

17. Oxidation and Reduction**SOLUTIONS****TEACHING TASK****JEE MAIN LEVEL QUESTIONS**

1. Oxidation state of nitrogen is not an integer in
A) Hydroxyl amine (NH_2OH) B) Ammonia (NH_3)
C) Hydrazine (N_2H_4) D) Hydrazoic acid (N_3H)

Answer: DSolution: A) NH_2OH : N = -1B) NH_3 : N = -3C) N_2H_4 : N = -2D) HN_3 : N = -1/3 (average, not integer)

2. The oxidation state of phosphorus is maximum in
A) Phosphine (PH_3) B) Diphosphine (P_2H_4)
C) Metaphosphoric acid (HPO_3) D) Phosphorus acid (H_3PO_3)

Answer: CSolution: A) PH_3 : P = -3B) P_2H_4 : P = -2C) HPO_3 : P = +5D) H_3PO_3 : P = +3

3. The oxidation state of oxygen is maximum in
A) Bleaching powder ($CaOCl_2$) B) Oxygen difluoride (OF_2)
C) Dioxygen difluoride (O_2F_2) D) Hydrogen peroxide (H_2O_2)

Answer: BSolution: A) $CaOCl_2$: O = -2B) OF_2 : O = +2C) O_2F_2 : O = +1D) H_2O_2 : O = -1

4. The oxidation number of chlorine is maximum in
A) $HOCl$ B) Cl_2O_6 C) $KClO_4$ D) $NaClO_3$

Answer: CSolution: A) $HOCl$: Cl = +1B) Cl_2O_6 : Cl = +6C) $KClO_4$: Cl = +7D) $NaClO_3$: Cl = +5

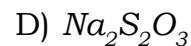
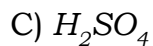
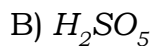
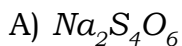
5. One of the following element always exhibits only -1 oxidation state in all of its compounds with other elements. The element is
A) Hydrogen B) Sodium C) Fluorine D) Oxygen

Answer: C

Solution: Fluorine is always -1 in compounds

6. In one of the following compounds, the oxidation number of sulphur is not a

whole number



Answer:A

Solution: A) $\text{Na}_2\text{S}_4\text{O}_6$

$$2(1) + 4S + 6(-2) = 0$$

$$4S = 10 \rightarrow S = 2.5$$

Others have integer values

7. Which of the following statements is wrong

A) Oxidation number of oxygen is +1 in peroxides

B) Oxidation number of oxygen is +2 in oxygen difluoride

C) Oxidation number of oxygen is -1/2 in super oxides

D) Oxidation number of oxygen is -2 in most of its compounds

Answer:A

Solution: O is -1 in peroxides (not +1)

8. In the conversion of $\text{CrO}_4^{2-} \rightarrow \text{Cr}_2\text{O}_7^{2-}$, the oxidation number of chromium

A) increases

B) decreases

C) becomes zero

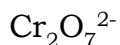
D) remains unchanged

Answer:D

Solution: CrO_4^{2-}

$$\text{Cr} + 4(-2) = -2$$

$$\text{Cr} = -2 + 8 \rightarrow \text{Cr} = 6$$



$$2\text{Cr} + 7(-2) = -2$$

$$2\text{Cr} = 12$$

$$\text{Cr} = 6$$

9. Oxidation number of carbon is zero in the compound

A) methyl chloride

B) chloroform

C) glucose

D) carbon tetrachloride

Answer:C

Solution: A) Methyl chloride (CH_3Cl)

H = +1 (each), Cl = -1

Let C = x

$$\text{Equation: } x + 3(+1) + (-1) = 0 \rightarrow x + 3 - 1 = 0 \rightarrow x = -2$$

Oxidation state: -2

B) Chloroform (CHCl_3)

H = +1, Cl = -1 (each)

$$\text{Equation: } x + 1 + 3(-1) = 0 \rightarrow x + 1 - 3 = 0 \rightarrow x = +2$$

Oxidation state: +2

C) Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$)

For organic compounds, we calculate average oxidation state:

H = +1 (each), O = -2 (each)

$$\text{Total: } 6x + 12(+1) + 6(-2) = 0 \rightarrow 6x + 12 - 12 = 0 \rightarrow 6x = 0 \rightarrow x = 0$$

Average oxidation state: 0 (but individual carbons vary)

