

# YAKEEN NEET 2.0

**2026**

**Redox Reaction**

**Physical Chemistry**

**Lecture -02**

**By- Amit Mahajan Sir**







## Topics to be covered

- 1 Revision of Last Class
- 2 Oxidation no calculation & questions based on it
- 3 Types of Redox reaction & questions based on it
- 4 ★★★★★ Trick MEDICS Test no 2
- 5 Magarmach Practice Questions ( MPQ ) & Home work from modules





## Rules to Attend Class

- ✓ 1. Always sit in a peaceful environment with headphone and be ready with your copy and pen.
- ✓ 2. Never ever attend a class from in between or don't join a live class in the middle of the chapter.
- ✓ 3. Make sure to revise the last class before attending the next class & always complete your Magarmach Practice Questions.
- ✓ 4. Never ever engage in chat whether live or recorded on the topic which is not being discussed in current class as by doing so u can be blocked by the admin team or your subscription can be cancelled.






## Rules to Attend Class



- ✓ 5. Try to make maximum notes during the class if something is left then u can use the notes pdf after the class to complete the remaining class.
- ✓ 6. Always ask your doubts in doubt section to get answer from faculty. Before asking any doubt please check whether same doubt has been asked by someone or not.





There is one big flaw in your Preparation that's name is Backlog ? What do we say to Backlog ?



NOT TODAY !!!

# MEDICS



## **Mastery**

Checks your grasp over  
NEET-level concepts

## **Evaluation**

Judging both knowledge  
and test-smartness

## **Decision Making**

Testing your speed + accuracy under pressure

## **Intuition**

Some answers need gut + logic –  
can you spot the trick?

## **Concepts**

It's all about strong basics –  
no shortcuts here

## **Strategy**

The MEDICS test – built  
for those who heal,  
hustle, and hope.



1. Which of the following has the highest number of atoms? 5. Which of the following statements is correct for one mole of any ideal gas at STP?

- A. 1 mol of  $O_2$   $1 \times N_A \times 2$   
 B. 1 mol of  $H_2O$   $1 \times N_A \times 3$   
 C. 1 mol of  $CO_2$   $1 \times N_A \times 3$   
 ✓ D. 1 mol of  $CH_4$   $1 \times N_A \times 5$

11

STP?

- ✗ A. Has mass equal to its atomic mass  
 ✓ B. Has a volume of 22.4 L  
 ✗ C. Contains  $6.023 \times 10^{23}$  molecules  
 ✗ D. Has pressure of 2 atm

$n=1$ , gas STP  
 $\downarrow$   
 $p=1 \text{ atm}$   
 $n \times 22.4 \text{ L}$   
 $1 \times 22.4 \text{ L}$

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

- A. CH  
 B.  $CH_2$   
 C.  $C_2H_5$   
 ✓ D.  $CH_3$

$\begin{array}{r} C \frac{80}{12} H \frac{20}{1} \\ \hline 6.67 \quad 20 \end{array}$

$\begin{array}{r} C \frac{80}{12} H \frac{20}{1} \\ \hline 6.67 \quad 20 \end{array} \Rightarrow C_1H_3$

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

6. In the reaction  $2A + 3B \rightarrow C + 2D$ , if 4 moles of A and 9 moles of B are taken the limiting reagent is:

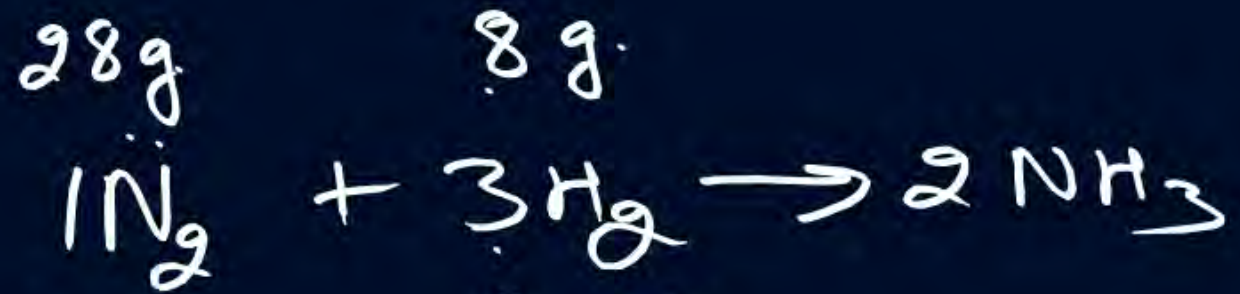
- ✓ A. A  
 B. B  
 C. C  
 D. D

L.R.  $\frac{4}{2} = 2$  |  $\frac{9}{3} = 3$

7. Which one of the following pairs are isoelectronic?

- A.  $Na^+$ ,  $Mg^{2+}$   
 B.  $O^{2-}$ ,  $F^-$   
 C.  $N^{3-}$ , Ne  
 ✓ D. All of these

$e^-$   
 10  
 10  
 10



n

$$\frac{28}{28} = 1$$

$$\frac{8}{2} = 4$$

L.R ✓  $\frac{1}{1} = 1$

$$\frac{4}{3} = 1.33$$



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

- ✓ A. 1 g of  $H_2$   $\xrightarrow{\frac{1}{2} \times N_A}$   $\frac{1}{32} \times N_A$   
 B. 1 g of  $O_2$   
 C. 1 g of  $CO_2$   $\xrightarrow{\frac{1}{44} \times N_A}$   
 D. 1 g of  $CH_4$   $\xrightarrow{\frac{1}{16} \times N_A}$

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
- $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$   
 $n_f = 2$   
 $eq. mass = \frac{98}{2} = 49g$



MEDICS Test no : 3 → Moderate + Tough  
↓  
Some basic concepts of Chemistry → Complete  
Target ⇒  $\frac{6}{10}$  ✓





