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PRAYAS

JEE 2026

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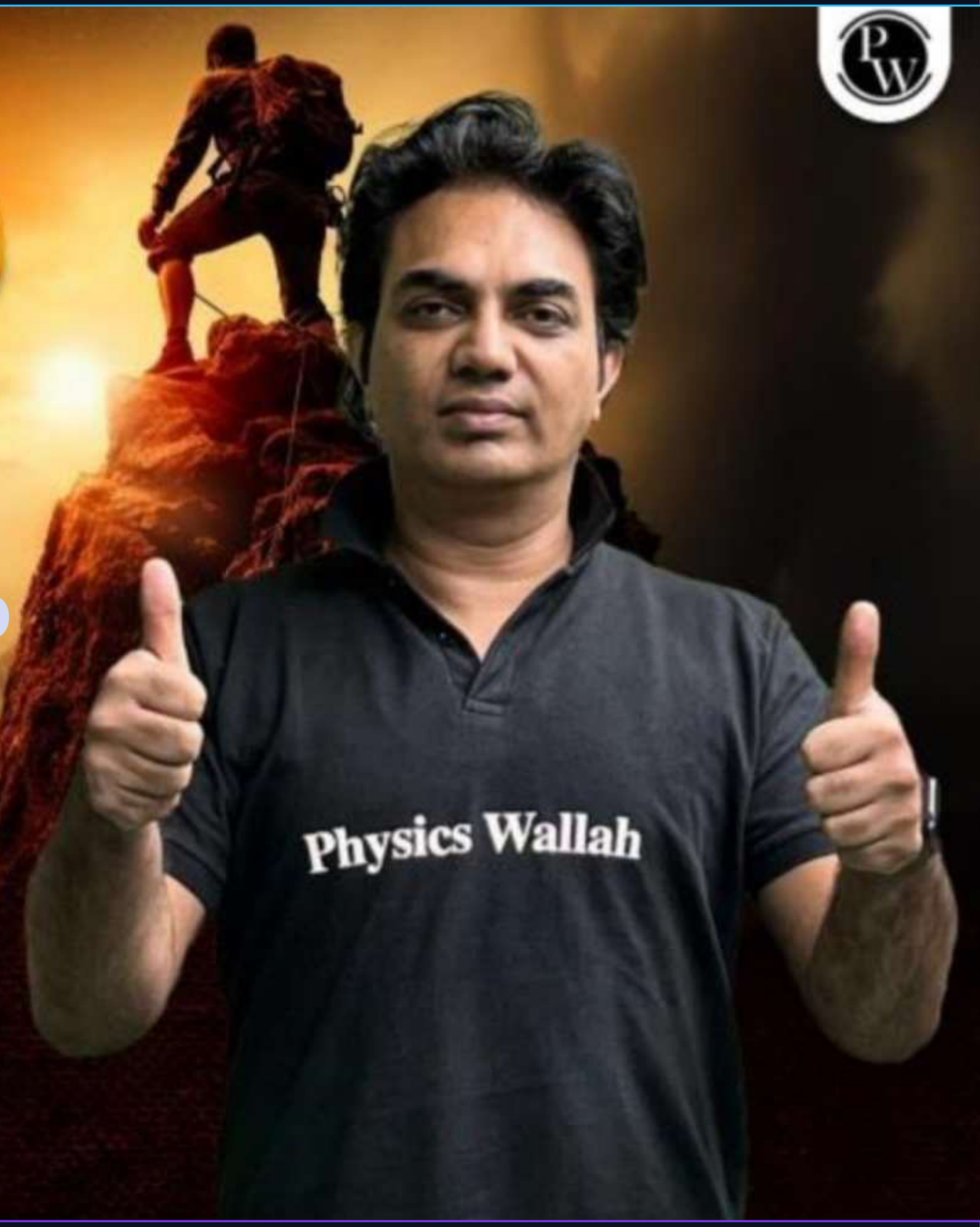
PHYSICAL CHEMISTRY

REDOX REACTION

Lecture – 03

FAISAL RAZAQ



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Topics to be covered

A n- factor Calculations

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TELEGRAM GROUP BY FAISAL SIR

