H_2 are + 0.34 V, – 0.762 V, – 3.05 V, + 0.80 V and 0.00 V respectively. Choose the strongest reducing agent among the following
(a) Zn (b) H_2
(c) Ag (d) Li

42. In the disproportionation reaction
$3\,HClO_3 \rightarrow HClO_4 + Cl_2 + 2O_2 + H_2O$, the equivalent mass of the oxidizing agent is (molar mass of $HClO_3 = 84.45$)
(a) 16.89 (b) 32.22
(c) 84.45 (d) 28.15

43. Which of the following behaves as both oxidising and reducing agents ?
(a) H_2SO_4 (b) SO_2
(c) H_2O (d) HNO_3

44. Which of the following statement(s) is/are correct ?
(i) Oxidation state of carbon in C_3H_4 is –(4/3).
(ii) Electrons are never shared in fraction.
(a) (i) and (ii) (b) Only (i)
(c) Only (ii) (d) Neither (i) nor (ii)

45. In the reaction shown below, oxidation state of the carbon in reactant and product are (*i*) and (*ii*) respectively? Is the given reaction a redox reaction?
$Na_2CO_3(aq) + HCl(aq) \longrightarrow Na^{\oplus}(aq) + Cl^-(aq) + H_2O(\ell) + CO_2(g)$
(a) (i) 6, (ii) 4, yes (b) (i) 6, (ii) 6, No
(c) (i) 4, (ii) 4, No (d) (i) 4, (ii) 4, yes

RESPONSE GRID

35. ⓐⓑⓒⓓ	**36.** ⓐⓑⓒⓓ	**37.** ⓐⓑⓒⓓ	**38.** ⓐⓑⓒⓓ	**39.** ⓐⓑⓒⓓ
40. ⓐⓑⓒⓓ	**41.** ⓐⓑⓒⓓ	**42.** ⓐⓑⓒⓓ	**43.** ⓐⓑⓒⓓ	**44.** ⓐⓑⓒⓓ
45. ⓐⓑⓒⓓ				

CHEMISTRY CHAPTERWISE SPEED TEST-36			
Total Questions	45	Total Marks	180
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	45	Qualifying Score	65
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work