## Revision of Last class

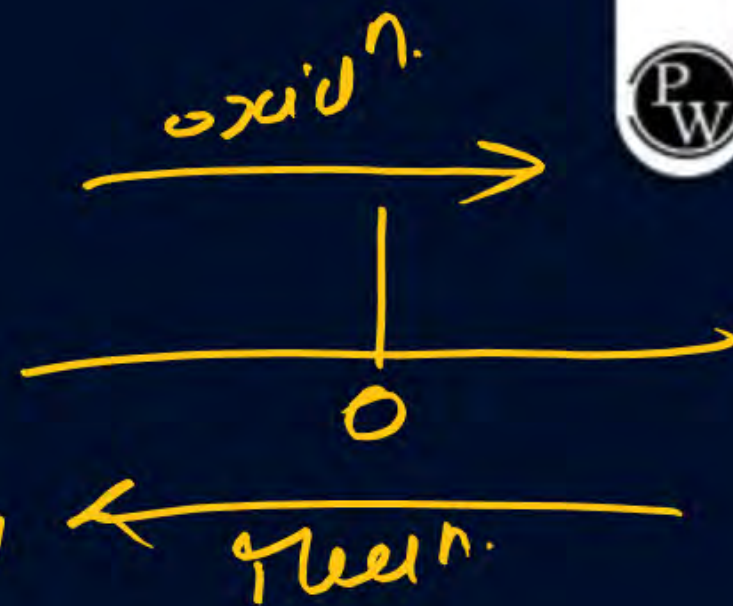


oxid<sup>n</sup> → loss of  $e^-$

(+)ve ↑ (-)ve ↓

red<sup>n</sup> → gain of  $e^-$

(-)ve ↑ (+)ve ↓

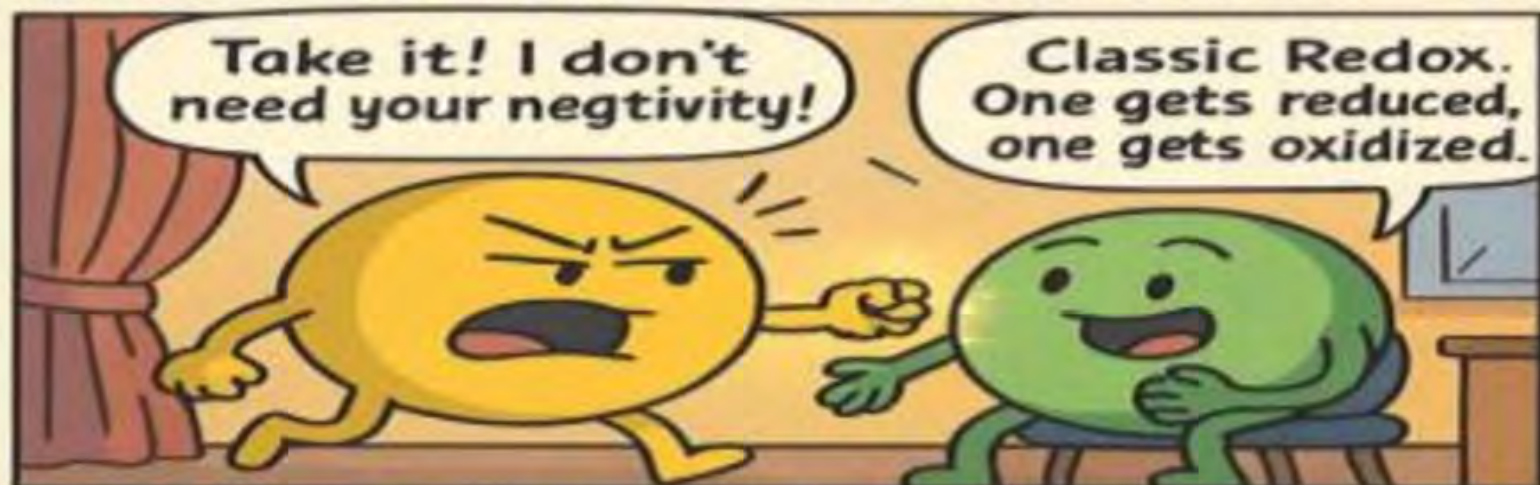




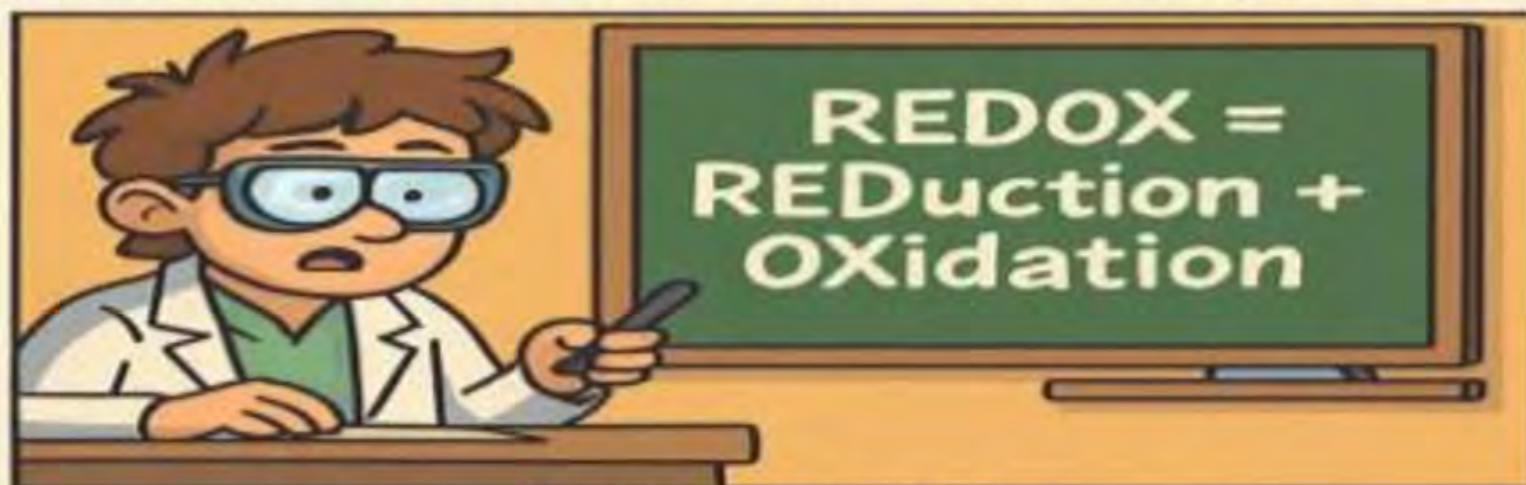


# Redox Reaction

## REDOX ROOMMATES:: EK ELECTRON KI KAHANI



**LABELS ON!**



**LABELS ON!**



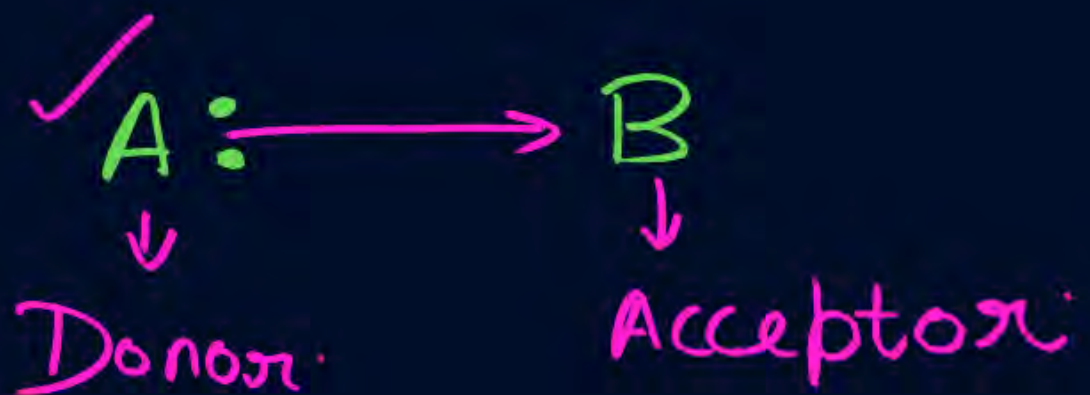




## Oxidation Number



Coordinate bond as dative bond.



Covalent bond :-

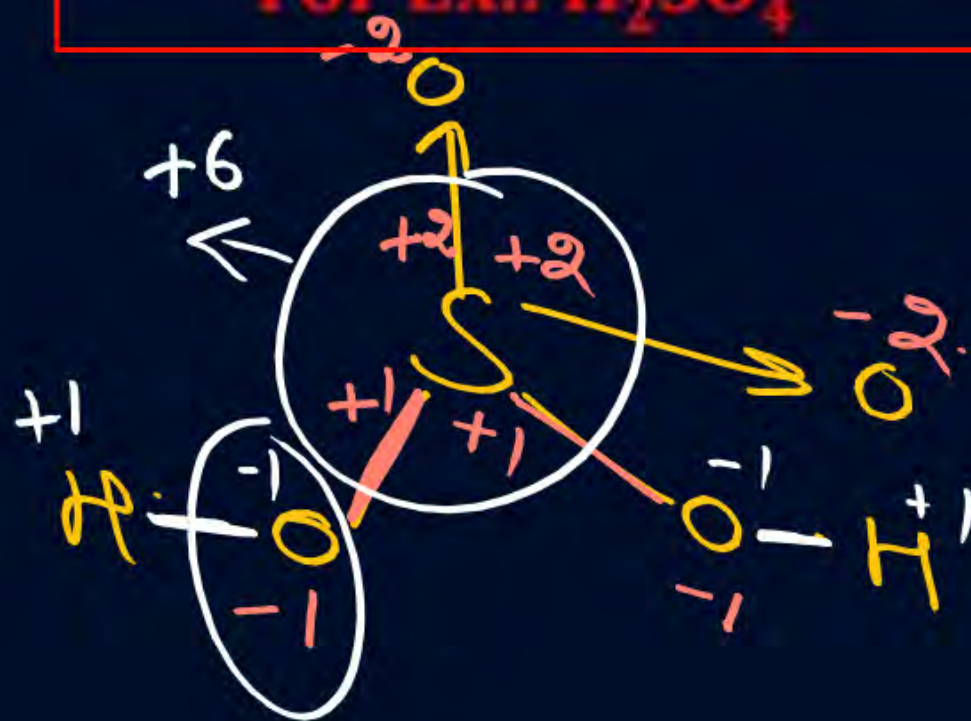




**How to find oxidation number if coordinate bond (Dative bond) is involved**

- If donor atom is less electronegative  $\rightarrow$  donor  $\rightarrow +2$   
& Acceptor atom is more electronegative  $\rightarrow$  acceptor  $\rightarrow -2$

For Ex.:  $\text{H}_2\text{SO}_4$





- If donor and acceptor have same electronegativity  
then donor  $\rightarrow +2$  Oxidation state  
Acceptor  $\rightarrow -2$  oxidation state