D) Carbon tetrachloride (CCl_4)

Cl = -1 (each)

$$\text{Equation: } x + 4(-1) = 0 \rightarrow x - 4 = 0 \rightarrow x = +4$$

Oxidation state: +4

10. If three electrons are lost by Mn^{+3} , its final oxidation state would be
 A) 0 B) +6 C) +2 D) +4

Answer: B

Solution: Initial: +3

Final: $+3 + 3 = +6$

11. Oxidation number and Covalency of sulphur in S_8 molecule are respectively
 A) 6 and 8 B) 0 and 8 C) 0 and 2 D) 6 and 2

Answer: C

Solution: In S_8 (elemental sulfur), each sulfur atom has an oxidation number of 0 since it's in its free state.

Covalency refers to the number of covalent bonds formed by an atom. In S_8 (a puckered ring structure), each sulfur forms 2 covalent bonds with neighboring sulfur atoms.

12. Sum of the oxidation numbers of carbon in acetaldehyde is
 A) -2 B) +2 C) -4 D) -1

Answer: A

Solution: Acetaldehyde (CH_3CHO) has 2 carbon atoms:

CH_3 group (C1): 3 H atoms (+1 each)

Let C1 = x

Equation: $x + 3(+1) = 0 \rightarrow x = -3$

CHO group (C2): 1 H atom (+1), 1 O atom (-2)

Let C2 = y

Equation: $y + 1 + (-2) = 0 \rightarrow y = +1$

Total oxidation numbers: -3 (C1) + $+1$ (C2) = -2

13. In bleaching powder oxidation states of Cl are
 A) -1, +2 B) -2, +1 C) -1, +1 D) -2, +1

Answer: C

Solution: Bleaching powder (CaOCl_2) contains two chlorine atoms with different oxidation states:

Cl^- (hypochlorite ion, ClO^-): Cl = +1

Cl^- (chloride ion, Cl^-): Cl = -1

Thus, the oxidation states are -1 and +1.

14. Oxidation numbers of sodium, mercury in sodium amalgam are
 A) zero, zero B) +1, -1 C) -2, +2 D) 0, +1

Answer: A

Solution: Sodium amalgam is an alloy of sodium (Na) and mercury (Hg).

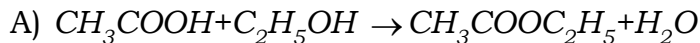
In alloys, elements retain their elemental oxidation state (0) because no electron transfer occurs.

Thus, both Na and Hg have oxidation numbers of 0.

15. Which of the following is a redox reaction
 A) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
 B) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
 C) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
 D) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$

Answer:C

Solution:

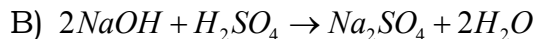


Type of Reaction: Esterification (organic reaction forming an ester).

Oxidation States:

Carbon in CH_3COOH : Remains +3 (carboxyl C) and -3 (methyl C).Carbon in $\text{C}_2\text{H}_5\text{OH}$: Remains -2 (alcohol C).

No change in oxidation states occurs.

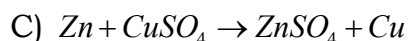


Type of Reaction: Neutralization (acid-base reaction).

Oxidation States:

Na remains +1, O remains -2, H remains +1, S remains +6.

No change in oxidation states.

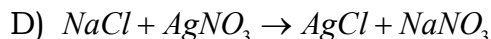


Type of Reaction: Single displacement (metal replacement).

Oxidation States:

Zn: Changes from 0 (elemental) to +2 (in ZnSO_4) → Oxidized.Cu: Changes from +2 (in CuSO_4) to 0 (elemental) → Reduced.

Conclusion: Redox reaction (Zn is oxidized, Cu is reduced).



Type of Reaction: Double displacement (precipitation).

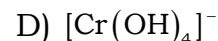
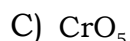
Oxidation States:

Na remains +1, Cl remains -1, Ag remains +1, N remains +5, O remains -2.

No change in oxidation states.

JEE ADVANCED LEVEL QUESTIONS**Multi correct answer type:**

16. The oxidation number of Cr = +6 in

**Answer:B,C**Solution: A) FeCr_2O_4

Oxidation states: Fe: Typically +2 or +3.

O: -2 (each).

Let Cr = x.

