YAKEEN NEET 2.0

Physical Chemistry

2026

Redox Reactions & Volumetric Analysis

Complete PDF of all Questions

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Questions on Basic Concepts of Chemistry

1. Which of the following is not a physical change?
   (A) Boiling of water
   (B) Melting of ice
   (C) Rusting of iron
   (D) Dissolving sugar in water
2. Which of the following is a diatomic molecule?
   (A) Carbon dioxide
   (B) Methane
   (C) Ammonia

5. Which unit is used to express concentration?
   (A) Gram (B) Mole
   (C) Molarity (D) Atomic massiunit
6. Avogadro's number is the number of particles in
   (A) 1 g of a a substance
   (B) 1 cm'? of a substance
   (D) 1 L of a substance

Questions on Basics Concepts of Chemistry

1. 1 mole contains
   (A) 6.022×10^{-23} particles
   (B) 1.66×10^{-23} particles
   (C) 3.01×10^{-23} particles
   (D) 1.00×10^{-23} particles
2. The molecular mass of H_3O is
   (A) 16 u (B) 18 u
   (C) 20 u (D) 22 u

7. Which is the lightest subatomic particle?
   (A) Proton (B) Neutron
   (C) Electron (D) Positron
8. Which of the following has the same number of protons and electrons?
   (A) Sodium atom
   (B) Magnesium ion
   (C) Chloride ion
   (D) Hydrogen molecule

QUESTION – (AIEEE 2002)

Oxidation number of Cl in $CaOCl_2$, (Bleaching powder) is:

A. Zero, since it contains Cl_2

B. –1, since it contains Cl^-

C. +1, since it contains ClO^-

D. +1 and –1, since it contains ClO^- and Cl^-

QUESTION – (AIEEE 2002)

Which of the following is a redox reaction?

A $NaCl + KNO_3 \longrightarrow NaNO_3 + KCl$

B $CaC_2O_4 + 2HCl \longrightarrow CaCl_2 + H_2C_2O_4$

C $Ca(OH)_2 + 2NH_4Cl \longrightarrow CaCl_2 + 2NH_3 + 2H_2O$

D $2K[Ag(CN)_2] + Zn \longrightarrow 2Ag + K_2[Zn(CN)_4]$

QUESTION – (AIEEE 2020)

The oxidation number of the underlined atom in the following species. Identify the incorrect option

A. $\underline{Cl}O_3^-$ is +5

B. $K_2\underline{Cr}_2O_7$ is +6

C. $H\underline{Au}Cl_4$ is +3

D. $Cu_2\underline{O}$ is –1

QUESTION – (AIEEE 2016)

In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ which has two (–O–O–) bonds. Oxidation state of Cr in CrO_5 is:

A. +3

B. +6

C. –10

D. +5

QUESTION – (AIEEE 2014)

The oxidation state of Cr in CrO_5 is:

A. –6

B. +12

C. +6

D. +4

QUESTION – (AIEEE 2012)

In which of the following compounds, nitrogen exhibits highest oxidation state?

A NH_2OH

B N_2H_4

C NH_3

D N_3H

QUESTION – (AIEEE 2016)

Hot concentrated sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions does not show oxidizing behaviour.

A $C + 2H_2SO_4 \longrightarrow CO_2 + 2SO_2 + 2H_2O$

B $CaF_2 + H_2SO_4 \longrightarrow CaSO_4 + 2HF$

C $Cu + 2H_2SO_4 \longrightarrow CuSO_4 + SO_2 + 2H_2O$

D $3S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

QUESTION – (AIEEE 2009)

Oxidation number of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$, are respectively:

A. +3, +6 and +5

B. +5, +3 and +6

C. –3, +6 and +6

D. +5, +6 and +6

QUESTION – (AIEEE 2004)

Which is the best description of the behaviour of bromine in the reaction given below: $H_2O + Br_2 \longrightarrow HOBr + HBr$

A. Both oxidised and reduced

B. Oxidised only

C. Reduced only

D. Proton acceptor only

QUESTION – (AIEEE 1999)

In which of the following compounds, transition metal has zero oxidation state?

A $[Fe(CO)_5]$

B $NH_2 - NH_2$

C $NOClO_4$

D CrO_5

QUESTION – (AIEEE 1997)

Which of the following is redox reaction?

A. Evaporation of H_2O

B. Both oxidation and reduction

C. H_2SO_4 with NaOH

D. In atmosphere O_3 from O_2 by lighting

QUESTION – (AIEEE 1994)

Which substance is serving as a reducing agent in the following reaction

$$14H^+ + Cr_2O_7^{2-} + 3Ni \longrightarrow 7H_2O + 3Ni^{2+} + 2Cr^{3+}$$

A H^+

B $Cr_2O_7^{2-}$

C H_2O

D Ni

QUESTION – (AIEEE 1994)

The oxidation state of I in $H_4IO_6^-$ is:

A. +1

B. –1

C. +7

D. +5

1. Which of the following has the highest number of atoms?

A. 1 mol of O2

B. 1 mol of H2O

C. 1 mol of CO2

D. 1 mol of CH4

2. The empirical formula of a compound containing 80% C and 20% H by ma

A. CH

B. CH2

C. C2H5

D. CH3

3. Which statement is incorrect about limiting reagent?

A. It limits the amount of product formed
B. It is always the reactant in lesser quantity
C. It gets completely consumed
D. Its amount determines the theoretical yield

