

Exercise - I (Conceptual Questions)

Build Up Your Understanding

OXIDATION NUMBER

- In $[\text{Ni}(\text{CO})_4]$, the oxidation state of Ni is :
(1) 4 (2) 0 (3) 2 (4) 8
CRR001
- The oxidation number of nitrogen in NH_2OH is:
(1) 0 (2) +1 (3) -1 (4) -2
CRR002
- Of the following elements, which one has the same oxidation state in all of its compounds ?
(1) Hydrogen (2) Fluorine
(3) Carbon (4) Oxygen
CRR003
- Oxidation number of fluorine in OF_2 is :
(1) +1 (2) +2 (3) -1 (4) -2
CRR004
- The oxidation number of C in CH_4 , CH_3Cl , CH_2Cl_2 , CHCl_3 and CCl_4 are respectively :
(1) +4, +2, 0, -2, -4
(2) +2, +4, 0, -4, -2
(3) -4, -2, 0, +2, +4
(4) -2, -4, 0, +4, +2
CRR005
- Oxidation state of oxygen in hydrogen peroxide is
(1) -1 (2) +1 (3) 0 (4) -2
CRR007
- Which one of the following statements is not correct?
(1) Oxidation state of S in $(\text{NH}_4)_2\text{S}_2\text{O}_8$ is +6
(2) Oxidation number of Os in OsO_4 is +8
(3) Oxidation state of S in H_2SO_5 is +8
(4) Oxidation number of O in KO_2 is $-\frac{1}{2}$
CRR008
- Which of the following shows highest oxidation number in combined state :
(1) Os (2) Ru
(3) Both (1) and (2) (4) None
CRR009

- Oxidation number of sodium in sodium amalgam (Na-Hg) is :
(1) +2 (2) +1 (3) -3 (4) Zero
CRR010
- Oxidation number of C in HNC is :
(1) +2 (2) -3 (3) +3 (4) Zero
CRR011
- Oxidation number of Fe in $\text{Fe}_{0.94}\text{O}$ is :
(1) 200 (2) 200/94
(3) 94/200 (4) None
CRR012
- Oxidation number of carbon in carbon suboxide (C_3O_2) is :
(1) $\frac{+2}{3}$ (2) $\frac{+4}{3}$ (3) +4 (4) $\frac{-4}{3}$
CRR013
- Oxidation number of sulphur in $\text{Na}_2\text{S}_2\text{O}_3$ would be :-
(1) +2 (2) +4 (3) -2 (4) 0
CRR014
- Two oxidation states for chlorine are found in the compound :
(1) CaOCl_2 (2) KCl (3) KClO_3 (4) Cl_2O_7
CRR015
- $-\frac{1}{3}$ oxidation state of nitrogen will be obtained in case of :
(1) Ammonia (NH_3)
(2) Hydrazoic acid (N_3H)
(3) Nitric oxide (NO)
(4) Nitrous oxide (N_2O)
CRR016
- Compound $\text{YBa}_2\text{Cu}_3\text{O}_7$ is a super conductor. The O.N. of the copper in the compound will be: [O. No. of Y = +3]
(1) $+\frac{7}{3}$ (2) zero (3) +2 (4) +1
CRR017
- The oxidation state of iodine in H_4IO_6^- is :-
(1) +7 (2) -1 (3) +5 (4) +1
CRR018

Redox Reactions

18. Amongst the following, identify the species with an atom in + 6 oxidation state:-

- (1) MnO_4^- (2) $\text{Cr}(\text{CN})_6^{3-}$
(3) NiF_6^{2-} (4) CrO_2Cl_2

CRR019

19. In which of the following compounds iron has lowest oxidation state:-

- (1) $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$
(2) $\text{K}_4[\text{Fe}(\text{CN})_6]$
(3) $[\text{Fe}(\text{CO})_5]$
(4) $\text{Fe}_{0.94}\text{O}$

CRR021

20. Select the compound in which the oxidation number of oxygen is -1:-

- (1) H_2O (2) O_2F_2 (3) Na_2O (4) BaO_2

CRR022

21. Match List - I (compound) with list - II (Oxidation state of N) and select the correct answer using the codes given below the list:-

List - I	List-II
(A) KNO_3	(a) $-1/3$
(B) HNO_2	(b) -3
(C) NH_4Cl	(c) 0
(D) NaN_3	(d) $+3$
	(e) $+5$