Equation for Fe^{2+} : $+2 + 2x + 4(-2) = 0 \rightarrow 2 + 2x - 8 = 0 \rightarrow 2x = 6 \rightarrow x = +3$.

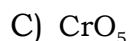


Oxidation states:

K: +1, Cl: -1, O: -2 (each).

Let Cr = x.

Equation: $+1 + x + 3(-2) + (-1) = 0 \rightarrow 1 + x - 6 - 1 = 0 \rightarrow x = +6$.



K: +1, Cl: -1, O: -2 (each).

Let Cr = x.

Equation: $+1 + x + 5(-2) + (-1) = 0 \rightarrow 1 + x - 10 - 1 = 0 \rightarrow x = +10$.

Actually CrO_5 has 4 peroxo O (-1 each) and 1 O (-2): total O = $4(-1) + 1(-2) = -6 \rightarrow x - 6 = 0 \rightarrow x = +6$

D) $[\text{Cr}(\text{OH})_4]^-$

Oxidation states:

OH: -1 (each).

Let Cr = x.

Equation: $x + 4(-1) = -1 \rightarrow x - 4 = -1 \rightarrow x = +3$.

17. The reaction $\text{Cu}_2\text{O} \rightarrow \text{CuO} + \text{Cu}$ is an example of

- A) Oxidation B) Reduction C) redox reaction D) Decomposition

Answer: C, D

Solution: Assign Oxidation States:

In Cu_2O : Each Cu: +1 (since O is -2, and total charge is 0: $2(+1) + (-2) = 0$).

In Cu (metal): 0 (elemental form).

In CuO: Cu: +2, O: -2.

Identify Changes in Oxidation States:

Cu in Cu_2O (+1) changes to:

Cu (0): Reduction (gain of electrons, oxidation state decreases from +1 to 0).

CuO (+2): Oxidation (loss of electrons, oxidation state increases from +1 to +2).

Thus it's redox (C) and also disproportionation (a type of redox).

It's also decomposition (D) of a compound into two different substances.

18. In which of the following process nitrogen is reduced ?

- A) $\text{NH}_4^+ \longrightarrow \text{N}_2$ B) $\text{NO}_3^- \longrightarrow \text{NO}$ C) $\text{NO}_2 \longrightarrow \text{NO}_2^-$ D) $\text{NO}_3^- \longrightarrow \text{NH}_4^+$

Answer: B, C, D

Solution: A) $\text{NH}_4^+ \longrightarrow \text{N}_2$

$\text{NH}_4^+ \rightarrow -3$

N_2 : N = 0 (elemental form).

Change: $-3 \rightarrow 0$ (oxidation, not reduction)

B) $\text{NO}_3^- \longrightarrow \text{NO}$

NO_3^- : N = +5 (O is -2, total charge = -1: $x + 3(-2) = -1 \rightarrow x = +5$).

NO: N = +2 (O is -2: $x + (-2) = 0 \rightarrow x = +2$).

Change: $+5 \rightarrow +2$ (Decrease by 3).

Conclusion: Reduction (correct).

C) $\text{NO}_2 \longrightarrow \text{NO}_2^-$

Oxidation state of N in NO_2 : +4

Oxidation state of N in NO_2^- : +3

Change: $+4 \rightarrow +3$ (Decrease by 1).

Conclusion: Reduction (correct).

D) $\text{NO}_3^- \longrightarrow \text{NH}_4^+$

Oxidation state of N in NO_3^- : +5

Oxidation state of N in NH_4^+ : -3

Change: +5 \rightarrow -3 (reduction, as the oxidation state decreases)

Statement Type/Assertion and Reason Type:

19. **Assertion (A)** : Fluorine always exhibit an oxidation state of -1 in its compounds

Reason (R) : Fluorine has maximum electronegativity and it contains seven electrons in its valence shell

Answer:A

Solution: Assertion (A) is true because fluorine, being the most electronegative element, always gains one electron to achieve a stable octet, resulting in an oxidation state of -1 in all its compounds.

Reason (R) is also true because fluorine's high electronegativity (highest among all elements) and its need for one more electron to complete its valence shell (7 valence electrons) explain why it always attains a -1 oxidation state.

20. **Statement I** : Oxidation number of Cl atom is zero in Cl_2

Statement II : Oxidation number of homonuclear molecule is taken as

Zero

Answer:A

Solution: Statement I is true because in Cl_2 (a diatomic molecule of the same element), the shared electrons are equally distributed, resulting in an oxidation state of 0 for each Cl atom.