5. Which of the following statements is correct for one mole of any ideal ga
STP?

A. Has mass equal to its atomic mass
B. Has a volume of 22.4 L
C. Contains 6.023×10^20 molecules
D. Has pressure of 2 atm

6. In the reaction 2A + 3B → C + 2D, if 4 moles of A and 6 moles of B are tak
the limiting reagent is:

A. A
B. B
C. C
D. D

7. Which one of the following pairs are isoelectronic?

A. Na+, Mg2+
B. O2–, F–
C. N3–, Ne
D. All of these

8. Which of the following has maximum number of molecules?

A. 1 g of H_2
B. 1 g of O_2
C. 1 g of CO_2
D. 1 g of CH_4

9. Which of the following laws explains the law of conservation of mass?

A. Dalton’s atomic theory
B. Avogadro’s law
C. Gay-Lussac’s law
D. None of these

10. What is the equivalent mass of H_2SO_4 in acid-base reaction?

A. 49
B. 98
C. 50
D. 24.5

Some exceptional Cases of Oxidation Number

- H_2SO_5
- CrO_5
- K_3CrO_8

- C_3O_2 (Carbon Suboxide)
- Br_3O_8
- $H_2S_2O_8$

- $Na_2S_4O_6$ (Sodium Tetrathionate)

- **HN_3 (Hydrazoic acid)**

- **$CaOCl_2$ (Bleaching Powder)**

- **Fe_3O_4 ($FeO + Fe_2O_3$)**

QUESTION (AIIMS 2015)

Oxidation numbers of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively

A +3, +6 and +5

B +5, +3 and +6

C –3, +6 and +6

D +5, +6 and +6

QUESTION (AIIMS 2010, 12)

The oxidation states 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

QUESTION (AIIMS 2008)

The oxidation state of iodine in HIO_4, H_3IO_5 and H_5IO_6 are respectively

A. +1, +3, +7

B. +7, +7, +3

C. +7, +7, +7

D. +7, +5, +3

QUESTION (AIIMS 2002)

Oxidation state of Fe in Fe_3O_4 is:

A $\frac{3}{2}$

B $\frac{5}{4}$

C $\frac{4}{5}$

D $\frac{8}{3}$

QUESTION (AIIMS 2001)

Both oxidation and reduction takes place in:

A $NaBr + HCl \rightarrow NaCl + HBr$

B $HBr + AgNO_3 \rightarrow AgBr + HNO_3$

C $H_2 + Br_2 \rightarrow 2HBr$

D $CaO + H_2SO_4 \rightarrow CaSO_4 + H_2O$

QUESTION (AIIMS 2001)

Both oxidation and reduction takes place in:

A $NaBr + HCl \rightarrow NaCl + HBr$

B $HBr + AgNO_3 \rightarrow AgBr + HNO_3$

C $H_2 + Br_2 \rightarrow 2HBr$

D $CaO + H_2SO_4 \rightarrow CaSO_4 + H_2O$

QUESTION (AIIMS 2000)

In the following chemical reaction:

$Ag_2O + H_2O + 2e^- \rightarrow 2Ag + 2OH^-$

A hydrogen is reduced

B electrons are reduced

C water is oxidised

D silver is oxidised

QUESTION (AIIMS 2000)

The oxidation number of Sulphur in $H_2S_2O_7$ is:

A +2

B +6

C +4

D +8

QUESTION (AIIMS 1999)

Oxidation number of Os in OsO_4 is:

A +2

B +4

C +8

D +10

QUESTION (AIIMS 1999)

Oxidation is:

A. Gain of electrons

B. Loss of neutrons

C. Loss of electrons

D. Decrease in positive valency

QUESTION (AIIMS 1997, 2001)

The oxidation number of Cr in $K_2Cr_2O_7$ is:

A +3

B −3

C +6

D −6

QUESTION

1.806×10^{24} water molecules initially at 277 K and 1 atm are changed to 377 K and 1 atm. Thus, increase in volume is

A 11.2 L

B 27.631 L

C 67.2 L

D 91.816 L

QUESTION

Consider the following cases:

I. 10 g of $CaCO_3$ of 50% impurity gave 2.24 L CO_2 at STP.

II. 8.7 g of pyrolusite sample (MnO_2 80% pure) on reaction with concentrated HCl displaced 1.792 L Cl_2 at STP.

III. Mixture of 1 mole of Na_2CO_3 and 1 mole of $NaHCO_3$ on heating gave 11.2 L CO_2 at STP.

Select correct cases

A. I, II

B. I, II, III

C. I, III

D. II, III

QUESTION

100 mL of 1 M HCl is mixed with x mL of 2M HCI giving a solution of 1.67M HCl. Thus, x is

A 100 mL

B 200 mL

C 300 mL

D 400 mL

QUESTION

What volume of 0.50 M $BaCl_2$ will contain 3.0 mol of chloride ion?

A 1.02 L

B 3.50 L

C 3.0 L

D 4.0 L

QUESTION

What volume of 96.0% H_2SO_4 solution (density 1.83 g mL^{-1}) is required to prepare 2.00 L of 3.00 M H_2SO_4 solution.

