

Class - IX

DPT Foundation Plus

Concept of Oxidation and Reduction

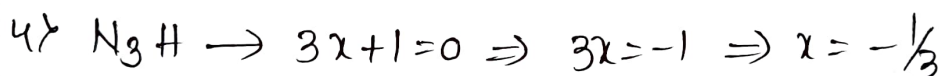
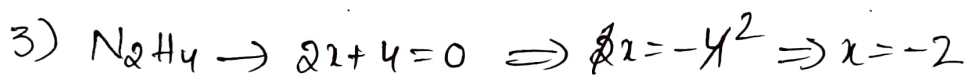
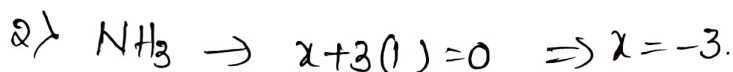
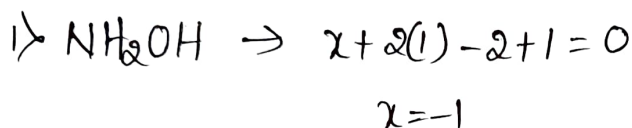
Teaching Task

JEE Main Level Questions

Q1)

Ans:- 4.

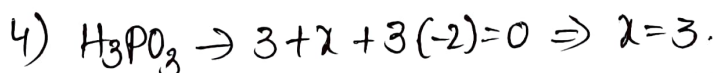
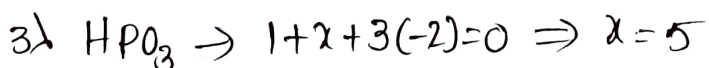
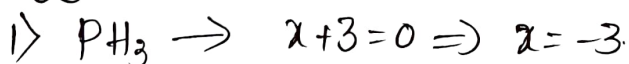
Solution:-



Q2)

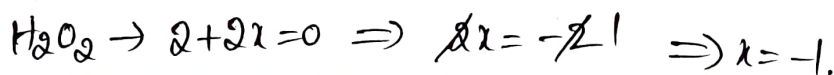
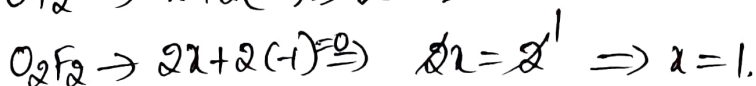
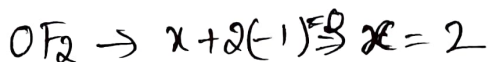
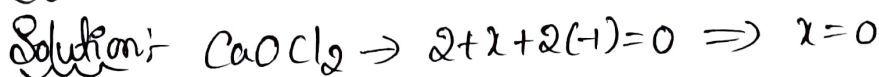
Ans:- 3

Solution:-



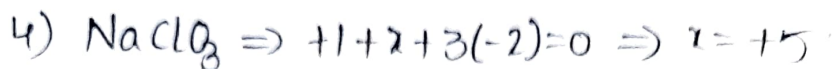
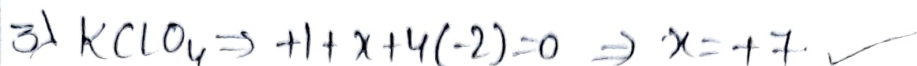
Q3)

Ans:- 2



Q4) Ans:- 3.

Solution:-

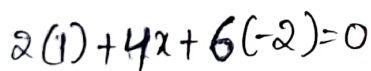


Q5) Ans:- 3

Solution:- Fluorine always exhibits an oxidation state of -1 in all of its compounds with other elements.

Q6) Ans:- 1

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

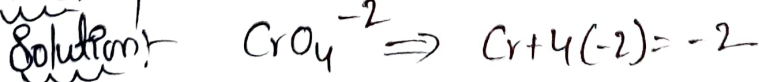


$$4x = 10 \Rightarrow x = \frac{10 \times 5}{4 \times 2} = \frac{5}{2}$$

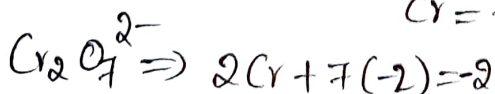
Q7) Ans:- 1

Solution:- Oxidation number of oxygen in peroxide is '-1'

Q8) Ans:- 4



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



$$2\text{Cr} - 14 = -2$$

$$2\text{Cr} = -2 + 14 \Rightarrow \cancel{2\text{Cr} = 12^6} \Rightarrow \text{Cr} = 6.$$

Q9) Ans:- 3.