Codes are:-

	A	B	C	D
(1)	e	d	b	a
(2)	e	b	d	a
(3)	d	e	a	c
(4)	b	c	d	e

CRR023

22. In which of the following pair, oxidation number of Fe is same :-

- (1) $\text{K}_3[\text{Fe}(\text{CN})_6]$, Fe_2O_3
(2) $\text{Fe}(\text{CO})_5$, Fe_2O_3
(3) Fe_2O_3 , FeO
(4) $\text{Fe}_2(\text{SO}_4)_3$, $\text{K}_4[\text{Fe}(\text{CN})_6]$

CRR024

23. In the conversion of Br_2 to BrO_3^- , the oxidation state of bromine changes from :-

- (1) 0 to 5 (2) 1 to 5
(3) 0 to -3 (4) 2 to 5

CRR025

24. The sum of oxidation states of sulphur in $\text{H}_2\text{S}_2\text{O}_8$ is :-

- (1) +2 (2) +6 (3) +7 (4) +12

CRR026

25. In which of the following compounds of Cr, the oxidation number of Cr is not +6 :-

- (1) CrO_3 (2) CrO_2Cl_2
(3) Cr_2O_3 (4) $\text{K}_2\text{Cr}_2\text{O}_7$

CRR027

26. Oxidation state of cobalt in $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}]\text{SO}_4$ is

- (1) 0 (2) +4 (3) -2 (4) +3

CRR028

27. Oxidation number of carbon in graphite is :-

- (1) Zero (2) +1 (3) +4 (4) +2

CRR029

28. Oxidation number of 'N' in N_3H (hydrazoic acid) is :-

- (1) $-\frac{1}{3}$ (2) -3
(3) +3 (4) $+\frac{2}{3}$

CRR030

29. Which of the following doesn't have +5 oxidation state of phosphorus ?

- (1) Phosphorus acid (H_3PO_3)
(2) Orthophosphoric acid (H_3PO_4)
(3) Meta phosphoric acid (HPO_3)
(4) Pyro phosphoric acid ($\text{H}_4\text{P}_2\text{O}_7$)

CRR031

30. The oxidation number of arsenic atom in H_3AsO_4 is :-

- (1) -1 (2) -3 (3) +3 (4) +5

CRR032

31. In substance $\text{Mg}(\text{HXO}_3)$, the oxidation number of X is :-

- (1) 0 (2) +2 (3) +3 (4) +4

CRR033

32. The oxidation number of phosphorus in PH_4^+ , PO_2^{3-} , PO_4^{3-} and PO_3^{3-} are respectively :-

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

CRR034

33. Which of the following compounds are arranged in increasing oxidation number of S :-
 (1) $\text{H}_2\text{SO}_3, \text{H}_2\text{S}, \text{H}_2\text{SO}_4, \text{H}_2\text{S}_2\text{O}_3$
 (2) $\text{H}_2\text{S}_2\text{O}_3, \text{H}_2\text{SO}_3, \text{H}_2\text{S}, \text{H}_2\text{SO}_4$
 (3) $\text{H}_2\text{S}, \text{H}_2\text{SO}_3, \text{H}_2\text{SO}_4, \text{H}_2\text{S}_2\text{O}_3$
 (4) $\text{H}_2\text{S}, \text{H}_2\text{S}_2\text{O}_3, \text{H}_2\text{SO}_3, \text{H}_2\text{SO}_4$

CRR035

34. Iodine shows the highest oxidation state in the compound :-
 (1) KI (2) KI_3 (3) IF_5 (4) KIO_4

CRR036

35. The sum of the oxidation states of all the carbon atoms present in the compound $\text{C}_6\text{H}_5\text{CHO}$ is :
 (1) -4 (2) 3 (3) +5 (4) -4/7

CRR037

APPLICATIONS OF REDOX REACTIONS

36. A reducing agent is a substance which can :
 (1) Accept electrons
 (2) Donate electrons
 (3) Accept protons
 (4) Donate protons

CRR038

37. The reaction $\text{H}_2\text{S} + \text{H}_2\text{O}_2 \rightarrow \text{S} + 2\text{H}_2\text{O}$ manifests :
 (1) Oxidising action of H_2O_2
 (2) Reducing nature of H_2O_2
 (3) Acidic nature of H_2O_2
 (4) Alkaline nature of H_2O_2

CRR039

38. If an element is in its lowest oxidation state, under proper conditions it can act as :
 (1) Reducing agent
 (2) An oxidising agent
 (3) Oxidising as well as reducing agent
 (4) Neither oxidising nor reducing agent