**For coordination Bond**

For Ex.:  $\text{Na}_2\text{S}_2\text{O}_3$

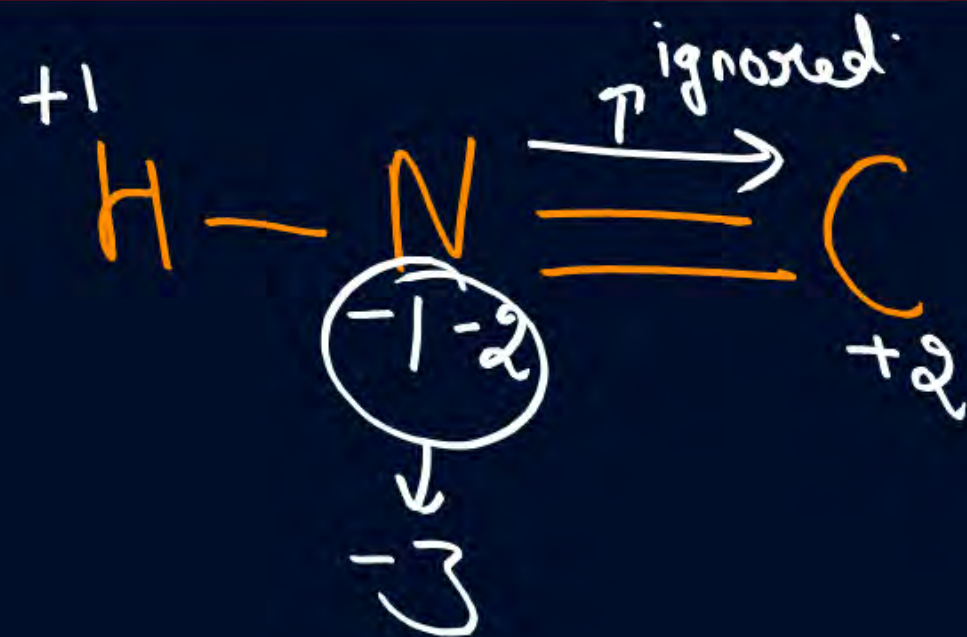


avg. oxid<sup>n</sup> no. of S =  $\frac{6 + (-2)}{2} = \frac{4}{2} = 2$

avg. O.N. of Sulphur

- If donor atom is more electronegative  
and Acceptor atom is less electronegative  
Then number contribution of coordinate bond towards oxidation  
state

For Ex.: HNC

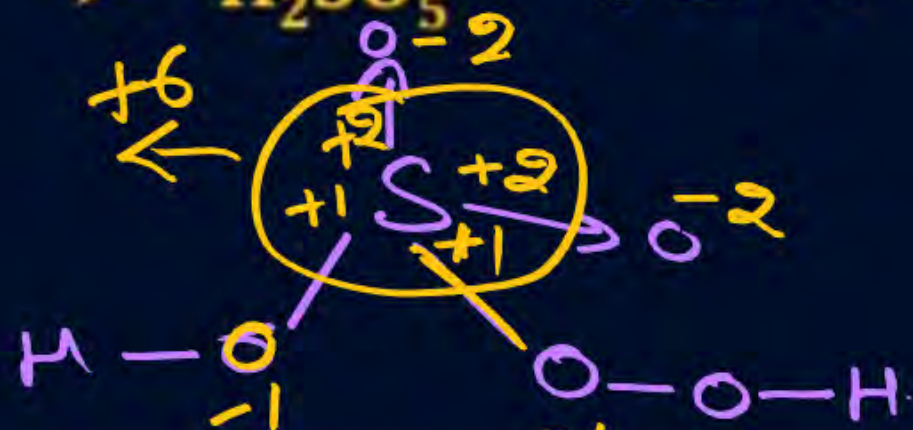






## Some exceptional Cases of Oxidation Number

➤  $\text{H}_2\text{SO}_5$  (Caro's acid)



➤  $\text{CrO}_5$



➤  $\text{K}_3\text{CrO}_8$

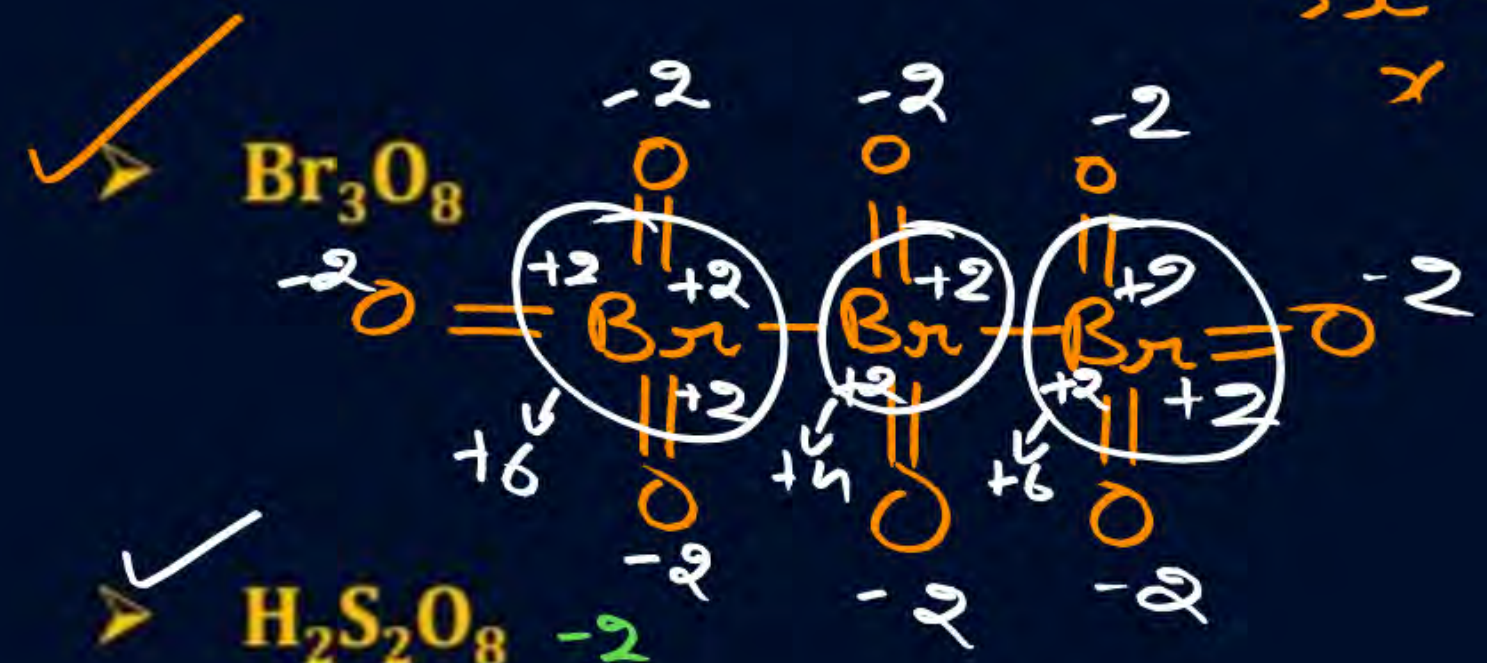
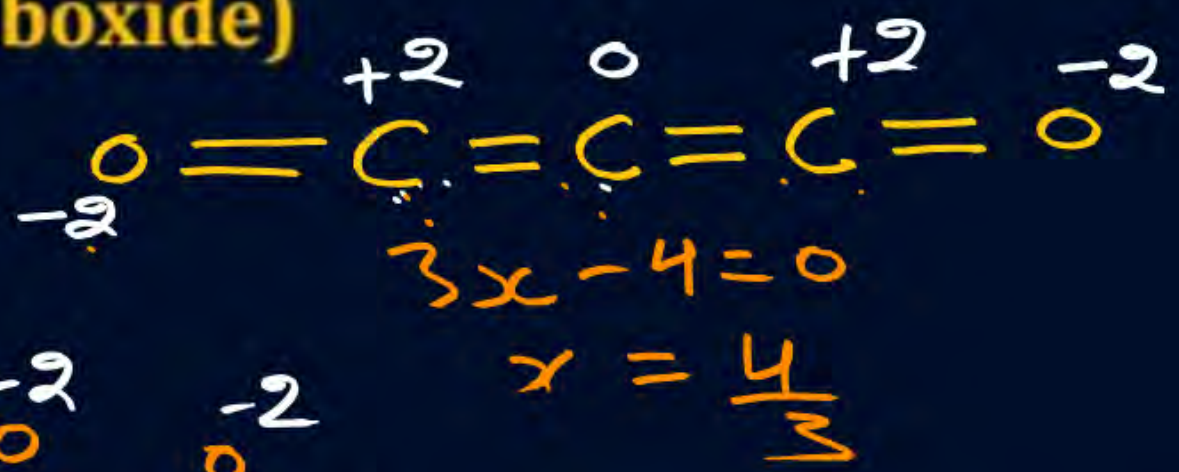
$\text{K}_3\text{CrO}_8$