Solution:-

1) Methyl chloride (CH_3Cl)

$$x + 3(-1) - 1 = 0$$

$$x = -2$$

2) Chloroform (CHCl_3) $\Rightarrow x + 1 - 3 = 0 \Rightarrow x = +2$

3) Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) $\Rightarrow 6x + 12 - 12 = 0 \Rightarrow x = 0$ ✓

4) Carbon tetrachloride (CCl_4) $\Rightarrow x + 4(-1) = 0 \Rightarrow x = +4$

Q10) Ans:- 2.

Solution:- Lost of electrons means oxidation, so in manganese if it lost three electrons means it undergo oxidation and therefore oxidation state is increased to +6.

Q11) Ans:- 3.

Solution:- Oxidation number of elementary form

is zero, So S_8 oxidation number = 0

$\rightarrow$ In S_8 , each sulfur atom forms 2 single bonds with adjacent sulfur atoms in the cyclic structure. So, the covalency of sulfur in S_8 is 2

Q12) Ans:- 4

Solution:- Acetaldehyde (CH_3CHO) $\Rightarrow \text{H}_3\text{C}-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{H}$

$$2x + 4(+1) + 1(-2) = 0$$

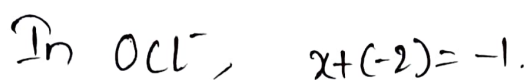
$$2x = -2 \Rightarrow x = -1.$$

Q13) Ans:- 3.

Solution:- CaOCl_2



In Cl^- , chlorine has an oxidation state of '-1'



$$x = +1.$$

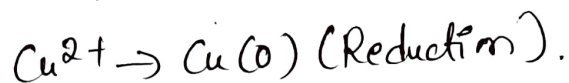
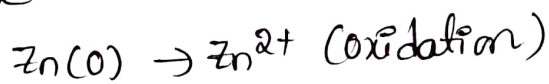
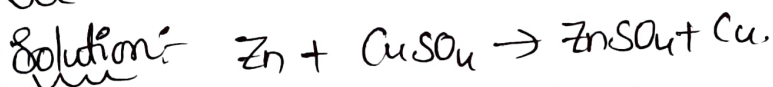
Q14) Ans:- 1

Solution:- Oxidation numbers

Na in metallic form = 0

Hg in metallic form = 0

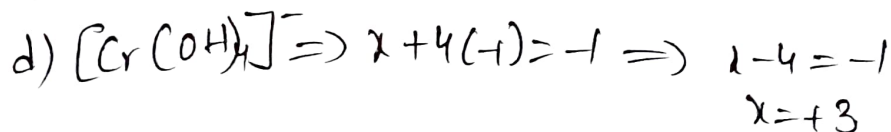
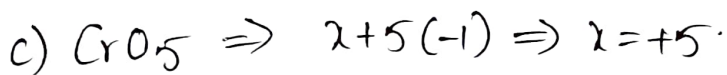
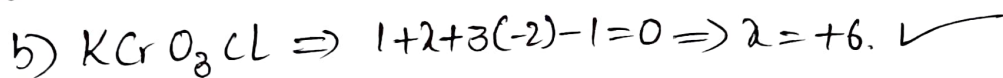
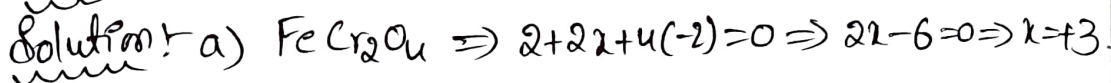
Q15) Ans:- 3.



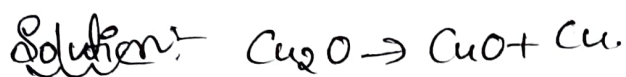
This is a redox reaction

JEE Advanced Level Questions.

Q16) Ans:- b.



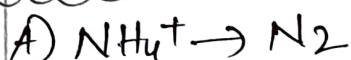
Q17) Ans: C, D.



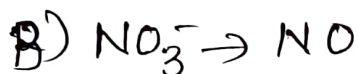
Redox reaction and Decomposition reaction

Q18) Ans: B, C, D.

Solution:



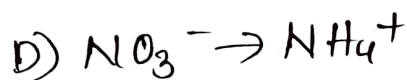
$-3 \rightarrow 0$ (Oxidation)



$5 \rightarrow 3$ (reduction)



$4 \rightarrow +1$ (reduction)



$5 \rightarrow -3$ (Reduction)

Q19) Ans: A.