CRR040

39. In a reaction of
 $\text{H}_2\text{O} (\text{steam}) + \text{C} (\text{red hot}) \rightarrow \text{CO} + \text{H}_2$
 (1) H_2O is the reducing agent
 (2) H_2O is the oxidising agent
 (3) Carbon is the oxidising agent
 (4) Oxidation-reduction does not occur

CRR041

40. The compound that can work both as an oxidising as well as reducing agent is :
 (1) KMnO_4 (2) H_2O_2
 (3) $\text{Fe}_2(\text{SO}_4)_3$ (4) $\text{K}_2\text{Cr}_2\text{O}_7$

CRR042

41. HNO_2 acts as an oxidant with which one of the following reagent:-
 (1) KMnO_4 (2) H_2S
 (3) $\text{K}_2\text{Cr}_2\text{O}_7$ (4) Br_2

CRR043

42. In which of the following reaction H_2O_2 acts as reducing agent :-
 (1) $2\text{FeCl}_2 + 2\text{HCl} + \text{H}_2\text{O}_2 \rightarrow 2\text{FeCl}_3 + 2\text{H}_2\text{O}$
 (2) $\text{Cl}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{HCl} + \text{O}_2$
 (3) $2\text{HI} + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{I}_2$
 (4) $\text{H}_2\text{SO}_3 + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{SO}_4 + \text{H}_2\text{O}$

CRR044

43. When H_2 reacts with Na, it acts as :-
 (1) Oxidising agent
 (2) Reducing agent
 (3) Both
 (4) Cannot be predicted

CRR045

44. In the course of a chemical reaction an oxidant -
 (1) Loses electron
 (2) Gains electron
 (3) Both loses and gain electrons
 (4) Electron change does not occur

CRR046

45. In the reaction:-
 $\text{C} + 4\text{HNO}_3 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + 4\text{NO}_2$
 HNO_3 acts as :-
 (1) An oxidising agent
 (2) An acid
 (3) A reducing agent
 (4) A base

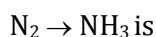
CRR047

46. A compound contains atoms A, B and C. The oxidation number of A is +2, of B is +5 and of C is -2. The possible formula of the compound is :
 (1) ABC_2 (2) $\text{B}_2(\text{AC}_3)_2$
 (3) $\text{A}_3(\text{BC}_4)_2$ (4) $\text{A}_3(\text{B}_4\text{C})_2$

CRR048

Redox Reactions

47. Equivalent weight of N_2 in the change



- (1) $\frac{28}{6}$ (2) 28 (3) $\frac{28}{2}$ (4) $\frac{28}{3}$

CRR049

48. Equivalent weight of NH_3 in the change



- (1) $\frac{17}{6}$ (2) 17 (3) $\frac{17}{2}$ (4) $\frac{17}{3}$

CRR050

49. In the reaction, $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$, the eq. wt. of $Na_2S_2O_3$ is equal to its :

- (1) Mol. wt. (2) Mol. wt./2
(3) 2 x Mol. wt. (4) Mol. wt./6

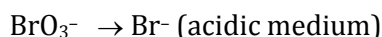
CRR051

50. In the reaction, $VO + Fe_2O_3 \rightarrow FeO + V_2O_5$, the eq. wt. of V_2O_5 is equal to its :

- (1) Mol. wt. (2) Mol. wt./8
(3) Mol. wt./6 (4) Mol. wt./2

CRR052

51. Molecular weight of $KBrO_3$ is M. What is its equivalent weight, if the reaction is :



- (1) M (2) M/4 (3) M/6 (4) 6M

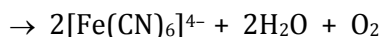
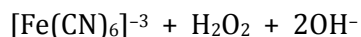
CRR053

52. In the reaction : $A^{-n_2} + xe^- \rightarrow A^{-n_1}$, here x will be

- (1) $n_1 + n_2$ (2) $n_2 - n_1$
(3) $n_1 - n_2$ (4) $n_1 \cdot n_2$

CRR054

53. What would be the equivalent weight of the reductant in the reaction :



[Given : Fe = 56, C = 12, N = 14, O = 16, H = 1]