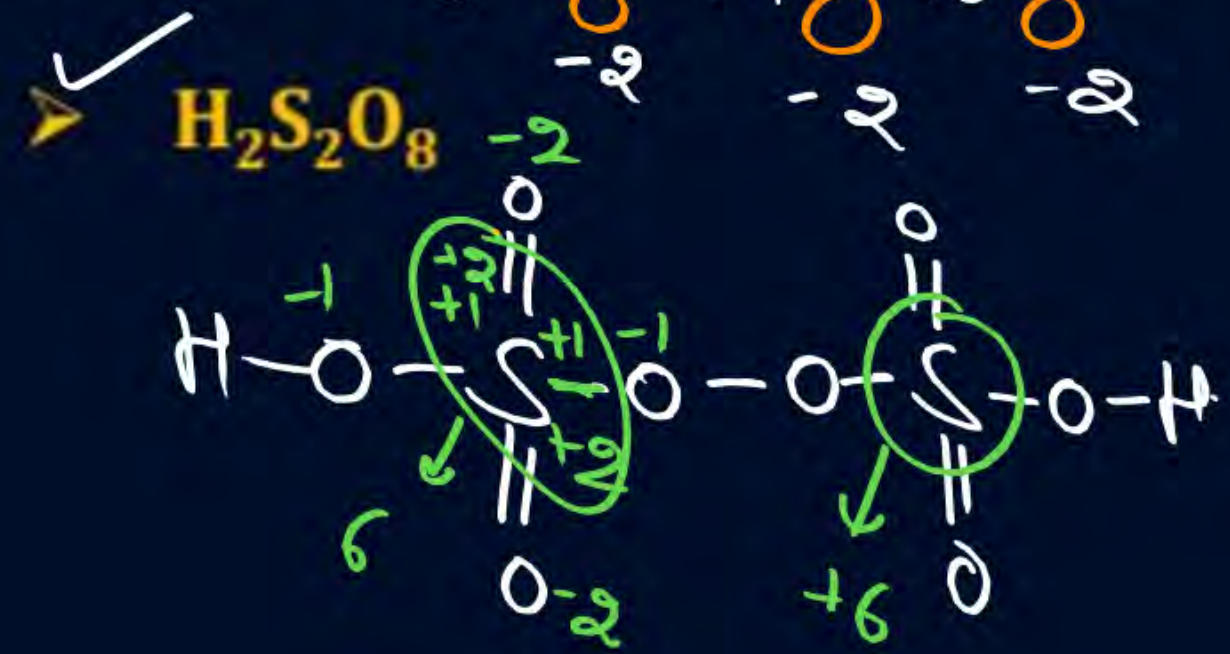


$$\rightarrow \text{avg O.N. of C} = \frac{2 + 0 + 2}{3} = \frac{4}{3} = 1.33$$

➤ **C<sub>3</sub>O<sub>2</sub> (Carbon Suboxide)**

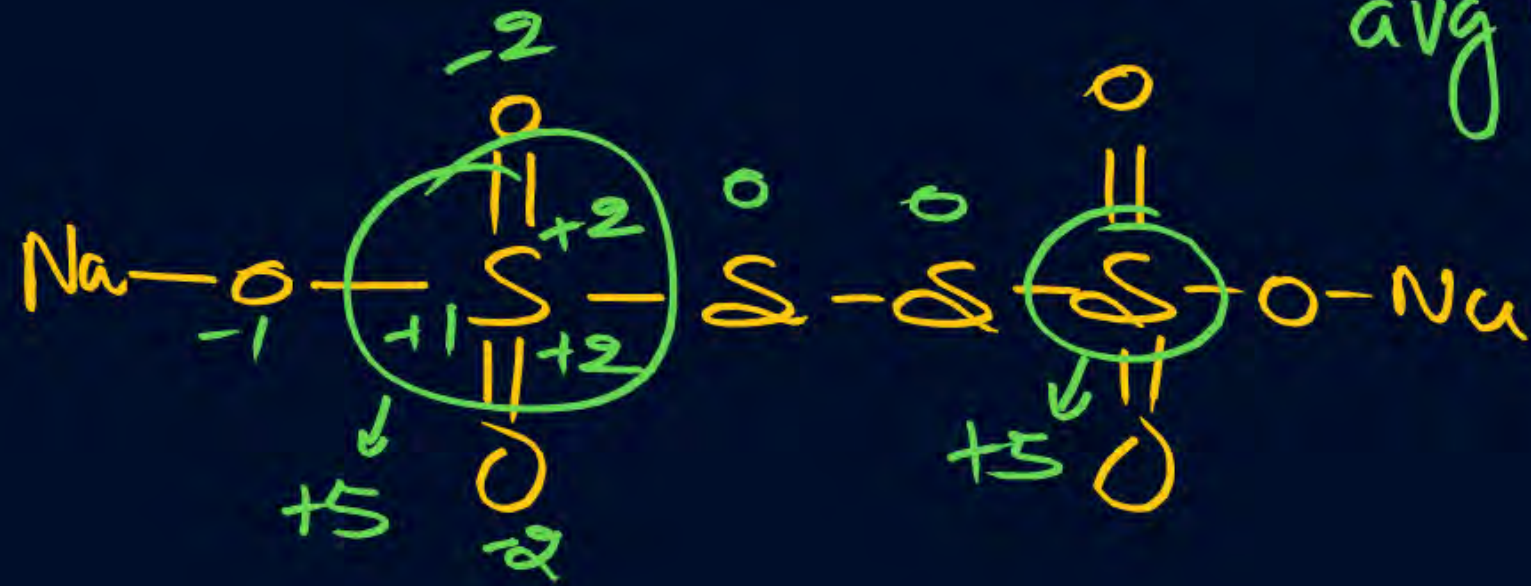


$$\text{avg O.N. of Br} = \frac{+6 + 4 + 6}{3} = \frac{16}{3} = 5.33$$



$$\text{avg O.N. of S} = \frac{6 + 6}{2} = 6$$

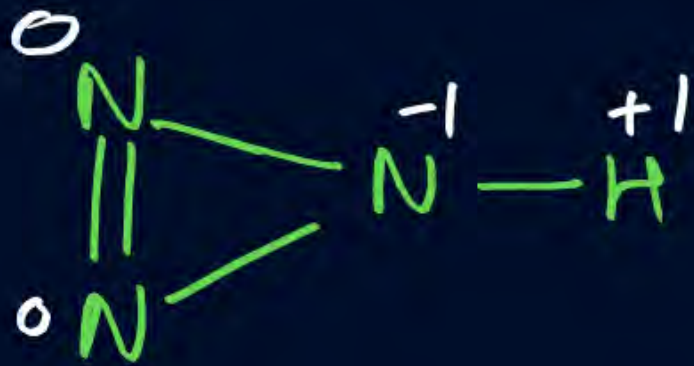
➤  **$\text{Na}_2\text{S}_4\text{O}_6$  (Sodium Tetrathionate)**