@FAISALSIRPW

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LIST OF IONS

Cl^-	chloride	$C_2O_4^{2-}$	oxalate
Br^-	bromide	NO_3^-	nitrate
F^-	fluoride	N^{3-}	nitride
I^-	iodide	NO_2^-	nitrite
CO_3^{2-}	carbonate	ClO_4^-	perchlorate
CN^-	cyanide	ClO_3^-	chlorate
NC^-	isocyanide	ClO_2^-	chlorite
SO_4^{2-}	sulphate	ClO^-	hypochlorite
SO_3^{2-}	sulphite	CrO_4^{2-}	chromate
$S_2O_3^{2-}$	thiosulphate	$Cr_2O_7^{2-}$	dichromate
S^{2-}	sulphide	MnO_4^-	permanganate
P^{3-}	phosphide	PO_4^{3-}	phosphate

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Cu^{+1} Cuprous	Cu^{+2} Cupric
Fe^{+2} Ferrous	Fe^{+3} Ferric
Sn^{+2} Stennous	Sn^{+4} Stennic
Hg_2^{2+} Mercurous	Hg^{2+} Mercuric

Question

Find out the O.S of C in FeC_2O_4 and SnC_2O_4

Method - 1

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

$$x = +3$$

Method - 2

$$C_2O_4^{2-}$$

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

$$x = +3$$

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Question NO_3^- - nitrate ion NH_4^+ = ammonium ion

Find out the O.S of both the nitrogen atoms in ammonium nitrate.

ammonium Nitrate = $\underline{N}H_4\,\underline{N}O_3$ ✗

$x + 4(+1) + y + 3(-2) = 0$

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$NH_4^+ = x + 4(+1) = +1$ ✓

$x = -3$

$NO_3^- = y + 3(-2) = -1$

$y = +5$

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JEE Main 2 Sep 2022 Shift-2

The oxidation states of transition metal atoms in $K_2Cr_2O_7$ $KMnO4$ and K_2FeO_4, respectively, are x, y and z. The sum of x, y and z is _____.

$K_2Cr_2O_7 = 2(+1) + 2(x) + 7(-2) = 0 \Rightarrow x = +6$

$KMnO_4 = 1 + x + 4(-2) = 0 \Rightarrow x = +7$

$K_2FeO_4 = 2(+1) + x + 4(-2) = 0 \Rightarrow x = +6$

$+6 + +7 + +6 = 19$

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JEE Main 2019

N_2O_3, NO, NO_2, N_2O arrange the increasing order of O.S. of nitrogen –

(A) N_2O, NO, N_2O_3, NO_2

(B) N_2O, NO_2, N_2O_3, NO

(C) NO_2, N_2O_3, N_2O, NO

(D) N_2O_3, NO, N_2O, NO_2

$N_2O = 2x - 2 = 0 \Rightarrow x = +1$

$NO = x - 2 = 0 \Rightarrow x = +2$

$N_2O_3 = 2x - 6 = 0 \Rightarrow x = +3$

$NO_2 = x - 4 = 0 \Rightarrow x = +4$

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Question

In which of the following compound oxidation number of Cl is +3?

A ICl

B ClO_3

C ClF_3

D $HClO_4$

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Question

Which of the following is the correct oxidation number of phosphorus in $Mg_2P_2O_7$

A −3

B +2

C +5

D +3

$$2(+2) + 2x + 7(-2) = 0$$

$$x = 5$$

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Question

Oxidation numbers of the two nitrogen atoms present in ammonium nitrate are respectively ?