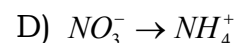
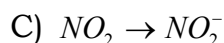
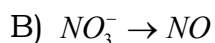
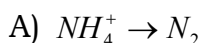
Statement II is also true because, by definition, the oxidation number of any element in its pure form (including homonuclear molecules like Cl_2 , O_2 , N_2 , etc.) is always zero.

Comprehension Type

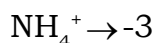
Oxidation number (or oxidation state) is a concept in chemistry used to represent the apparent charge of an atom in a compound. It's a hypothetical charge assigned to an atom based on a set of rules and assumptions, and it is a useful tool for balancing redox reactions.

Oxidation and reduction are two fundamental processes in chemistry that often occur together in what is known as a redox (reduction-oxidation) reaction. These processes involve the transfer of electrons between chemical species.

21. Which of the following process nitrogen is oxidised

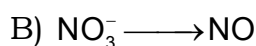
**Answer:A**

Solution: Solution: A) $\text{NH}_4^+ \rightarrow \text{N}_2$



N_2 : N = 0 (elemental form).

Change: $-3 \rightarrow 0$ (oxidation, not reduction)

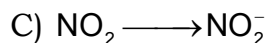


NO_3^- : N = +5 (O is -2, total charge = -1: $x + 3(-2) = -1 \rightarrow x = +5$).

NO : N = +2 (O is -2: $x + (-2) = 0 \rightarrow x = +2$).

Change: $+5 \rightarrow +2$ (Decrease by 3).

Conclusion: Reduction (correct).

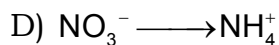


Oxidation state of N in NO_2 : +4

Oxidation state of N in NO_2^- : +3

Change: $+4 \rightarrow +3$ (Decrease by 1).

Conclusion: Reduction (correct).



Oxidation state of N in NO_3^- : +5

Oxidation state of N in NH_4^+ : -3

Change: $+5 \rightarrow -3$ (reduction, as the oxidation state decreases)

22. In the reaction $2\text{BaO}_2 \rightarrow 2\text{BaO} + \text{O}_2$ the oxidation number of Barium

A) Decreases from +4 to +2

B) Decreases from +2 to 0

C) Increases from -4 to -2

D) Does not change

Answer: D

Solution: $2\text{BaO}_2 \rightarrow 2\text{BaO} + \text{O}_2$

In BaO_2 (barium peroxide), oxygen is in the -1 oxidation state (peroxide ion, O_2^{2-}). Since there are two oxygens each at -1, the total negative charge is -2, so barium must be +2.

In BaO , oxygen is in the usual -2 oxidation state (oxide ion), so barium is still +2.

Matrix Matching Type:

23.

List - I

(Compound)

List - II

(Oxidation no of sulphur)

A) $\text{H}_2\text{S}_2\text{O}_8$

3) + 6

B) H_2S

5) - 2

C) Na_2SO_3

4) + 4

D) S_2Cl_2

1) + 1

Answer: A-3, B-5, C-4, D-1

Solution:

A) $\text{H}_2\text{S}_2\text{O}_8$

$$2(\text{H}) + 2(\text{S}) + 8(\text{O}) = 0$$

Substitute known values:

$$2(+1) + 2x + [2(-1) + 6(-2)] = 0$$

$$\text{Simplify: } 2 + 2x + (-2 - 12) = 0$$

$$2 + 2x - 14 = 0$$

$$x = +6$$

B) H_2S

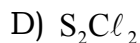
$$2(1) + \text{S} = 0$$

$$\text{S} = -2$$

C) Na_2SO_3

$$2(1) + \text{S} + 3(-2) = 0$$

$$S = +4$$



$$2S + 2(-1) = 0$$

$$2S = 2$$

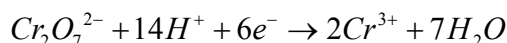
$$S = +1$$

Integer Type:

24. The number of electrons involved in the half-reaction $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$ is ____

Answer:6

Solution: Balance the half-reaction for $Cr_2O_7^{2-}$



Chromium goes from +6 (in $Cr_2O_7^{2-}$) to +3 (in Cr^{3+})

Total electrons transferred: 6 (to balance the charge).

For $2Cr^{3+}$: No change in oxidation state, so 0 electrons are involved.