avg O.N. of S =  $\frac{5 + 0 + 0 + 5}{4}$   
 $= \frac{10}{4} = 2.5$

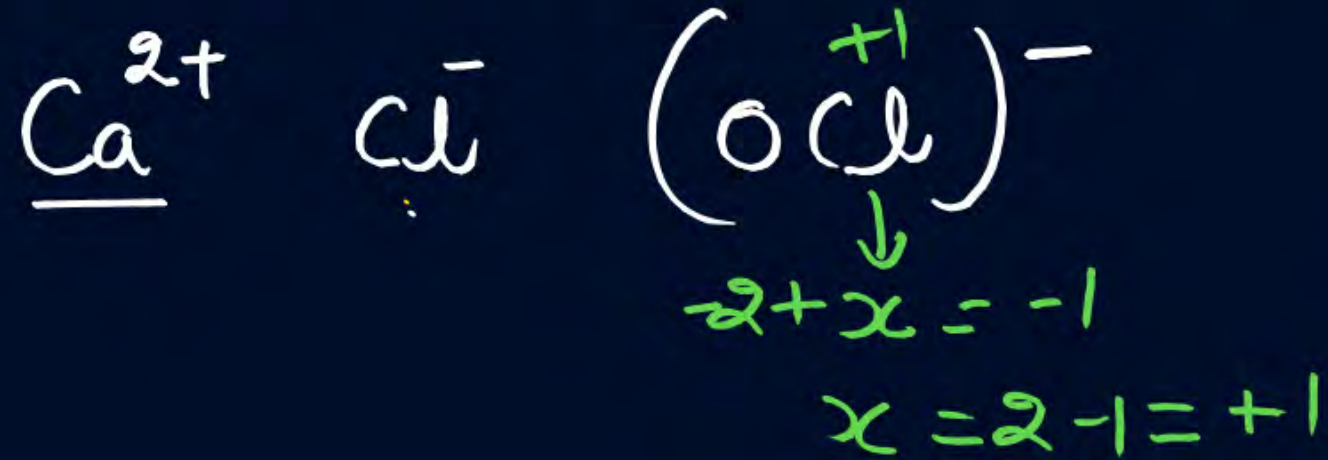


➤ **HN<sub>3</sub> (Hydrazoic acid)**



$$\text{avg O.N. of Nitrogen} = \frac{0 + 0 - 1}{3} = -\frac{1}{3} = -0.333$$

➤ **CaOCl<sub>2</sub> (Bleaching Powder)**



➤ **Fe<sub>3</sub>O<sub>4</sub> (FeO + Fe<sub>2</sub>O<sub>3</sub>)**

$\overset{+2}{\text{FeO}}$ $\downarrow$ $x - 2 = 0$ $x = +2$	$\overset{+3}{\text{Fe}_2\text{O}_3}$ $\downarrow$ $2x - 6 = 0$ $2x = 6$ $x = 3$
$\text{Avg O.N. of Fe} = \frac{+2 + 6}{3} = \frac{8}{3} = 2.66$	







O.A.

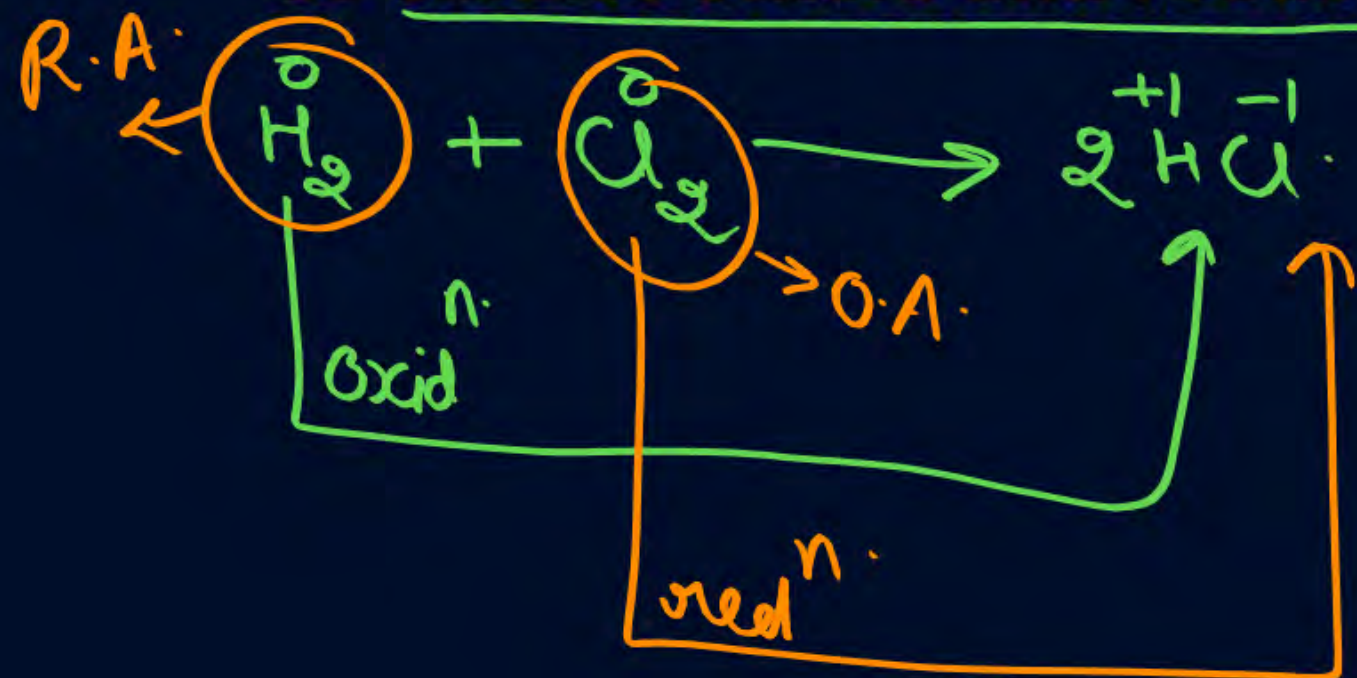
## Oxidising Agent or Oxidant

→ Reduces itself & oxidise others



- An oxidising agent or an oxidant may be defined as a substance the oxidation number of whose atom (atoms) decreases.