A +3 and +3

B 0 and 0

C −3 and +5

D −1 and −1

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Question

The oxidation number of cobalt in $[Co(CN)_6]^{3-}$ is –

A +3

B −3

C +6

D −6

$x + 6(-1) = -3$

$x = +3$

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Question

In which of the following compound oxidation number of iron is not +3

A Fe_3O_4

B Fe_2O_3

C $FeCl_3$

D $FePO_4$

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Question

In which of the following compound oxidation number of iron is not +3

A Fe_3O_4

B Fe_2O_3

C $FeCl_3$

D $FePO_4$

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Question

Oxidation number of Sulphur in H_2SO_5 is

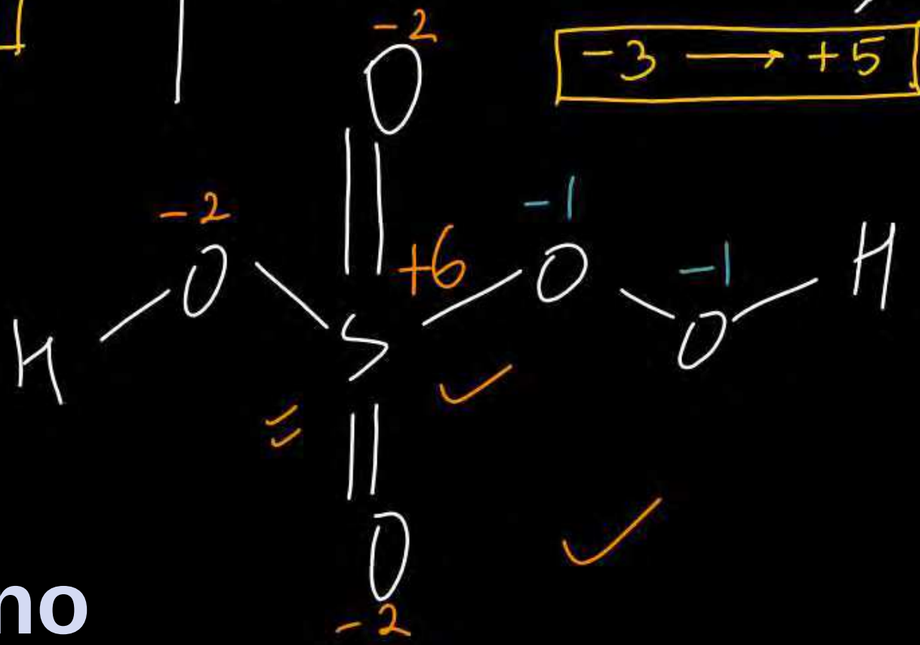
- A +2
- B +4
- C +8
- D +6

$2 + x + 5(-2) = 0$

$x = +8$

$-2 \longrightarrow +6$

$-3 \longrightarrow +5$



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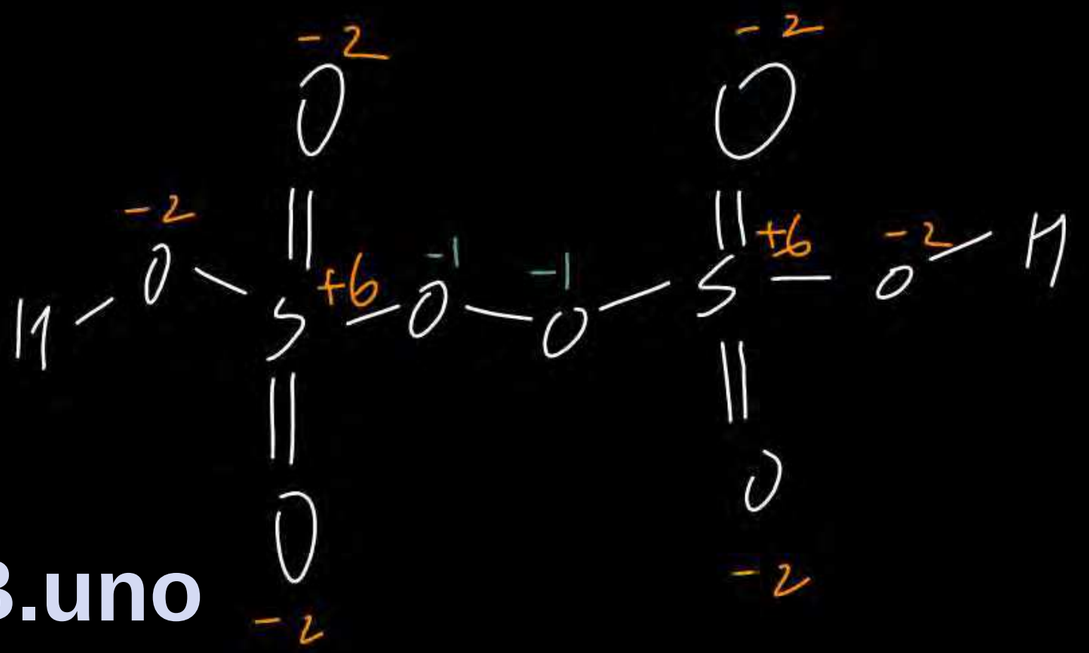
$H_2S_2O_8$