Conclusion:

The half-reaction involves 6 electrons.

25. The oxidation state of phosphorus in $Ba(H_2PO_2)_2$ is ____

Answer:1

Solution: The compound $Ba(H_2PO_2)_2$

1 Ba atom: +2

4 H atoms: $4 \times (+1) = +4$

4 O atoms: $4 \times (-2) = -8$

2 P atoms: 2x

Total charge on the compound is 0 (neutral): $2 + 4 - 8 + 2x = 0$

$$2x - 2 = 0 \rightarrow x = +1$$

LEARNERS TASK**CONCEPTUAL UNDERSTANDING QUESTIONS**

1. The oxidation state of sulphur in $Na_2S_4O_6$ is

A) 3/2

B) 2/3

C) 5/2

D) 2/5

Answer:C

Solution: $Na_2S_4O_6$

$$2(1) + 4S + 6(-2) = 0$$

$$4S - 10 = 0$$

$$4S = 10$$

$$S = 10/4 = 5/2$$

2. Phosphorous exhibits highest oxidation state in

A) PH_3

B) H_3PO_3

C) $Ca_3(POD)_2$

D) H_3PO_2

Answer:C

Solution: A) PH_3 : -3

B) H_3PO_3 : +3

C) $\text{Ca}_3(\text{PO}_4)_2$: +5 (highest)

D) H_3PO_2 : +1.

3. Oxidation state of 'S' in S_8 molecule is

A) 0

B) +2

C) +4

D) +6

Answer:A

Solution: In elemental form (S_8), the oxidation state is 0.

4. Oxidation state of N in N_3H is

A) +1/3

B) +3

C) -1/3

D) -1

Answer:C

Solution: Let the oxidation state of N be

$$3x + 1 = 0$$

$$3x = -1$$

$$x = -1/3$$

5. Oxidation number of C in CH_2O is

A) -2

B) +2

C) 0

D) 4

Answer:C

Solution: $x + 2(+1) + (-2) = 0$

$$x = 0.$$

6. Oxidation state of Fe in $\text{K}_4[\text{Fe}(\text{CN})_6]$

A) +6

B) +4

C) +2

D) +5

Answer:C

Solution: $\text{K}_4[\text{Fe}(\text{CN})_6]$

CN^- has -1 charge.

$$4(+1) + x + 6(-1) = 0$$

$$x = +2.$$

7. Oxidation number and valency of oxygen in OF_2 are

A) +1, 2

B) +2, 2

C) +1, 1

D) +2, 1

Answer:B

Solution: OF_2 oxidation number

$$x + 2(-1) = 0$$

$$x = +2$$

Valency = 2 (forms 2 bonds).

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

A) HClO_4

B) HClO_3

C) HClO_2

D) HCl

Answer:B

Solution: A) HClO_4 : +7

B) HClO_3 : +5 (correct)

C) HClO_2 : +3

D) HCl : -1.

9. All elements commonly exhibit an oxidation state of

A) +1

B) -1

C) zero

D) +2

Answer:C

Solution: All elements in their free state (e.g., O_2 , Na, S_8) have 0 oxidation state.

10. The maximum oxidation state that fluorine exhibits is

- A) -1 B) zero C) +1 D) +2

Answer:A

Solution: Fluorine is the most electronegative element and only exhibits -1

JEE MAIN LEVEL QUESTIONS

11. The minimum oxidation state that nitrogen exhibits is

- A) -2 B) -3 C) -4 D) -5

Answer:B

Solution: Nitrogen's lowest oxidation state is -3 (e.g., in NH_3 or metal nitrides like Li_3N).

12. What is the oxidation state of carbon in carbondioxide?

- A) +2 B) +4 C) +6 D) +1

Answer:B

Solution: Oxygen is -2 each.

$$x + 2(-2) = 0 \rightarrow x = +4.$$

13. In which of the following compounds oxygen exhibits an oxidation state of +2?

- A) H_2O B) H_2O_2 C) OF_2 D) H_2SO_4

Answer:C

Solution: A) H_2O : -2

B) H_2O_2 : -1 (peroxide)

C) OF_2 : +2 (fluorine is -1, so oxygen is +2)

D) H_2SO_4 : -2.

14. The oxidation number of sulphur in S_8 , S_2F_2 and H_2S are

- A) 0, +1 and -2 B) +2, +1 and -2 C) 0, +1 and +2 D) -2, +1 and -2

Answer:A

Solution: S_8 (elemental sulfur): 0

S_2F_2 : Fluorine is -1, so sulfur is +1.