- (1) 17 (2) 212 (3) 34 (4) 32

CRR055

54. Equivalent weight of FeC_2O_4 in the change : $FeC_2O_4 \rightarrow Fe^{3+} + CO_2$ is :

- (1) M/3 (2) M/6 (3) M/2 (4) M/1

CRR056

55. The number of mole of oxalate ions oxidised by one mole of MnO_4^- is :

- (1) 1/5 (2) 2/5 (3) 5/2 (4) 5

CRR057

56. In a reaction 4 mole of electrons are transferred to one mole of HNO_3 when it acts as an oxidant. The possible reduction product is:

- (1) (1/2) mole N_2 (2) (1/2) mole N_2O
(3) 1 mole of NO_2 (4) 1 mole NH_3

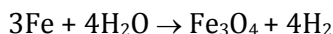
CRR058

57. The equivalent weight of $MnSO_4$ is half of its molecular weight when it is converted to :-

- (1) Mn_2O_3 (2) MnO_2
(3) MnO_4^- (4) MnO_4^{2-}

CRR059

58. In the following change,



If the atomic weight of iron is 56, then its equivalent weight will be :-

- (1) 42 (2) 21 (3) 63 (4) 84

CRR060

59. $Cr_2O_7^{2-} + I^- + H^+ \rightarrow Cr^{+3} + I_2 + H_2O$

The equivalent weight of the reductant in the above equation is :- (At. wt. of Cr=52, I=127)

- (1) 26 (2) 127 (3) 63.5 (4) 10.4

CRR061

60. How many moles of $KMnO_4$ are reduced by 1 mole of ferrous oxalate in acidic medium:-

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

CRR062

REDOX REACTIONS

61. Which one of the following is a redox reaction?

- (1) $H_2 + Br_2 \rightarrow 2HBr$
(2) $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$
(3) $HCl + AgNO_3 \rightarrow AgCl + HNO_3$
(4) $NaOH + HCl \rightarrow NaCl + H_2O$

CRR063

62. Which of the following is not a redox change ?

- (1) $2H_2S + SO_2 \rightarrow 2H_2O + 3S$
(2) $2BaO + O_2 \rightarrow 2BaO_2$
(3) $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$
(4) $2KClO_3 \rightarrow 2KCl + 3O_2$

CRR064

63. In the reaction, $\text{Cl}_2 + \text{OH}^- \rightarrow \text{Cl}^- + \text{ClO}_4^- + \text{H}_2\text{O}$, chlorine is :
 (1) Oxidised
 (2) Reduced
 (3) Oxidised as well as reduced
 (4) Neither oxidised nor reduced

CRR065

64. Which is a redox reaction :

- (1) $2\text{CuI}_2 \rightarrow \text{CuI} + \text{I}_2$
 (2) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
 (3) $\text{NH}_4\text{Cl} + \text{NaOH} \rightarrow \text{NH}_3 + \text{NaCl} + \text{H}_2\text{O}$
 (4) $\text{Cr}_2(\text{SO}_4)_3 + 6\text{KOH} \rightarrow 2\text{Cr}(\text{OH})_3 + 3\text{K}_2\text{SO}_4$

CRR066

65. Which of the following example does not represent disproportionation -

- (1) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
 (2) $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
 (3) $4\text{KClO}_3 \rightarrow 3\text{KClO}_4 + \text{KCl}$
 (4) $3\text{Cl}_2 + 6\text{NaOH} \rightarrow 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$

CRR067

66. The decomposition of KClO_3 to KCl and O_2 on heating is an example of :

- (1) Intermolecular redox change
 (2) Intramolecular redox change
 (3) Disproportionation or auto redox change
 (4) Comproportionation

CRR068

67. Which of the following change represents a disproportionation reaction (s) :

- (1) $\text{Cl}_2 + 2\text{OH}^- \rightarrow \text{ClO}^- + \text{Cl}^- + \text{H}_2\text{O}$
 (2) $\text{Cu}_2\text{O} + 2\text{H}^+ \rightarrow \text{Cu} + \text{Cu}^{2+} + \text{H}_2\text{O}$
 (3) $2\text{HCuCl}_2 \xrightarrow[\text{Water}]{\text{dilution with}} \text{Cu} + \text{Cu}^{2+} + 4\text{Cl}^- + 2\text{H}^+$
 (4) All of the above

CRR069

68. How many electrons should X_2H_4 liberate so that in the new compound X shows oxidation number of $-\frac{1}{2}$ (E.N. $\text{X} > \text{H}$)

- (1) 10 (2) 4 (3) 3 (4) 2

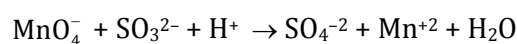
CRR070

69. Which one of the following is not a redox reaction :-

- (1) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 (2) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 (3) $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \frac{1}{2} \text{H}_2$
 (4) $\text{MnCl}_3 \rightarrow \text{MnCl}_2 + \frac{1}{2} \text{Cl}_2$