$2 + 2x + 8(-2) = 0$

$x = \cancel{+7}$

Answer = +6



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

$\boxed{x = +6}$

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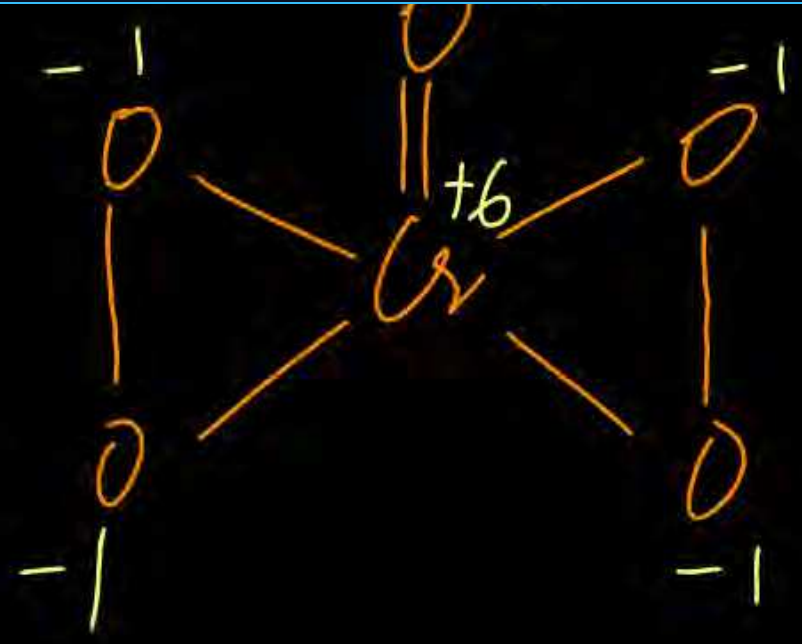
CrO_5



$x + 5(-2) = 0$

$x = +10$

oh ho. kahi Peroxy linkage [illegible] na hai.

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Max OS of Cr = +6

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Question

Oxidation number of Fe in $K_3[Fe(CN)_6]$ is

A +2

B +3

C +1

D +4

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Question

In which of the following compound, iodine is in its highest oxidation state

A KI

B KIO_4

C KI_3

D IF_5

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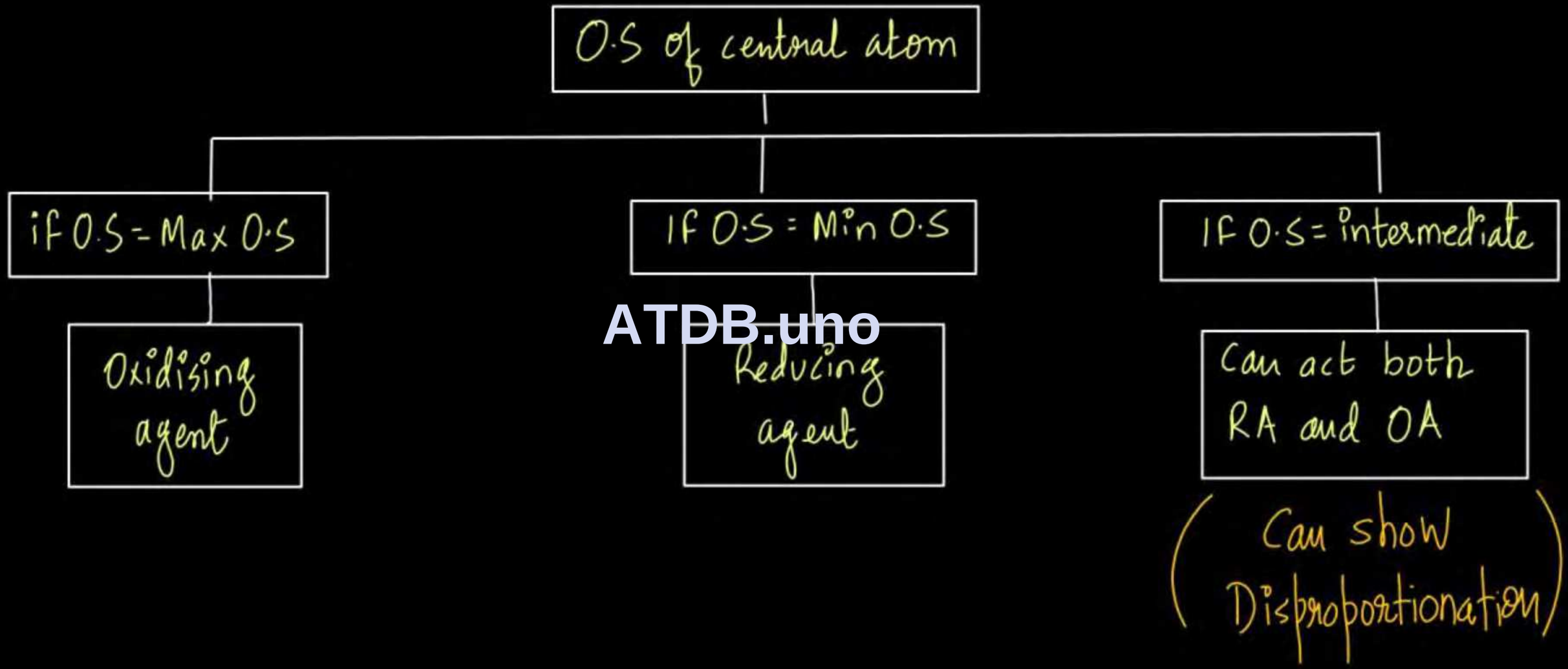
How to identify whether a particular substance is an OA or RA