H_2S : Hydrogen is +1, so sulfur is -2.

15. Chlorine is passed into dilute, cold KOH solution. What are the oxidation numbers of chlorine in the products formed?

- A) -1, +5 B) -1, +3 C) +1, +7 D) +1, -1

Answer:D

Solution: The reaction produces KClO (hypochlorite, Cl = +1) and KCl (chloride, Cl = -1).

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

- A) Nitrogen B) Oxygen C) Fluorine D) Chlorine

Answer:C

Solution: Fluorine is the most electronegative element and always has -1 in compounds.

17. In the conversion of $K_2Cr_2O_7$ to K_2CrO_4 the oxidation number of the following

changes

A) K

B) Cr

C) Oxygen

D) None

Answer:D

Solution: In $K_2Cr_2O_7$, Cr is +6.

In K_2CrO_4 , Cr is still +6.

No change occurs (trick question!). Correct answer is D) None.

18. The oxidation number of 'N' in HN_3 is

A) +1/3

B) 0

C) -1/3

D) 1

Answer:C

Solution: Let oxidation state of N be x.

$$1 + 3x = 0 \rightarrow x = -1/3$$

19. Oxidation number of sulphur in oleum ($H_2S_2O_7$) is

A) +4

B) +2

C) -2

D) +6

Answer:D

Solution: Structure: $HO-SO_2-O-SO_2-OH$ (each S bonded to 4 O atoms).

$$\text{Calculation: } 2(+1) + 2x + 7(-2) = 0 \rightarrow x = +6.$$

20. The element which has only one oxidation state in its compounds is

A) Hydrogen

B) Oxygen

C) Nitrogen

D) Fluorine

Answer:D

Solution: Fluorine is always -1 (no exceptions).

JEE ADVANCED LEVEL QUESTIONS

Multicorrect Answer Type

21. $3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$ the correct statement for the reaction is

A) Cu is oxidized

B) HNO_3 is reduced

C) Cu is reduced

D) Cu acts as reducing agent

Answer:A,B,D

Solution: A) Cu is oxidized \rightarrow Correct (Oxidation state changes from 0 to +2).

B) HNO_3 is reduced \rightarrow Correct (Nitrogen's oxidation state changes from +5 (in HNO_3) to +2 (in NO)).

D) Cu acts as a reducing agent \rightarrow Correct (Since Cu is oxidized, it donates electrons, making it a reducing agent).

22. Which of the following have been arranged in order of decreasing oxidation number of Sulphur?

A) $H_2S_2O_7 > Na_2S_4O_6 > Na_2S_2O_3 > S_8$

B) $SO^{2+} > SO_4^{2-} > SO_3^{2-} > HSO_4^-$

C) $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

D) $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

Answer:A,C

Solution: Oxidation Numbers of S in Given Compounds:

A) $H_2S_2O_7$ (Disulfuric acid): $2(+1) + 2x + 7(-2) = 0 \rightarrow x = +6$

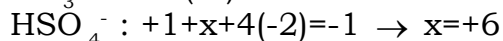
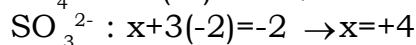
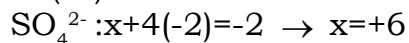
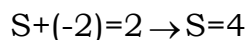
$Na_2S_4O_6$: $2(1) + 4S + 6(-2) = 0 \rightarrow 4S = 10 \rightarrow S = 10/4 \rightarrow S = 2.5$

$Na_2S_2O_3$: $2(1) + 2S + 3(-2) = 0 \rightarrow 2S = 4 \rightarrow S = 2$

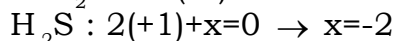
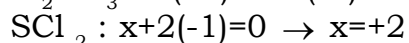
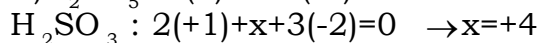
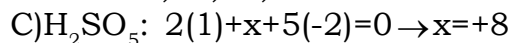
S_8 : $S = 0$

Order: $+6 > 2.5 > 2 > 0 \rightarrow$ Correct decreasing order.