A 335 mL

B 600 mL

C 450 mL

D 402 mL

QUESTION

2.86 g of washing soda $Na_2CO_3.\ xH_2O$ was completely neutralised by 200 mL of 0.1 N H_2SO_4.

$$Na_2CO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O + CO_2$$

Thus, x is

A 4

B 5

C 10

D 2

QUESTION

50 mL of 0.2 M NaOH and 50 mL of 0.4 M HCl react to form NaCl

A 0.585 g

B 5.85 g

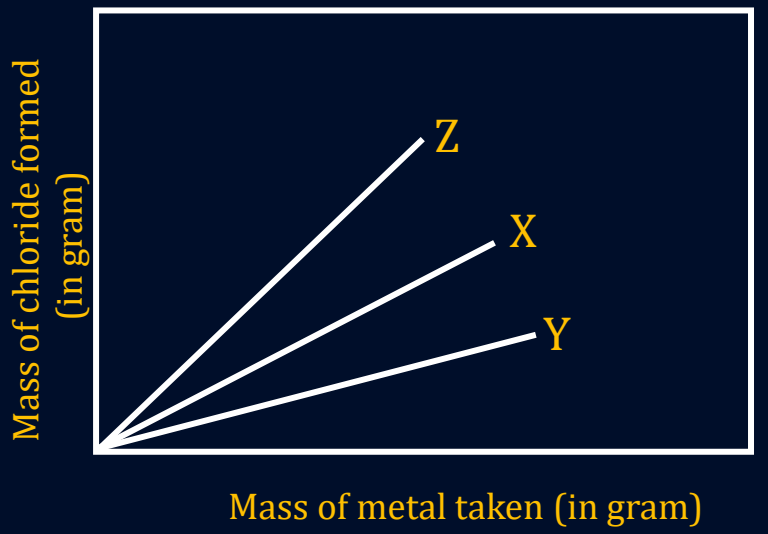
C 1.17 g

D 0.117 g

QUESTION

Alkaline earth metals X, Y, Z on reaction with Cl_2 form chloride. Graph between amount of metal taken (along X-axis) and amount of chloride formed (along Y-axis) is of the type.

Thus, atomic masses of metals X, Y and Z are in order



(A) $X < Y < Z$

(B) $Y < X < Z$

(C) $Z < X < Y$

(D) $Z < Y < X$

QUESTION

An oxide of nitrogen contains 30.4% nitrogen. Its dimer can be written as

A N_2O_2

B N_2O_4

C N_2O

D NO_2

QUESTION

A sample of pure compound contains 2.04 g of sodium, 2.65×10^{22} atoms of carbon and 0.132 mol of oxygen atom. Thus, its empirical formula is

A Na_2CO_3

B $Na_2C_2O_4$

C $Na_2(CO)_2$

D None of these

QUESTION – (NCERT: PL-242, | JEE Main Jan. 28, 2025 (I))

Match the List-I with List-II

List-I (Redox Reaction)		List-II (Type of Redox reaction)	
A.	$CH_{4(G)} + 2O_{2(g)} \xrightarrow{\Delta} CO_{2(g)} + 2H_2O_{(l)}$	(I)	Disproportionation reaction
B.	$2NaH_{(s)} + \xrightarrow{\Delta} 2Na_{(s)} + H_{2(g)}$	(II)	Combination reaction
C.	$V_2O_{5(s)} + 5Ca_{(s)} \xrightarrow{\Delta} 2V_{(s)} + 5CaO_{(s)}$	(III)	Decomposition reaction
D.	$2H_2O_{2(aq)} \xrightarrow{\Delta} 2H_2O_{(l)} + O_{2(g)}$	(IV)	Displacement reaction

Choose the correct answer from the option given below:

A (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

B (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

C (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

D (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

QUESTION – (6th April 1st Shift 2023)

Which of the following options are correct for the reaction

$2[Au(CN)_2]^-_{(aq)} + Zn_{(s)} \rightarrow 2Au_{(s)} + [Zn(CN)_4]^{2-}_{(aq)}$

(A) Redox reaction **(B) Displacement reaction**

(C) Decomposition reaction **(D) Combination reaction**

Choose the correct answer from the options given below:

A. A and B only

B. A only

C. A and D only

D. C and D only

QUESTION – (NCERT: PL-246, | JEE Main Feb. 1, 2024 (I))

Which of the following reactions are disproportionation reactions?

(A) $Cu^{+} \rightarrow Cu^{2+} + Cu$

(B) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + 2H_2O$

(C) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$

(D) $2MnO_4^{-} + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^{+}$

Choose the correct answer from the options given below :

A (A), (B)

B (B), (C), (D)

C (A), (B), (C)

D (A), (D)

QUESTION – (25th July 2nd Shift 2021)

Identify the process in which change in the oxidation state is five.

A $C_2O_4^{2-} \rightarrow 2CO_2$

B $CrO_7^{2-} \rightarrow 2Cr^{3+}$

C $CrO_4^{2-} \rightarrow Cr^{3+}$

D $MnO_4^{-} \rightarrow Mn^{2+}$

QUESTION – (7th Jan 1st Shift 2020)

Oxidation number of potassium in K_2O, K_2O_2 and KO_2 respectively, is

A +1, +1 and +1

B 2, 1 and $+\frac{1}{2}$

C +1, +2 and +4

D +1, +4 and +2

QUESTION – (7th Jan 2nd Shift 2020)

The redox reaction among the following is

A combination of dinitrogen with dioxygen at 2000 K

B formation of ozone from atmospheric oxygen in the presence of sunlight

C reaction of H_2SO_4 with NaOH

D reaction of $[Co(H_2O)_6]Cl_3$ with $AgNO_3$.