Or oxidise others and reduce itself



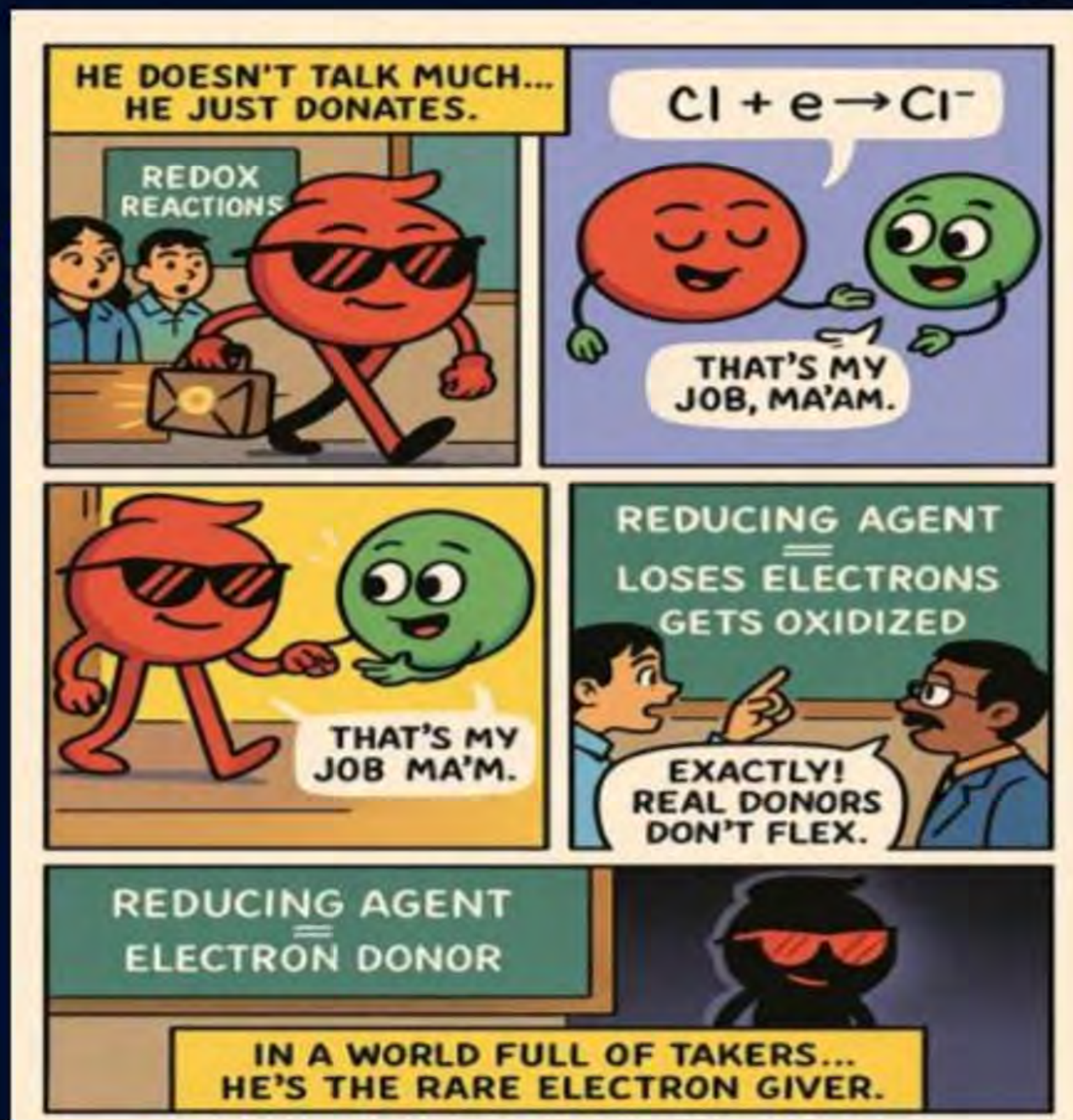
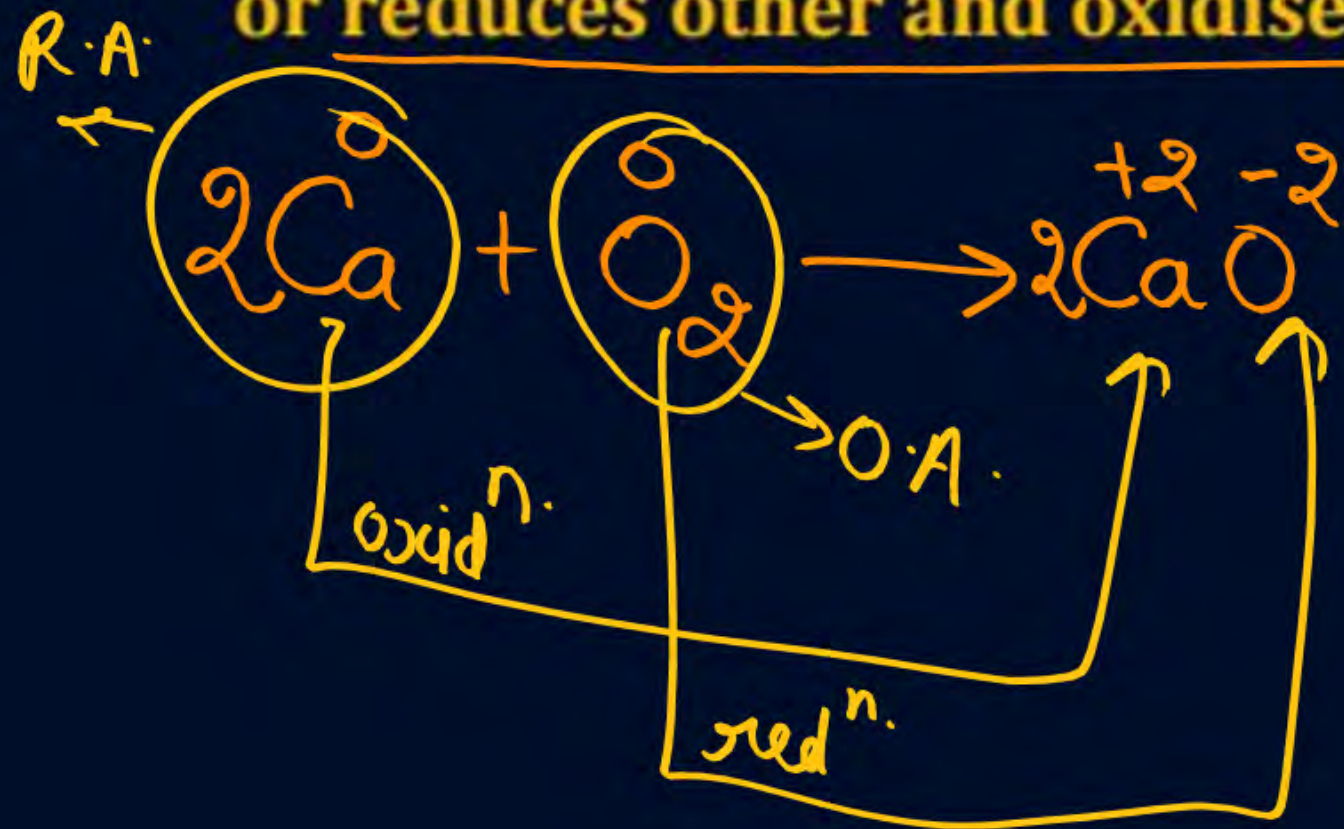




## Reducing Agent

- An reducing agent or an reductant may be defined as a substance the oxidation number of whose atom (atoms) increases.

or reduces other and oxidises itself





## QUESTION – (AIEEE 2002)

Oxidation number of Cl in  $\text{CaOCl}_2$ , (Bleaching powder) is:

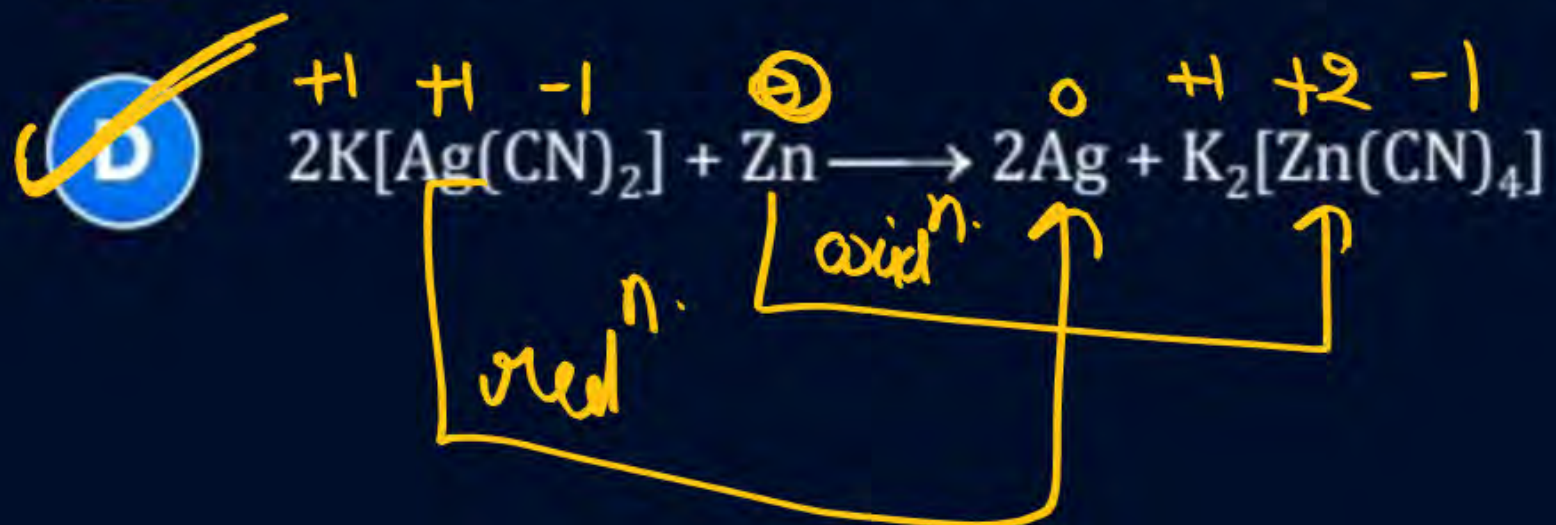
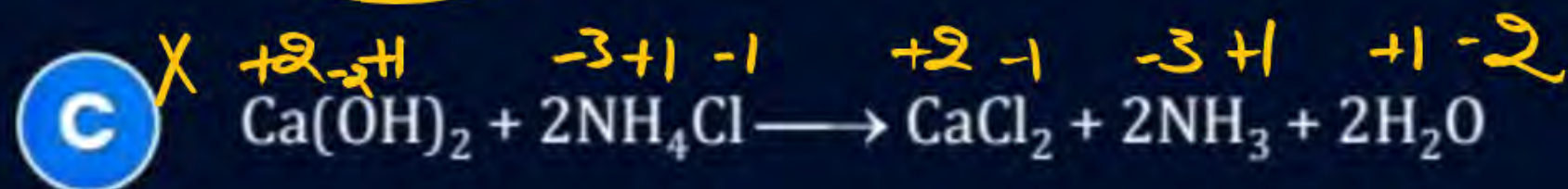
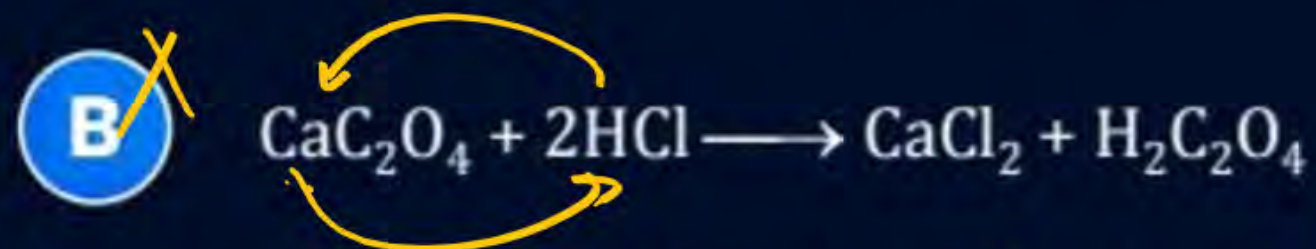
- ☐ A Zero, since it contains  $\text{Cl}_2$
- ☐ B -1, since it contains  $\text{Cl}^-$
- ☐ C +1, since it contains  $\text{ClO}^-$
- ☒ D +1 and -1, since it contains  $\text{ClO}^-$  and  $\text{Cl}^-$