CRR071

70. In the reaction -



- (1) MnO_4^- and H^+ both are reduced
 (2) MnO_4^- is reduced and H^+ is oxidised
 (3) MnO_4^- is reduced and SO_3^{2-} is oxidised
 (4) MnO_4^- is oxidised and SO_3^{2-} is reduced

CRR072

71. $\text{I}_2 + \text{KI} \rightarrow \text{KI}_3$

In the above reaction:-

- (1) Only oxidation taken place
 (2) Only reduction takes place
 (3) Both the above
 (4) Neither oxidation nor reduction

CRR073

72. Which of the following reaction represents the oxidising behaviour of H_2SO_4 :-

- (1) $2\text{PCl}_5 + \text{H}_2\text{SO}_4 \rightarrow 2\text{POCl}_3 + 2\text{HCl} + \text{SO}_2\text{Cl}_2$
 (2) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
 (3) $\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HCl}$
 (4) $2\text{HI} + \text{H}_2\text{SO}_4 \rightarrow \text{I}_2 + \text{SO}_2 + 2\text{H}_2\text{O}$

CRR074

73. Select the example of disproportionation reaction

- (1) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$
 (2) $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + 2\text{H}_2\text{O}$
 (3) $4\text{H}_3\text{PO}_3 \rightarrow \text{PH}_3 + 3\text{H}_3\text{PO}_4$
 (4) $\text{AgCl} + 2\text{NH}_3 \rightarrow \text{Ag}(\text{NH}_3)_2\text{Cl}$

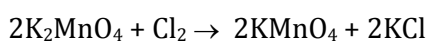
CRR075

74. Which of the following reaction involves oxidation & reduction :-

- (1) $\text{NaBr} + \text{HCl} \rightarrow \text{NaCl} + \text{HBr}$
 (2) $\text{HBr} + \text{AgNO}_3 \rightarrow \text{AgBr} + \text{HNO}_3$
 (3) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
 (4) $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$

CRR076

75. The reaction



is an example of

- (1) Redox
 (2) Reduction only
 (3) Neutralization
 (4) Disproportionation

CRR077

Redox Reactions

76. Which of the following reaction involves neither oxidation nor reduction :-

- (1) $\text{CrO}_4^{2-} \rightarrow \text{Cr}_2\text{O}_7^{2-}$ (2) $\text{Cr} \rightarrow \text{CrCl}_3$
(3) $\text{Na} \rightarrow \text{Na}^+$ (4) $2\text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-}$

CRR078

77. $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$

Zn undergoes -

- (1) Reduction
(2) Oxidation
(3) Both oxidation and reduction
(4) Neither oxidation nor reduction

CRR079

BALANCING OF REDOX REACTIONS

78. Balance the following given half reaction for the unbalanced whole reaction :

$\text{CrO}_4^{2-} \rightarrow \text{CrO}_2^- + \text{OH}^-$ is :

- (1) $\text{CrO}_4^{2-} + 2\text{H}_2\text{O} + 3\text{e}^- \rightarrow \text{CrO}_2^- + 4\text{OH}^-$
(2) $2\text{CrO}_4^{2-} + 8\text{H}_2\text{O} \rightarrow \text{CrO}_2^- + 4\text{H}_2\text{O} + 8\text{OH}^-$
(3) $\text{CrO}_4^{2-} + \text{H}_2\text{O} \rightarrow \text{CrO}_2^- + \text{H}_2\text{O} + \text{OH}^-$
(4) $3\text{CrO}_4^{2-} + 4\text{H}_2\text{O} + 6\text{e}^- \rightarrow 2\text{CrO}_2^- + 8\text{OH}^-$

CRR080

79. Choose the set of coefficients that correctly balances the following equation :

$x\text{Cr}_2\text{O}_7^{2-} + y\text{H}^+ + z\text{e}^- \rightarrow a\text{Cr}^{3+} + b\text{H}_2\text{O}$

- | | x | y | z | a | b |
|-----|---|----|---|---|---|
| (1) | 2 | 14 | 6 | 2 | 7 |
| (2) | 1 | 14 | 6 | 2 | 7 |
| (3) | 2 | 7 | 6 | 2 | 7 |
| (4) | 2 | 7 | 6 | 1 | 7 |