QUESTION – (Online 2017)

Which of the following reactions is an example of a redox reaction?

A $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF$

B $XeF + 2H_2O \rightarrow XeO_2F_2 + 4HF$

C $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$

D $XeF_2 + PF_5 \rightarrow [XeF]^+ PF_6^-$

QUESTION – (Online 2017)

In which of the following reactions, hydrogen peroxide acts as an oxidizing agent?

A $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

B $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

C $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$

D $HOCl + H_2O_2 \rightarrow H_2O^+ + Cl^- + O_2$

QUESTION – (2006)

Which of the following chemical reactions depicts the oxidising behaviour of H_2SO_4?

A $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O$

B $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$

C $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$

D $2PCl_5 + H_2SO_4 \rightarrow 2POCl_3 + 2HCl + SO_2Cl_2$

QUESTION – (NCERT: PL-239 | NV, JEE Main April 06, 2023 (I)

In ammonium-phosphomolybdate, the oxidation state of Mo is _____

QUESTION – (NCERT: PL-239 | NV, JEE Main April 15, 2023 (I)

In Chromyl chloride, the oxidation state of chromium is (+) _____

QUESTION – (AIEEE 2002)

Which of the following is a redox reaction?

A $NaCl + KNO_3 \longrightarrow NaNO_3 + KCl$

B $CaC_2O_4 + 2HCl \longrightarrow CaCl_2 + H_2C_2O_4$

C $Ca(OH)_2 + 2NH_4Cl \longrightarrow CaCl_2 + 2NH_3 + 2H_2O$

D $2K[Ag(CN)_2] + Zn \longrightarrow 2Ag + K_2[Zn(CN)_4]$

QUESTION – (26th June 2nd Shift 2022)

Which one of the following is an example of disproportionation reaction?

A $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

B $MnO_4^- + 4H^+ 4e^- \rightarrow MnO_2 + 2H_2O$

C $10I^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5I_2$

D $8MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$

QUESTION – (26th July 1st Shift 2022)

Which of the given reactions is not an example of disproportionation reaction?

A $2H_2O_2 \rightarrow 2H_2O + O_2$

B $2NO_2 + H_2O \rightarrow HNO_3$

C $MnO_4^- + 4H^+ + 3e^- \rightarrow MnO_2 + 2H_2O$

D $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

QUESTION – (2002)

Which of the following is a redox reaction?

A $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

B $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

C $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$

D $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

QUESTION – (NCERT: PL-239 | NV, JEE Main Jan. 27, 2024 (II)

1 mole of PbS in oxidized by "X" moles of O_3 to et "Y" moles of O_2. X + Y =

QUESTION – (NCERT: PL-242, 243 | JEE Main April 6, 2024 (II))

Match List-I with List-II

List-I (Reaction)		List-II (Type of Redox reaction)	
A.	$N_2(g) + O_2(g) \rightarrow 2NO(g)$	(I)	Decomposition
B.	$2Pb(NO_3)_2(s) \rightarrow 2PbO(s) + 4NO_2(g) + O_2(g)$	(II)	Displacement
C.	$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq.) + H_2(g)$	(III)	Disproportionation
D.	$2NO_2(g) + 2OH(aq.) \rightarrow NO_2^-(aq.) + NO_3^-(aq.) + H_2O(l)$	(IV)	combination

Choose the correct answer from the options give below:

A. (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

B. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

C. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

D. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

QUESTION – (NCERT: PL-239 | NV, JEE Main Sep. 02, 2020 (I)

The oxidation states of iron atom in compound (A), (B) and (C), respectively, are *x*, *y* and *z*. The sum of *x*, *y* and z is

$Na_4[Fe(CN)_5(NOS)]$	$Na_4[FeO_4]$	$[Fe_2(CO)_9]$
(A)	(B)	(C)

QUESTION – (NCERT: PL-239 | NV, JEE Main Jan. 27, 2024 (I)

From the given list, the number of compounds with +4 oxidation state of Sulphur

SO_3, H_2SO_3, $SOCl_2$, SF_4, $BaSO_4$, $H_2S_2O_7$

QUESTION – (NCERT: PL-239 | NV, JEE Main Sep. 02, 2020 (II)

The oxidation states of transition metal atoms in $K_2Cr_2O_7$, $KMnO_4$ and K_2FeO_4, respectively, are *x*, *y* and *z*. The of *x*, *y* and *z* is _____.

QUESTION – (NCERT: PL-239, | JEE Main Jan. 07, 2020 (I))

Oxidation number of potassium in K_2O, K_2O_2 and KO_2, respectively, is :

A. +2, +1 and +1/2

B. +1, +1 and +1

C. +1, +4 and +2

D. +1, +2 and +4

QUESTION – (NCERT: PL-239, | JEE Main Jan. 07, 2020 (I))

The oxidation state of Cr in $[Cr(H_2O)_6]Cl_3$, $[Cr(C_6H_6)_2]$ & $K_2[Cr(CN)_2(O)_2(O_2)(NH_3)]$ respectively are :

A. +3, +4 and +6

B. +3, +2 and +4

C. +3, 0 and +6

D. +3, 0 and +4

QUESTION – (NCERT: PL-239, | JEE Main Online April 19, 2014)

Among the following, identify the species with an atom in +6 oxidation state:

A $[MnO_4]$

B $[Cr(CN)_6]^{3-}$

C Cr_2O_3

D CrO_2Cl_2

QUESTION – (AIEEE 2008)

In the following change, $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

If the atomic mass of iron is 56, then its equivalent mass will be

A 42

B 21

C 63

D 84

QUESTION –

The eq. mass of $Na_2S_2O_3$ as reductant in the reaction,
$Na_2S_2O_3 + H_2O + Cl_2 \rightarrow Na_2SO_4 + 2HCl + S$

A M/1

B M/2

C M/6

D M/8

QUESTION –

The eq. mass of iodine in, $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$ is

A M

B M/2

C M/4

D None of these

QUESTION –

In the reaction, $CH_3OH \rightarrow HCOOH$ the number of electrons that must be added to the right is

A 4

B 3

C 2

D 1

QUESTION –

In the reaction, $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + H_2O + O$
The ratio of equivalent mass of $CuSO_4$ to its molecular mass is

A 1/8

B 1/4

C 1/2

D 1

QUESTION –

One mole of N_2H_4 loses 10 mole of electrons to form a new compound Y. Assuming that all nitrogen appears in the new compound, what is the oxidation number of nitrogen in Y (there is no change in the oxidation state of hydrogen)?

A. –3

B. +3

C. +5

D. +1

QUESTION –

In alkaline condition $KMnO_4$ reacts as follows,

$$2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O$$

Therefore, its equivalent mass will be

A 31.6

B 52.7

C 79.0

D 158.0

QUESTION –

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

A M

B M/2

C 2 × M

D M/6

$Cr_2O_7^{2-} + XH^+ + Ye^{\ominus} \rightarrow 2A + ZH_2O$

X, Y, Z and A are respectively are :

(A) 8, 6, 4 and Cr_2O_3

(B) 14, 7, 6 and Cr^{3+}

(C) 8, 4, 6 and Cr_2O_3

(D) 14, 6, 7 and Cr^{3+}

QUESTION – (NCERT: PL-246 | NV, JEE Main Jan. 31, 2024 (II))

Number of moles of H^+ ions required by 1 mole of MnO_4^- to oxidise oxalate ion to CO_2 is _____.

QUESTION – (NCERT: PL-246 | NV, JEE Main Jan.30, 2024 (I))

$2MnO_4^- + bI^- + cH_2O \rightarrow xI_2 + yMnO_2 + zOH^-$

If the above equation is balanced with integral coefficients, the value of z is:

Chlorine undergoes disproportionation in alkaline medium as shown below :

$a\ Cl_2(g) + b\ OH^-(aq) \rightarrow c\ ClO^-(aq) + d\ Cl^-(aq) + e\ H_2O(l)$

The values of *a*, *b*, *c* and *d* in a balanced redox reaction are respectively :

(A) 2, 2, 1 and 3

(B) 1, 2, 1 and 1

(C) 2, 4, 1 and 3

(D) 3, 4, 4 and 2

QUESTION – (31st Aug 2nd Shift 2021)

In which one of the following sets all species show disproportionation reaction?

(A) ClO_4^-, MnO_4^-, ClO_2^- and F_2

(B) MnO_4^-, ClO_2^-, Cl_2 and Mn^{3+}

(C) $Cr_2O_7^{2-}$, MnO_4^-, ClO_2^- and Cl_2

(D) ClO_2, F_2, MnO_4^- and $Cr_2O_7^{2-}$

QUESTION (AIIMS 2017)

Consider the following reaction occurring in basic medium

$2MnO_4^-(aq) + Br^-(aq) \rightarrow 2MnO_2(s) + BrO_3^-(aq)$

How the above reaction can be balanced further?

(A) By adding 2 OH^- ions on right side

(B) By adding one H_2O molecule to left side

(C) By adding $2H^+$ ions on right side

(D) Both (A) and (B)

QUESTION (AIIMS 2005)

In the balanced chemical reaction,

$IO_3^- + aI^- + bH^+ \rightarrow cH_2O + dI_2$

a, b, c and d respectively corresponds to:

(A) 5, 6, 3, 3

(B) 5, 2, 6, 3

(C) 3, 5, 3, 6

(D) 5, 6, 5, 5

QUESTION (NEET 2024)

Which reaction is **NOT** a redox reaction?

A $H_2 + Cl_2 \rightarrow 2HCl$

B $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

C $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

D $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$

QUESTION (NEET 2023)

On balancing the given redox reaction,

$aCr_2O_7^{2-} + bSO_3^{2-}(aq) + cH^+(aq) \rightarrow 2aCr^{3+}(aq) + bSO_4^{2-}(aq) + c/2\ H_2O(l)$

the coefficients a, b and c are found to be respectively:

A. 8, 1, 3

B. 1, 3, 8

C. 3, 8, 1

D. 1, 8, 3

QUESTION (NEET 2020)

What is the change in oxidation number of carbon in the following reaction?

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

A. 0 to +4

B. –4 to +4

C. 0 to –4

D. +4 to +4

QUESTION (NEET 2020-Covid)

The oxidation number of the underlined atom in the following species.
Identify the incorrect option.

A $\underline{Cl}O_3^-$ is +5

B $K_2\underline{Cr}_2O_7$ is +6

C $H\underline{Au}Cl_4$ is +3

D $Cu_2\underline{O}$ is –1

QUESTION – (AIEEE 2019)

Which of the following reactions are disproportionation reaction?