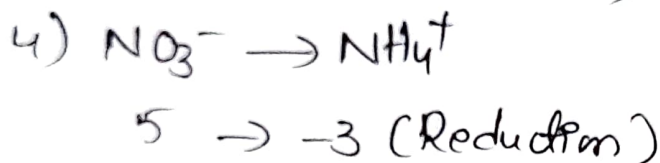
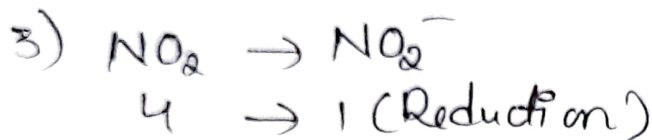
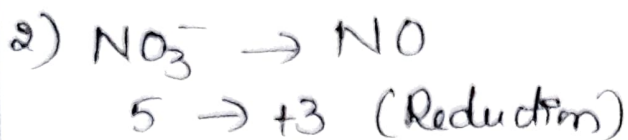
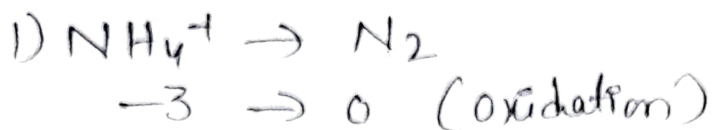
Solution: F exhibits '-1' oxidation state in all of its compounds because Fluorine is the most electronegative element

Q20) Ans: Both statements are correct

Solution: Oxidation number of Cl atom is zero in Cl_2 , because oxidation number of a homonuclear molecule is taken as zero

Q21) Ans:- 1

Solution:-



Q22) Ans:- 4

Solution:-

BaO_2 Oxygen peroxide bond

$$\text{Ba} + 2(-1) = 0 \Rightarrow \text{Ba} = +2$$

BaO

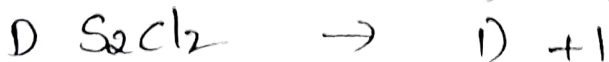
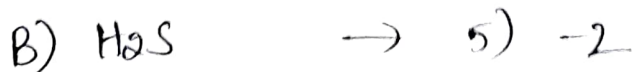
$$\text{Ba} - 2 = 0 \Rightarrow \text{Ba} = +2$$

From BaO_2 to BaO oxidation number,
No change

Matrix Matching

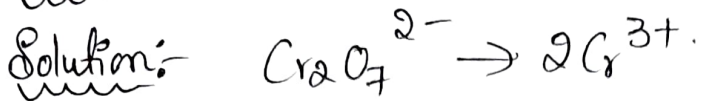
Q23) Ans:- A) 3 B) 5 c) 4 D) 1

Solution:-



Integer Type

Q24) Ans:- 6.



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

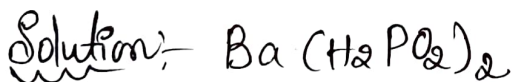
$$2\text{Cr} = 12 \Rightarrow \text{Cr} = +6$$

$\rightarrow \text{Cr}^{3+} \Rightarrow$ oxidation state of Cr is +3.

'Cr' atom changes from +6 to +3, meaning each Cr gains 3 electrons

$\rightarrow$ There are 2 Cr atoms, the total electrons involved are
 $2 \times 3 = 6$ electrons

Q25) Ans:- 1



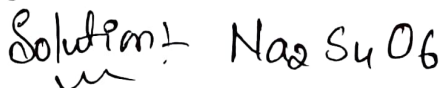
$$2 + x - 4 = -1$$

$$x - 2 = -1$$

$$x = +1$$

Learnners Task

Q1) Ans:- 3.



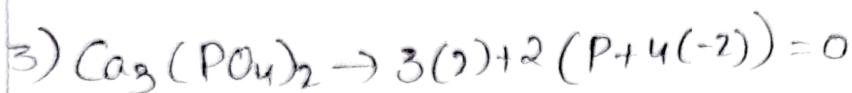
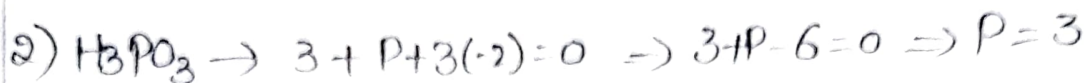
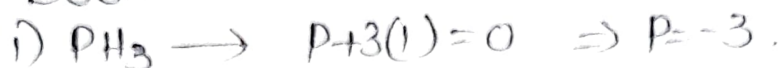
$$2(1) + 4x + 6(-2) = 0$$

$$4x - 10 = 0$$

$$4x = 10 \Rightarrow x = \frac{10}{4} = 2.5$$

Q2) Ans:- 3.