CRR081

80. In the reaction:

$\text{MnO}_4^- + x\text{H}^+ + n\text{e}^- \rightarrow \text{Mn}^{2+} + y\text{H}_2\text{O}$

What is the value of n :

- (1) 5 (2) 8 (3) 6 (4) 3

CRR082

81. The number of electrons required to balance charge in the following equation -

$\text{MnO}_4^- + 2\text{H}_2\text{O} \rightarrow \text{MnO}_2 + 4\text{OH}^-$ is

- (1) 5 (2) 4
(3) 3 (4) 2

CRR083

82. $2\text{KMnO}_4 + 5\text{H}_2\text{S} + 6\text{H}^+$

$\rightarrow 2\text{Mn}^{2+} + 2\text{K}^+ + 5\text{S} + 8\text{H}_2\text{O}$

In the above reaction, how many electrons would be involved in the oxidation of 1 mole of reductant?

- (1) Two (2) Five (3) Ten (4) One

CRR084

83. The value of n in :

$\text{MnO}_4^- + 8\text{H}^+ + n\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$ is

- (1) 5 (2) 4 (3) 3 (4) 2

CRR085

84. For the redox reaction

$\text{Zn} + \text{NO}_3^- \rightarrow \text{Zn}^{2+} + \text{NH}_4^+$

in basic medium, coefficients of Zn, NO_3^- and OH^- in the balanced equation respectively are :

- (1) 4, 1, 7 (2) 7, 4, 1
(3) 4, 1, 10 (4) 1, 4, 10

CRR086

85. In the balanced equation-

$[\text{Zn} + \text{H}^+ + \text{NO}_3^- \rightarrow \text{NH}_4^+ + \text{Zn}^{2+} + \text{H}_2\text{O}]$ coefficient of NH_4^+ is:-

- (1) 4 (2) 3 (3) 2 (4) 1

CRR087

86. In the balanced equation

$\text{MnO}_4^- + \text{H}^+ + \text{C}_2\text{O}_4^{2-} \rightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$, the moles of CO_2 formed are :-

- (1) 2 (2) 4 (3) 5 (4) 10

CRR088

87. In the following reaction the value of 'X' is

$\text{H}_2\text{O} + \text{SO}_3^{2-} \rightarrow \text{SO}_4^{2-} + 2\text{H}^+ + \text{X}$

- (1) 4e^- (2) 3e^- (3) 2e^- (4) 1e^-

CRR089

88. The number of electrons required to balance the following equation are:

$\text{NO}_3^- + 4\text{H}^+ \rightarrow 2\text{H}_2\text{O} + \text{NO}$

- (1) 2 on right side
(2) 3 on left side
(3) 3 on right side
(4) 5 on left side

CRR090

EXERCISE-I (Conceptual Questions)
ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	3	2	3	3	1	3	3	4	1	2	2	1	1	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	1	4	3	4	1	1	1	4	3	4	1	1	1	4
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	3	4	4	4	1	2	1	1	2	2	2	2	1	2	1
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	3	1	4	1	3	3	3	1	1	3	2	2	2	2	4
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	1	3	3	1	1	2	4	3	1	3	3	4	3	4	1
Question	76	77	78	79	80	81	82	83	84	85	86	87	88		
Answer	1	2	1	2	1	3	1	1	3	4	4	3	2		

Exercise - II (Previous Year Questions)

AIPMT/NEET

AIPMT 2014

1. The reaction of aqueous KMnO_4 with H_2O_2 in acidic conditions gives :-
 (1) Mn^{4+} and O_2
 (2) Mn^{2+} and O_2
 (3) Mn^{2+} and O_3
 (4) Mn^{4+} and MnO_2

CRR094

RE-AIPMT 2015

2. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified KMnO_4 for complete oxidation?
 (1) FeC_2O_4
 (2) $\text{Fe}(\text{NO}_2)_2$
 (3) FeSO_4
 (4) FeSO_3

CRR095

NEET-II 2016

3. Hot concentrated sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions does not show oxidizing behaviour?
 (1) $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$
 (2) $\text{CaF}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{HF}$
 (3) $\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$
 (4) $3\text{S} + 2\text{H}_2\text{SO}_4 \rightarrow 3\text{SO}_2 + 2\text{H}_2\text{O}$