A. $2Cu^{+} \longrightarrow Cu^{2+} + Cu^{0}$

B. $3MnO_4^{2-} + 4H^{+} \longrightarrow 2MnO_4^{-} + MnO_2 + 2H_2O$

C. $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$

D. $2MnO_4^{-} + 3Mn^{2+} + 2H_2O \longrightarrow 5MnO_2 + 4H^{+}$

Select the correct option from the following:

A. (A) and (B) only

B. (A), (B) and (C)

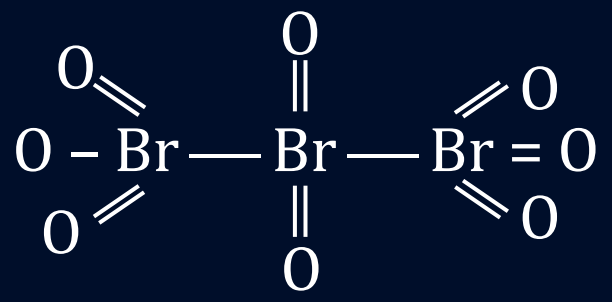
C. (A), (C) and (D)

D. (A) and (D) only

QUESTION – (AIEEE 2019)

The correct statement of tribromooctaoxide is:

A



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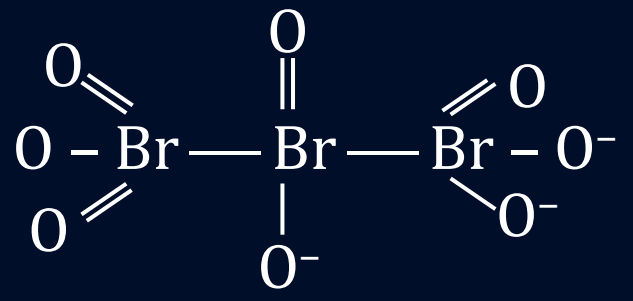

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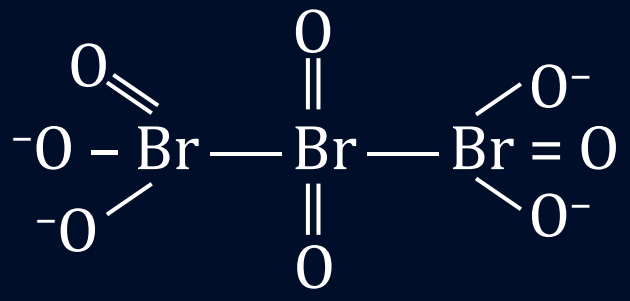
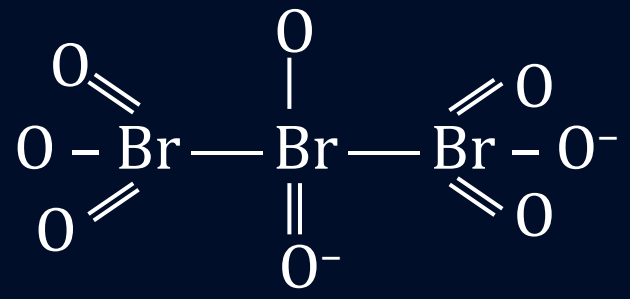


D



QUESTION (NEET 2018)

For the redox reaction

$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$

The correct coefficients of the reactants for the balanced equation are:

	MnO_4^-	$C_2O_4^{2-}$	H^+
A	16	5	2
B	2	5	16
C	5	16	2
D	2	16	5

QUESTION (NEET 2016 - I)

Hot concentrated Sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions does not show oxidizing behavior?

A $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$

B $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

C $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

D $3S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$

QUESTION (NEET 2014)

In acidic medium, H_2O_2 changes $Cr_2O_7^{-2}$ to CrO_5 which has two (—O—O—) bonds. Oxidation state of Cr in CrO_5 is:

A +3

B +6

C –10

D +5

QUESTION (NEET 2014)

The oxidation state of Cr in CrO_5 is:

A. −6

B. +12

C. +6

D. +4

QUESTION (AIPMT 2012)

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

QUESTION (AIPMT 2009)

Oxidation numbers of P in PO_4^{3-}, of S in SO_4^{2-} and the Cr in $Cr_2O_7^{2-}$ are respectively

A. +3, +6 and +5

B. + 5, +3 and +6

C. –3, +6 and +6

D. +5, +6 and +6

QUESTION (AIPMT 2003)

The oxidation states of Sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order

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 $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

QUESTION (AIPMT 2000)

A compound contains atoms of three elements A, B and C. If the oxidation number of A is +2, B is +5, and that of C is –2. The possible formula of the compound is:

A $A_2(BC_3)_2$

B $A_3(BC_4)_2$

C $A_3(B_4C)_2$

D ABC_2

QUESTION (AIPMT 1999)

The oxidation number of phosphorus in pyro-phosphoric acid is:

A +3

B +1

C +4

D +5

QUESTION (1988, 1995)

The oxidation number of chromium in potassium dichromate is:

A +6

B –5

C –2

D +2

QUESTION (1994)

Phosphorus has the oxidation state of +3 in

A Phosphorous acid

B Orthophosphoric acid

C Hypophosphorous acid

D Metaphosphoric acid

QUESTION (1999)

The following redox reaction is balanced by which set of coefficients?