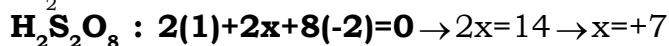
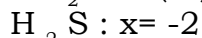
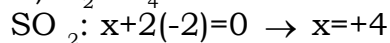
B) SO^{2+}



Order: +4, +6, +4, +6 \rightarrow Not in decreasing order.



Order: +8 > +4 > +2 > -2 \rightarrow Correct decreasing order.



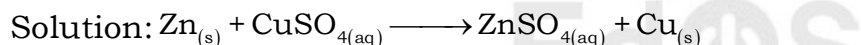
Order: +6, +4, -2, +7 \rightarrow Not in decreasing order.

Statement Type / Assertion and Reason Type:

23. **Assertion (A)** : $Zn_{(s)} + CuSO_{4(aq)} \longrightarrow ZnSO_{4(aq)} + Cu_{(s)}$ is an redox reaction.

Reason (R) : A reaction in which oxidation and reduction takes place simultaneously is called redox reaction.

Answer:A



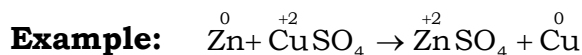
Oxidation: Zn (Zinc) loses electrons $\rightarrow Zn \rightarrow Zn^{2+} + 2e^-$

Reduction: Cu^{2+} (from $CuSO_4$) gains electrons: $Cu^{2+} + 2e^- \rightarrow Cu$

Since both oxidation and reduction occur simultaneously, this is indeed a redox reaction.

Comprehension Type:

Removal of electron(s) from atom (or) an ion is called oxidation (or) increase in the oxidation number is called oxidation. Addition of electron(s) to an atom or an ion is called reduction (or) decrease in the oxidation number is called reduction.



24. The atom under going oxidation is:

A) Zn

B) Cu

C) S

D) $CuSO_4$

Answer:A



Oxidation: Zn (Zinc) loses electrons $\rightarrow Zn \rightarrow Zn^{2+} + 2e^-$

25. Which of the following undergoes reduction?

A) Zn

B) Cu^{+2}

C) O

D) $CuSO_4$

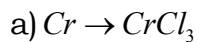
Answer:B

Solution: Reduction: Cu^{2+} (from $CuSO_4$) gains electrons: $Cu^{2+} + 2e^- \rightarrow Cu$

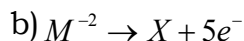
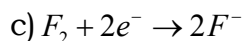
Matrix Matching Type

26. Answer: a-2, b-1, c-4, d-3

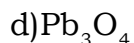
Solution:

Column - I**Column - I**

2) Cr is oxidised

1) $X = M^3$ 

4) F is reduced



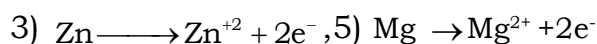
3) Good oxidising agent

27. Answer: a-3, 5, b-4, c-2, d-1

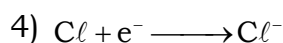
Solution:

Column - I**Column - II**

a) Oxidation



b) Reduction



c) Oxidant

2) F

d) Reductant

1) Ca

Integer Type

28. The oxidation number of carbon in diamond is ____

Answer: 0

Solution: Diamond is a pure, elemental form of carbon (C).

In all elemental forms (including diamond, graphite, and C_{60}), the oxidation number of an uncombined atom is 0.29. What is the oxidation number of chlorine in ClO_3^{-} is ____**Answer: 5**Solution: ClO_3^{-}

$$Cl + 3(-2) = -1$$

$$Cl = -1 + 6 = +5$$

KEY

			TEACHING TASK						
1	2	3	4	5	6	7	8	9	10
D	C	B	C	C	A	A	D	C	B
11	12	13	14	15	16	17	18	19	20
C	A	C	A	C	B,C	C,D	B,C,D	A	A
21	22	23		24		25			
A	D	A-3,B-5,C-4,D-1			6	1			
			LEARNERS TASK						
		Conceptual Understanding Questions							
1	2	3	4	5	6	7	8	9	10
C	C	A	C	C	C	B	B	C	A
		JEE MAIN LEVEL QUESTIONS							
11	12	13	14	15	16	17	18	19	20
B	B	C	A	D	C	D	C	D	D
		JEE ADVANCED LEVEL QUESTIONS							
21	22	23	24	25	26	27			
A,B,D	A,C	A	A	B	a-2, b-1, c-4, d-3		a-3,5,b-4,c-2,d-1		
28	29								
0	5								

EdOS

EdOS