Solution:-



$$6 + 2(\text{P} - 8) = 0$$

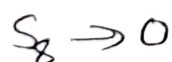
$$6 + 2\text{P} - 16 = 0 \Rightarrow \text{P} = 5 = +5$$



$$\text{P} = +1.$$

Q3) Ans:- 1

Solution:- Oxidation number of an atom in elementary form is zero.



Q4) Ans:- 3

Solution:- N_3H

$$3x + 1 = 0$$

$$3x = -1 \Rightarrow x = -1/3$$

Q5) Ans:- 3

Solution:- CH_2O

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

Q6) Ans:- 3.

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

$$4(+1) + \text{Fe} + 6(-1) = 0$$

$$4 + \text{Fe} - 6 = 0$$

$$\text{Fe} - 2 = 0 \Rightarrow \text{Fe} = +2.$$

Q7) Ans: 2

Solution: OF_2

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

oxidation number of Oxygen = +2

Valency of Oxygen = 2

Q8) Ans: 2

Solution:

1) $\text{HClO}_4 \rightarrow 1 + x + 4(-2) = 0 \Rightarrow x - 7 = 0 \Rightarrow x = +7$

2) $\text{HClO}_3 \rightarrow 1 + x + 3(-2) = 0 \Rightarrow x - 5 = 0 \Rightarrow x = +5 \checkmark$

3) $\text{HClO}_2 \rightarrow 1 + x + 2(-2) = 0 \Rightarrow x - 3 = 0 \Rightarrow x = +3$

4) $\text{HCl} \rightarrow 1 + x = 0 \Rightarrow x = -1$

Q9) Ans: 3

Solution: Ground state configuration of all elements is zero, this means every element shows zero oxidation state.

Q10) Ans: 1

Solution: Fluorine exhibits maximum oxidation state is '-1'.

JEE Main Level Questions

Q11) Ans: 2

Solution: Nitrogen forms compounds that ranges from -3 to +5 in oxidation state.

Minimum oxidation state that nitrogen exhibits is '-3'.

Q12) Ans:- 2

Solution:- CO_2

$$x + 2(-2) = 0 \Rightarrow x = +4$$

Q13) Ans:- 3

Solution:-

$$1) \text{H}_2\text{O} \rightarrow 2(1) + x = 0 \Rightarrow x = -2$$

$$2) \text{H}_2\text{O}_2 \rightarrow 2(1) + 2x = 0 \Rightarrow \cancel{x} = -\cancel{x}^1 \Rightarrow x = -1$$

$$3) \text{OF}_2 \rightarrow x + 2(-1) = 0 \Rightarrow x = +2 \quad \checkmark$$

$$4) \text{H}_2\text{SO}_4 \rightarrow 2 + 6 + 4x = 0 \Rightarrow 4x = -8^2 = -2$$

Q14) Ans:- 1

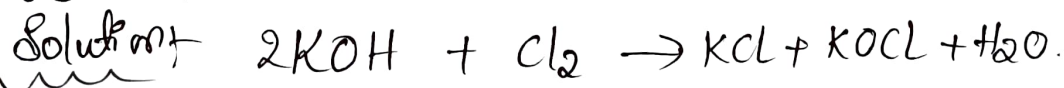
Solution:-

Oxidation number of S_8 is zero.

$$\text{S}_2\text{F}_2 \rightarrow 2x + 2(-1) = 0 \Rightarrow \cancel{2}x = \cancel{2}^1 = 1$$

$$\text{H}_2\text{S} \rightarrow 2(1) + x = 0 \Rightarrow x = -2$$

Q15) Ans:- 4



$$\text{KCl} \rightarrow 1 + x = 0 \Rightarrow x = -1$$

$$\text{KOCl} \rightarrow 1 + (-2) + x = 0 \Rightarrow x = +1$$

Q16) Ans:- 3

Solution:- Fluorine is the most electronegative element of the periodic table. It cannot exhibit positive oxidation state.

Q17)

Ans:- 4

Solution:- There is no change in oxidation state.

Oxidation state of 'K'



Oxidation state of Cr.



Q18)

Ans:- 3

Solution:- HN_3

$$1 + 3N = 0 \Rightarrow 3N = -1 \Rightarrow N = -1/3$$

Q19)

Ans:- 4.

Solution:- $H_2S_2O_7$

$$2(1) + 2S + 7(-2) = 0$$

$$2S - 12 = 0 \Rightarrow S = \frac{12}{2} = 6 \Rightarrow S = 6.$$

Q20)

Ans:- 4.

Solution:- The element that consistently exhibits only one oxidation state in its compounds is fluorine.