# QUESTION – (AIEEE 2002)



Which of the following is a redox reaction?

# MIT  $AB + CD \rightarrow AC + BD \rightarrow$  double displacement rxn  
 ↓  
 Never redox rxn.





# QUESTION – (AIEEE 2020)

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

**A**  $\underline{\text{Cl}}\text{O}_3^-$  is +5

$$\begin{aligned} &\downarrow \\ &x - 6 = -1 \\ &x = 6 - 1 = +5 \end{aligned}$$

**B**  $\text{K}_2\underline{\text{Cr}}_2\text{O}_7$  is +6

$$\begin{aligned} &\downarrow \\ &2 + 2x - 14 = 0 \\ &2x = 12 \Rightarrow x = +6 \end{aligned}$$

**C**  $\text{H}\underline{\text{Au}}\text{Cl}_4$  is +3

$$\begin{aligned} &\downarrow \\ &1 + x - 4 = 0 \Rightarrow x = +3 \end{aligned}$$

**D**  $\text{Cu}_2\underline{\text{O}}$  is -1

$$\begin{aligned} &\downarrow \\ &2 + x = 0 \\ &x = -2 \end{aligned}$$

## QUESTION – (AIEEE 2016)

Converts into compound  $\text{CrO}_5$

In acidic medium,  $\text{H}_2\text{O}_2$  changes  $\text{Cr}_2\text{O}_7^{2-}$  which has two  $(-\text{O}-\text{O}-)$  bonds. Oxidation state of Cr in  $\text{CrO}_5$  is:

- ☐ A +3
- ☒ B +6
- ☐ C -10
- ☐ D +5



## QUESTION – (AIEEE 2014)

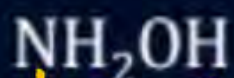
The oxidation state of Cr in  $\text{CrO}_5$  is:

- ☐ A -6
- ☐ B +12
- ☒ C +6
- ☐ D +4

# QUESTION – (AIEEE 2012)

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

A



$$x + 3 - 2 = 0$$

$$x = -1$$

B



$$2x + 4 = 0$$

$$2x = -4$$

C



$$x = -3$$

$$x + 3 = 0$$

D



$$x = -3$$

$$\text{avg o.n. of Nitrogen} = -\frac{1}{3}$$



# QUESTION – (AIEEE 2016)

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

- A**  $\overset{0}{\text{C}} + 2\overset{+6}{\text{H}_2\text{SO}_4} \longrightarrow \overset{+4}{\text{CO}_2} + 2\overset{+4}{\text{SO}_2} + 2\text{H}_2\text{O}$
- B**  $\text{CaF}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{CaSO}_4 + 2\text{HF}$
- C**  $\overset{0}{\text{Cu}} + 2\overset{+6}{\text{H}_2\text{SO}_4} \longrightarrow \overset{+2}{\text{CuSO}_4} + \overset{+4}{\text{SO}_2} + 2\text{H}_2\text{O}$
- D**  $\overset{0}{3\text{S}} + 2\overset{+6}{\text{H}_2\text{SO}_4} \longrightarrow 3\overset{+4}{\text{SO}_2} + 2\text{H}_2\text{O}$

QUESTION – (AIEEE 2009)

Oxidation number of P in  $\text{PO}_4^{3-}$ , of S in  $\text{SO}_4^{2-}$  and that of Cr in  $\text{Cr}_2\text{O}_7^{2-}$ , are respectively:

$$\begin{array}{l} +5 \\ \downarrow \\ x - 8 = -3 \\ x = +5 \end{array}$$

+6

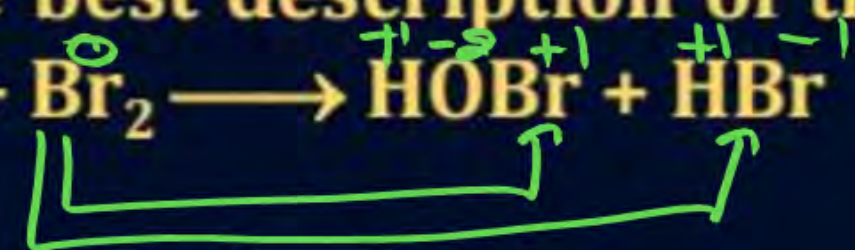
+6

- 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:

$$\overset{+1}{\text{H}}\overset{-2}{\text{O}} + \overset{0}{\text{Br}}_2 \longrightarrow \overset{+1}{\text{H}}\overset{-2}{\text{O}}\overset{+1}{\text{Br}} + \overset{+1}{\text{H}}\overset{-1}{\text{Br}}$$


☒ **A** Both oxidised and reduced

☐ **B** Oxidised only

☐ **C** Reduced only

☐ **D** Proton acceptor only

## QUESTION – (AIEEE 1999)

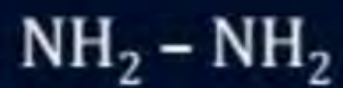
In which of the following compounds, transition metal has zero oxidation state?

☒ A



$$\begin{array}{l} \downarrow \\ x + 5 \times 0 = 0 \\ x = 0 \end{array}$$

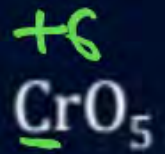
☐ B



☐ C



☐ D





# QUESTION – (AIEEE 1997)

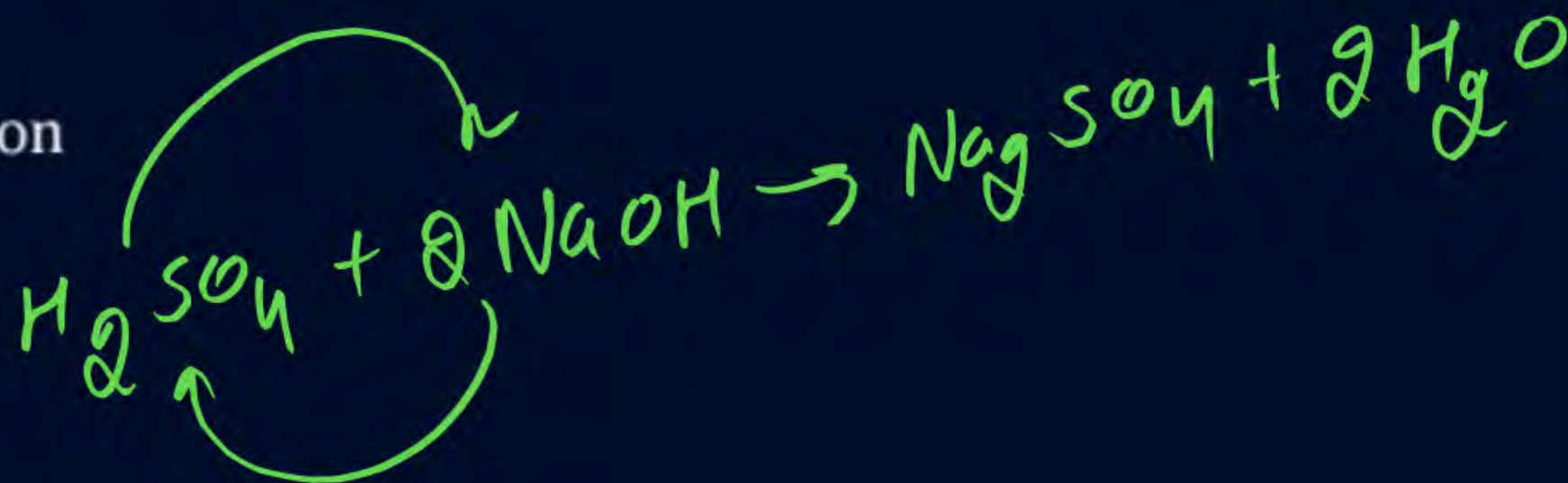
Which of the following is redox reaction?