CRR096

NEET(UG) 2018

4. For the redox reaction
 $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \longrightarrow \text{Mn}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$
 the correct coefficients of the reactants for the balanced equation are
- | | | |
|------------------|-----------------------------|--------------|
| MnO_4^- | $\text{C}_2\text{O}_4^{2-}$ | H^+ |
| (1) 16 | 5 | 2 |
| (2) 2 | 5 | 16 |
| (3) 2 | 16 | 5 |
| (4) 5 | 16 | 2 |

CRR097

NEET(UG) 2019

5. Which of the following reactions are disproportionation reaction?
 (a) $2\text{Cu}^+ \rightarrow \text{Cu}^{2+} + \text{Cu}^0$
 (b) $3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$
 (c) $2\text{KMnO}_4 \xrightarrow{\Delta} \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2$
 (d) $2\text{MnO}_4^- + 3\text{Mn}^{2+} + 2\text{H}_2\text{O} \rightarrow 5\text{MnO}_2 + 4\text{H}^+$
 Select the **correct** option from the following :-
 (1) (a) and (b) only (2) (a), (b) and (c)
 (3) (a), (c) and (d) (4) (a) and (d) only

CRR098

NEET (UG) 2020

6. What is the change in oxidation number of carbon in the following reaction?
 $\text{CH}_4(\text{g}) + 4\text{Cl}_2(\text{g}) \rightarrow \text{CCl}_4(\text{l}) + 4\text{HCl}(\text{g})$
 (1) 0 to -4 (2) +4 to +4
 (3) 0 to +4 (4) -4 to +4

CRR099

NEET (UG) 2021

7. The equivalent weight of the salt $\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$ used as reducing agent is
 (1) $\frac{\text{Mol. wt}}{1}$
 (2) $\frac{\text{Mol. wt}}{2}$
 (3) $\frac{\text{Mol. wt}}{3}$
 (4) $\frac{\text{Mol. wt}}{4}$

CRR100

8. Which of the following reactions is the metal displacement reaction? Choose the right option.
 (1) $2\text{KClO}_3 \xrightarrow{\Delta} 2\text{KCl} + 3\text{O}_2$
 (2) $\text{Cr}_2\text{O}_3 + 2\text{Al} \xrightarrow{\Delta} \text{Al}_2\text{O}_3 + 2\text{Cr}$
 (3) $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\uparrow$
 (4) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2\uparrow$

CRR101

NEET (UG) 2022

9. Which of the following reactions is a decomposition redox reaction ?
- (1) $2 \text{Pb}(\text{NO}_3)_2(\text{s}) \rightarrow 2 \text{PbO}(\text{s}) + 4 \text{NO}_2(\text{g}) + \text{O}_2(\text{g})$
- (2) $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{NO}(\text{g})$
- (3) $\text{Cl}_2(\text{g}) + 2\text{OH}^-(\text{aq}) \rightarrow \text{ClO}^-(\text{aq}) + \text{Cl}^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- (4) $\text{P}_4(\text{s}) + 3\text{OH}^-(\text{aq}) + 3\text{H}_2\text{O}(\text{l}) \rightarrow \text{PH}_3(\text{g}) + 3\text{H}_2\text{PO}_2^-(\text{aq})$

CRR102

NEET (UG) 2023

- 10.** On balancing the given redox reaction,
- $$a\text{Cr}_2\text{O}_7^{2-} + b\text{SO}_3^{2-}(\text{aq}) + c\text{H}^+(\text{aq}) \rightarrow$$
- $$2a\text{Cr}^{3+}(\text{aq}) + b\text{SO}_4^{2-}(\text{aq}) + \frac{c}{2}\text{H}_2\text{O}(\ell)$$
- the coefficients a, b and c are found to be,
respectively -
- (1) 3, 8, 1 (2) 1, 8, 3
(3) 8, 1, 3 (4) 1, 3, 8

CRR113

NEET (UG) 2024

- 11.** Which reaction is **NOT** a redox reaction ?
- (1) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- (2) $2 \text{KClO}_3 + \text{I}_2 \rightarrow 2 \text{KIO}_3 + \text{Cl}_2$
- (3) $\text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl}$
- (4) $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$

CRR136

NEET (UG) 2024 (Re-examination)

- 12.** The oxidation states **not** shown by Mn in given reaction is :
- $$3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$$
- A. +6 B. +2 C. +4
D. +7 E. +3

Choose the **most appropriate** answer from the options given below :

- (1) D and E only (2) B and D only
(3) A and B only (4) B and E only

CRR137

EXERCISE-II (Previous Year Questions)

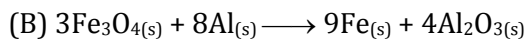
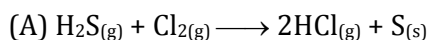
ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	
Answer	2	3	2	2	1	4	4	2	1	4	4	4	

Exercise – III (Analytical Questions)

Master Your Understanding

1. In the reaction given below :



The related statements are :

Statement-I : In (A) H_2S is oxidised because a more electronegative element Cl_2 is added to hydrogen.