$aZn + bNO_3^- + cH^+ \rightarrow dNH_4^+ + eH_2O + fZn^{2+}$

	a	b	c	d	e	f
A	1	1	10	1	3	1
B	2	2	10	2	3	2
C	4	2	10	1	3	4
D	4	1	10	1	3	4

QUESTION (1994)

In which of the following reactions, there is no change in valency?

A $4KClO_3 \longrightarrow 3KClO_4 + KCl$

B $SO_2 + 2H_2S \longrightarrow 2H_2O + 3S$

C $BaO_2 + H_2SO_4 \longrightarrow BaSO_4 + H_2O_2$

D $3BaO + O_2 \longrightarrow 2BaO_2$

QUESTION (1994)

Which substance serves as a reducing agent in the following reaction?

$14H^+ + Cr_2O_7^{2-} + 3Ni \rightarrow 2Cr^{3+} + 7H_2O + 3Ni^{2+}$

A H_2O

B Ni

C H^+

D $Cr_2O_7^{2-}$

QUESTION

1 mole of BaF_2 is mixed with 2 moles of H_2SO_4. Filtrate required _____moles of NaOH to neutralise acid.

A 2 moles of KOH

B 4 moles of KOH

C 3 moles of KOH

D 1 mole of KOH

QUESTION

The equivalent mass of an element is 4. Its chloride has a vapour density 59.25. Thus, valency of the element is

A 1

B 2

C 3

D 4

QUESTION

Equivalent mass of a divalent cation is E. Thus, molar mass of its oxide and chloride are respectively

A (E + 8)(E + 35.5)

B (E + 16) (E + 71)

C 2(E + 8), 2(E + 35.5)

D (2E + 8) (2E + 35.5)

QUESTION

Number of moles of dibasic acid in 0.10 dm^3 of the aqueous solution to give decinormal solution is

A 0.10 mol

B 0.01 mol

C 0.005 mol

D 0.50 mol

QUESTION

A divalent metal cation has equivalent weight 12. The molecular weight of its oxide is

A 16

B 32

C 40

D 52

QUESTION

What the ratio of volume of 12.0 N and 3.0 N HCl in a mixture to give 1.00 L of 6.00 N HCl.

A 1 : 1

B 2 : 1

C 1 : 2

D 1 : 3

QUESTION

Mixture of x mL of 2N HCl, 50 mL of 4 N HNO_3 and 62.5 mL of 2M H_2SO_4 is diluted to 1L. 50 mL of this solution required 25 mL of 0.5 M Na_2CO_3 solution for complete reaction. Thus, x is

A 25 mL

B 40 mL

C 60 mL

D 100 mL

QUESTION

Normality of 0.3 M H_3PO_3 solution based on the following reaction is

$$H_3PO_3 + 2OH^- \longrightarrow HPO_3^{2-} + 2H_2O$$

A 0.3 N

B 0.6 N

C 0.1 M

D 0.15 N

QUESTION

100 mL of 10% NaOH (W/V) is added to 100 mL of 10% HCl (w/V), thus resultant mixture is

A. 0.12 M in terms of H^+

B. 0.12 M in terms of OH^-

C. 0.048 M in terms of H^+

D. 0.192 M in terms of H^+

QUESTION – (AIEEE 2010)

The oxide, which cannot act as a reducing agent is:

A CO_2

B ClO_2

C NO_2

D SO_2

QUESTION –

Find volume of 0.1 M $K_2Cr_2O_7$ which will react with 3 moles of $FeSO_4$?

QUESTION –

Find moles of Sn^{2+} which will react with 5 L of 2M $K_2Cr_2O_7$ in acidic medium?

QUESTION –

The mass of potassium dichromate crystals required to oxidise 750 cm^3 of 0.6 M Mohr's salt solution is (molar mass of $K_2Cr_2O_7$ = 294)

A 0.49 g

B 0.45 g

C 22.05 g

D 2.2 g

QUESTION –

Consider a titration of potassium dichromate solution with acidified Mohr's salt solution. The number of moles of Mohr's salt required per mole of dichromate is

A 3

B 4

C 5

D 6

QUESTION –

The volume, in mL of 0.02 M $K_2Cr_2O_7$ solution required to react with 0.288 g of ferrous oxalate in acidic medium is .... (Molar mass of Fe = 56 g/mol)

QUESTION –

The equivalent mass of $MnSO_4$ is half of its molecular mass it is converted to

A Mn_2O_3

B MnO_2

C MnO_4^-

D MnO_4^{2-}

QUESTION –

The value of n in, $MnO_4^- + 8H^+ + ne^- \rightarrow Mn^{2+} + 4H_2O$ is

A 5

B 4

C 3

D 2

QUESTION –

The number of mole of oxalate ions oxidized by one mole of MnO_4^- is

A 1/5

B 2/5

C 5/2

D 5

QUESTION –

The number of mole of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate in acidic medium solution is

A 3/5

B 2/5

C 4/5

D 1

QUESTION –

The number of mole of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is

A 2/5

B 3/5

C 4/5

D 1

QUESTION –

In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecules of CO_2 is

A 2

B 5

C 1

D 10

QUESTION –

Reduction of the metal centre in aqueous permanganate ion involves:

A. 3 electrons in neutral medium

B. 5 electrons in neutral medium

C. 3 electrons in strongly alkaline medium

D. 5 electrons in acidic medium

QUESTION –

Find volume of 1M I_2 which will react with 5 moles of Hypo (Sodium thiosulphate) ($Na_2S_2O_3$)

SINGLE CHOICE QUESTIONS

QUESTION – (NCERT Exemplar)

Which of the following is not an example of redox reaction?