**A** ✗ Evaporation of  $H_2O$   $H_2O(l) \rightarrow H_2O(g)$

**B** ✓ Both oxidation and reduction

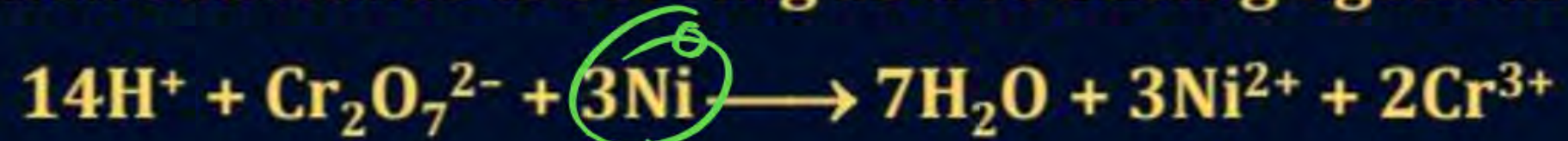
**C** ✗  $H_2SO_4$  with  $NaOH$

**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



Handwritten notes: A green circle is drawn around the  $3\text{Ni}$  in the reaction. An arrow points from this circle down to the text "R.A." (Reducing Agent). Another arrow points from the circle up and to the right to the text "oxid<sup>n</sup>" (oxidation).

- ☐ A  $\text{H}^+$
- ☐ B  $\text{Cr}_2\text{O}_7^{2-}$
- ☐ C  $\text{H}_2\text{O}$
- ☒ D Ni



## QUESTION – (AIEEE 1994)

The oxidation state of I in  $\text{H}_4\text{IO}_6^-$  is:

$$4 + x - 12 = -1$$

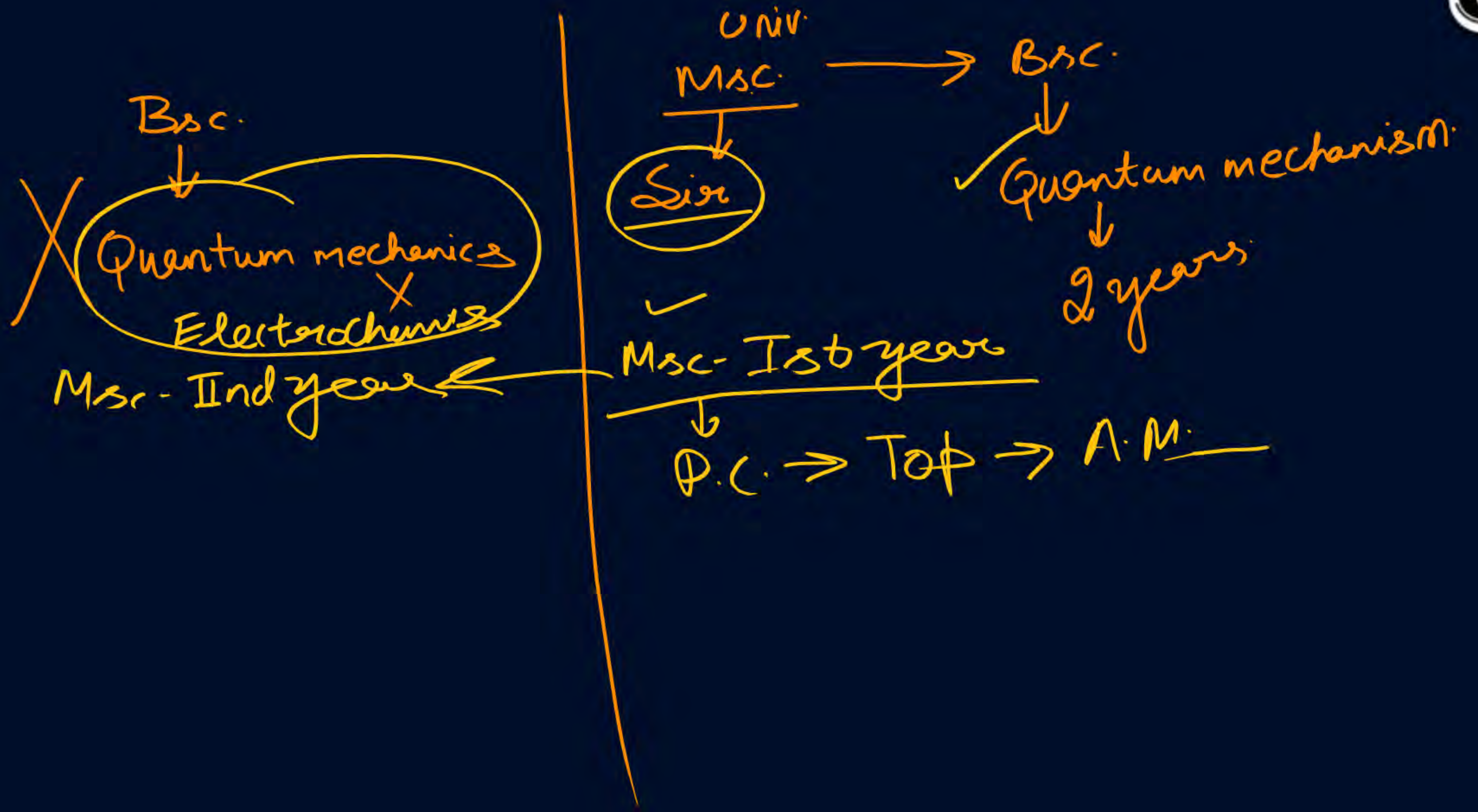
$$x = 8 - 1 = +7$$

**A** +1

**B** -1

**C** +7

**D** +5







Comparison is thief of Joy

$$\frac{180}{720} \rightarrow \frac{250}{720} \rightarrow \frac{720}{720}$$



## Home work from modules

Programb  $\rightarrow$  9 1 to 7, 14 to 37





## Magarmach Practice Questions ( MPQ )



## QUESTION (AIIMS 2015)

Oxidation numbers of P in  $\text{PO}_4^{3-}$ , of S in  $\text{SO}_4^{2-}$  and that of Cr in  $\text{Cr}_2\text{O}_7^{2-}$  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  $\text{HIO}_4$ ,  $\text{H}_3\text{IO}_5$  and  $\text{H}_5\text{IO}_6$  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  $\text{Fe}_3\text{O}_4$  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**  $\text{NaBr} + \text{HCl} \rightarrow \text{NaCl} + \text{HBr}$
- B**  $\text{HBr} + \text{AgNO}_3 \rightarrow \text{AgBr} + \text{HNO}_3$
- C**  $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$
- D**  $\text{CaO} + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$



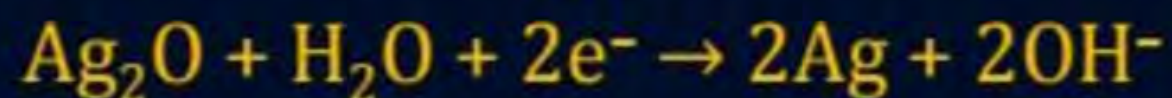
## QUESTION (AIIMS 2001)

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- B**  $\text{HBr} + \text{AgNO}_3 \rightarrow \text{AgBr} + \text{HNO}_3$
- C**  $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$
- D**  $\text{CaO} + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$

## QUESTION (AIIMS 2000)

In the following chemical reaction:



- 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  $\text{H}_2\text{S}_2\text{O}_7$  is:

- A** +2
- B** +6
- C** +4
- D** +8

## QUESTION (AIIMS 1999)

Oxidation number of Os in  $\text{OsO}_4$  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  $\text{K}_2\text{Cr}_2\text{O}_7$  is:

- A** +3
- B** -3
- C** +6
- D** -6



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