Statement-II : In (B) Aluminium is oxidised because oxygen is added to it.

Statement-III : In (B) Ferrous ferric oxide is reduced.

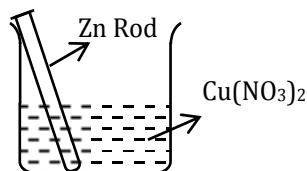
Statement-IV : Individual oxidation or reduction reactions never occur but redox reactions occur.

The correct one is :

- (1) Statement-I, II, III and IV are correct
- (2) Statement-I, II are correct but III and IV are incorrect
- (3) Statement-I, II, III and IV are incorrect
- (4) Statement-II, IV are incorrect but I and III are correct

CRR103

2.



(Zn rod in $\text{Cu}(\text{NO}_3)_2$ solution)

Statement-I : Zn loses electron to form Zn^{2+} so Zn is getting oxidised.

Statement-II : Cu acts as reducing agent.

The correct statement is :

- (1) Statement-I is correct but statement-II is wrong
- (2) Statement-I is incorrect but statement-II is correct
- (3) Statement-I and statement-II both are correct
- (4) Statement-I and statement-II both are incorrect

CRR104

3. Match the following column-I and column-II :

Column-I		Column-II	
(a)	H_2S	(p)	Oxidising agent
(b)	KMnO_4	(q)	Reducing agent
(c)	H_2O_2	(r)	Can act as both oxidising and reducing agent

(1) (a-r), (b-p), (c-q) (2) (a-q), (b-p), (c-r)

(3) (a-p), (b-q), (c-r) (4) (a-r), (b-q), (c-p)

CRR105

4. Given below are two statements:

Statement-I : Fractional oxidation number is unconvincing to us because electrons are never shared or transferred in fraction.

Statement-II : Fractional oxidation state is the average oxidation state of element.

The correct one is :

- (1) Both statement-I and statement-II are correct
- (2) Statement-I is correct but statement-II is wrong
- (3) Statement-I is wrong but statement-II is correct
- (4) Both statement-I and statement-II are wrong

CRR108

5. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion :- Oxidation state of Hydrogen is +1 in H_2O while -1 in CaH_2 .

Reason :- CaH_2 is a metal hydride and for metal hydrides, hydrogen is assigned the oxidation number of +1.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

- (1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**.
- (2) **(A)** is correct but **(R)** is not correct.
- (3) **(A)** is not correct but **(R)** is correct.
- (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.

CRR109

6. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)**.

Assertion :- The average oxidation no. of sulphur in $\text{Na}_2\text{S}_4\text{O}_6$ is 2.5

Reason :- Two S-atoms are not directly linked with O-atoms.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

- (1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**.
 (2) **(A)** is correct but **(R)** is not correct.
 (3) **(A)** is not correct but **(R)** is correct.
 (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.

CRR110

7. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)**.

Assertion :- The decomposition of H_2O_2 to form H_2O and O_2 is an example of disproportionation reaction.

Reason :- The oxygen of peroxide is in -1 oxidation state and it is converted to zero

oxidation state in O_2 and -2 oxidation state in H_2O .

In the light of the above statements, choose the **most appropriate** answer from the options given below :

- (1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**.
 (2) **(A)** is correct but **(R)** is not correct.
 (3) **(A)** is not correct but **(R)** is correct.
 (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.

CRR111

8. From the following options :

- (A) Oxidation state of Br in Br_3O_8 is $+10/3$
 (B) Oxidation state of C in C_3O_2 is $+1$
 (C) Oxidation state of S in $\text{S}_4\text{O}_6^{2-}$ is $+2.5$
 (D) Oxidation state of H in metal hydrides is -1
 (E) Oxidation state of P in P_4 is $-1/4$

The correct option is :

- (1) A, B, C, D and E one correct
 (2) A, C, D and E are correct
 (3) B, C, D and E are correct
 (4) C and D are correct

CRR112

EXERCISE-III (Analytical Questions)

ANSWER KEY

Question	1	2	3	4	5	6	7	8	
Answer	1	1	2	1	2	1	4	4	