Q21)

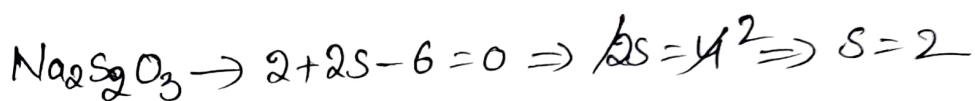
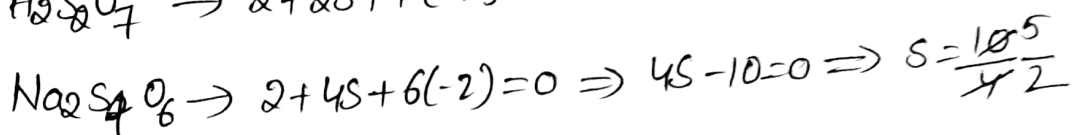
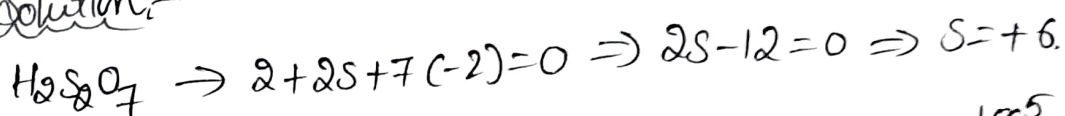
Ans:- 1, 2, 4.



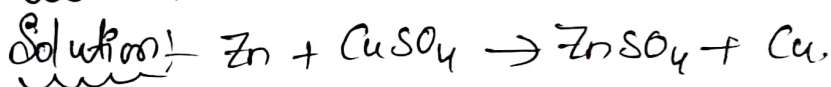
Cu is oxidized, it acts as reducing agent
 HNO_3 is reduced.

Q22) Ans:- a.

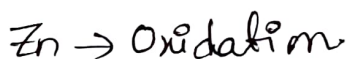
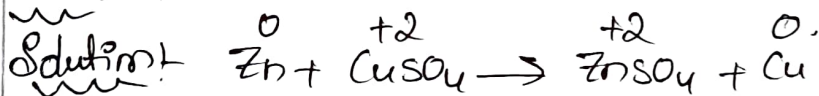
Solution:-



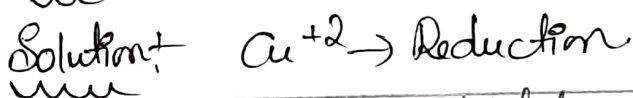
Q23) Ans:- 4



Q24) Ans:- 1



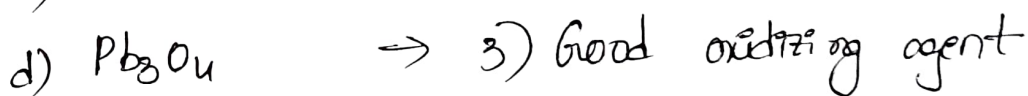
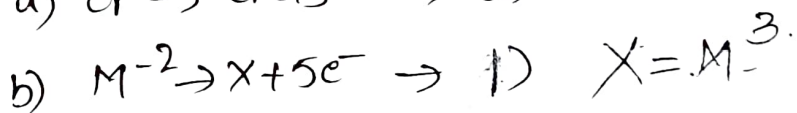
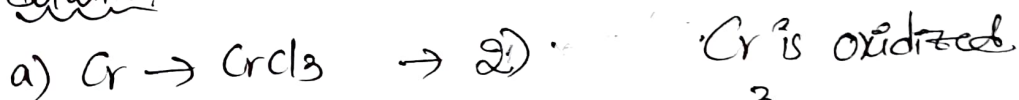
Q25) Ans:- 2



Matrix Matching.

Q26) Ans:- a) 2 b) 1 c) 4 d) 3.

Solution:-



Q27) Ans:- a) 3 b) 4 c) 2 d) 1.

Solution:-

a) Oxidation $\rightarrow$ 3) $\text{Zn} \rightarrow \text{Zn}^{2+} + 2e^-$

b) Reduction $\rightarrow$ 4) $\text{Cl} + e^- \rightarrow \text{Cl}^-$

c) Oxidant $\rightarrow$ 2) F^-

d) Reductant $\rightarrow$ 1) Ca

Integer Type

Q28) Ans:- 0

Solution:- The oxidation number of carbon in diamond is zero because diamond is an elemental form of carbon.

Q29) Ans:- +5

Solution:- ClO_3^-

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

$$\text{Cl} = -1 + 6 = 5$$