A $CuO + H_2 \longrightarrow Cu + H_2O$

B $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

C $2K + F_2 \longrightarrow 2KF$

D $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

QUESTION – (NCERT Exemplar)

The oxidation number of an element in a compound is evaluated on the basis of certain 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.

QUESTION – (NCERT Exemplar)

Thiosulphate reacts differently with iodine and bromine in the reactions given below:

$$2S_2O_3^{2-} + I_2 \longrightarrow S_4O_6^{2-} + 2I^-$$

$$S_2O_3^{2-} + 2Br_2 + 5H_2O \longrightarrow 2SO_4^{2-} + 2Br^- + 10H^+$$

Which of the following statements justifies the above dual behavior 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.

QUESTION – (NCERT Exemplar)

In which of the following compounds, an element exhibits two different oxidation states.

A NH_2OH

B NH_4NO_3

C N_2H_4

D N_3H

QUESTION – (NCERT Exemplar)

Which of the following arrangements represent increasing oxidation number of the central atom?

A $CrO_2^-, ClO_3^-, CrO_4^{2-}, MnO_4^-$

B $ClO_3^-, CrO_4^{2-}, MnO_4^-, CrO_2^-$

C $CrO_2^-, ClO_3^-, MnO_4^-, CrO_4^{2-}$

D $CrO_4^{2-}, MnO_4^-, CrO_2^-, ClO_3^-$

QUESTION – (NCERT Exemplar)

The largest oxidation number exhibited by an element depends on its outer electronic configuration. With which of the following outer electronic configurations the element will exhibit largest oxidation number?

A $3d^1\ 4s^2$

B $3d^3\ 4s^2$

C $3d^5\ 4s^1$

D $3d^5\ 4s^2$

QUESTION – (NCERT Exemplar)

Identify disproportionation reaction

A $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

B $CH_4 + 4Cl_2 \rightarrow CCl_4 + 4HCl$

C $2F_2 + 2OH^- \rightarrow 2F^- + OF_2 + H_2O$

D $2NO_2 + 2OH^- \rightarrow NO_2^- + NO_3^- + H_2O$

QUESTION – (NCERT Exemplar)

Which of the following elements does not show disproportionation tendency?

A Cl

B Br

C F

D I

MULTIPLE CHOICE QUESTIONS

QUESTION* – (NCERT Exemplar)

Which of the following statement(s) is/are not true about the following decomposition reaction.

$$2KClO_3 \longrightarrow 2KCl + 3O_2$$

A Potassium is undergoing oxidation.

B Chlorine is undergoing oxidation.

C Oxygen is reduced.

D None of the species are undergoing oxidation or reduction

QUESTION* – (NCERT Exemplar)

Identify the correct statement (s) in relation to the following reaction:

$$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$$

A. Zinc is acting as an oxidant.

B. Chlorine is acting as a reductant.

C. Hydrogen ion is acting as an oxidant.

D. Zinc is acting as a reductant.

QUESTION* – (NCERT Exemplar)

The exhibition of various oxidation states by an element is also related to the outer orbital electronic configuration of its atom. Atom(s) having which of the following outermost electronic configurations will exhibit more than one oxidation state in its compounds.

A $3s^1$

B $3d^1\ 4s^2$

C $3d^2\ 4s^2$

D $3s^2\ 3p^3$

QUESTION* – (NCERT Exemplar)

Identify the correct statements with reference to the given reaction

$$P_4 + 3OH^- + 3H_2O \longrightarrow PH_3 + 3H_2PO_2^-$$

A. Phosphorus is undergoing reduction only.

B. Phosphorus is undergoing oxidation only.

C. Phosphorus is undergoing oxidation as well as reduction.

D. Hydrogen is undergoing neither oxidation nor reduction

MATRIX MATCH TYPE QUESTIONS

QUESTION – (NCERT Exemplar)

Match Column I with Column II for the oxidation states of the central atoms.

Column I	Column II
(i) $Cr_2O_7^{2-}$	(a) + 3
(ii) MnO_4^-	(b) + 4
(iii) VO_3^-	(c) + 5
(iv) FeF_6^{3-}	(d) + 6
	(e) + 7

QUESTION – (NCERT Exemplar)

Match the items in Column I with relevant items in Column II.

Column I	Column II
(i) Ions having positive charge	(a) + 7
(ii) The sum of oxidation number of all atoms in a neutral molecule	(b) – 1
(iii) Oxidation number of hydrogen ion (H^+)	(c) + 1
(iv) Oxidation number of fluorine in NaF	(d) 0
(v) Ions having negative charge	(e) Cation
	(f) Anion

ASSERTION AND REASON TYPE

QUESTION – (NCERT Exemplar)

Assertion (A) : Among halogens fluorine is the best oxidant.
Reason (R) : Fluorine is the most electronegative atom.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. Both A and R are false.

QUESTION – (NCERT Exemplar)

Assertion (A) : In the reaction between potassium permanganate and potassium iodide, permanganate ions act as Oxidising agent.

Reason (R) : Oxidation state of manganese changes from +2 to +7 during the reaction.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D Both A and R are false.

QUESTION – (NCERT Exemplar)

Assertion (A) : The decomposition of hydrogen peroxide to form water and oxygen is an example of disproportionation reaction.

Reason (R) : 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.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. Both A and R are false.

THANK YOU