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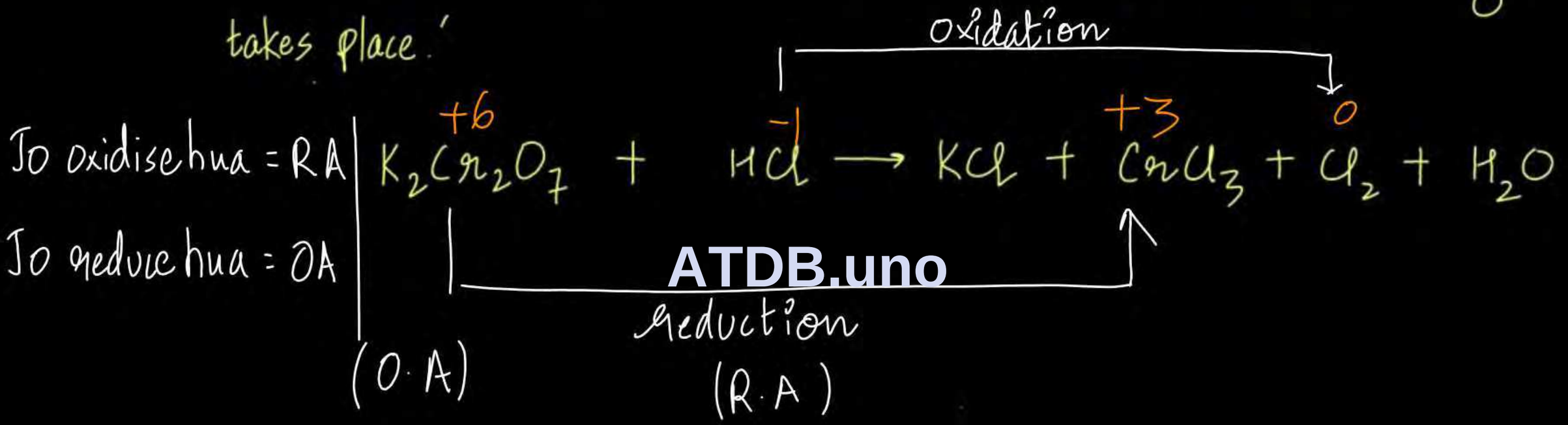
Redox Reaction

'A reaction in which reduction and oxidation simultaneously takes place.'



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Question

red

0 +1 +2 0

In $C + H_2O \rightarrow CO + H_2$, H_2O acts as

oxid.

A Oxidising agent

B Reducing agent

C Both

D None

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JEE Main 2017 Offline

O_2F_2 ... $x = +1$

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

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

(B) $XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF$

(C) $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$

+4 +1 +6 0

(RA) (OA)

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

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JEE Main 2017 Online

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) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

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Stumper

One mole of X_2H_4 releases 10 moles of electrons to form a compound Y. What should be the oxidation number of X in the compound Y ?

A +3

B −3

C −6

D +1

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SALTS WHICH REACT SUCH THAT NO ATOM UNDERGOES CHANGE IN OXIDATION STATE

Eq. wt = Mol. wt / n

n-factor = total cationic or total anionic charge.

CO_3^{2-}

$x - 6 = -2$

$x = +4$

$\overset{+2}{Mg}\overset{+4}{C}\overset{-2}{O_3} \xrightarrow{\Delta} \overset{+2}{Mg}\overset{-2}{O} + \overset{+4}{C}\overset{-2}{O_2}$; Eq. wt $= \frac{\text{Mol wt}}{2}$

$= \frac{84}{2}$

$= 42$

Mg^{+2} $(n = 2)$ $\quad CO_3^{2-}$

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SALTS WHICH REACT IN A MANNER THAT ONLY ONE ATOM UNDERGOES CHANGE IN OXIDATION STATE AND GOES IN ONLY ONE PRODUCT

n-factor = moles of electron transfer by per mole of salt

$KMnO_4$ (+7) (acidic) → Mn^{+2} (n = 5)

$KMnO_4$ (+7) (neutral / weak basic) → Mn (+4) (m = 3)

$KMnO_4$ (+7) (Basic) → Mn^{+6} (n = 1)

learn !

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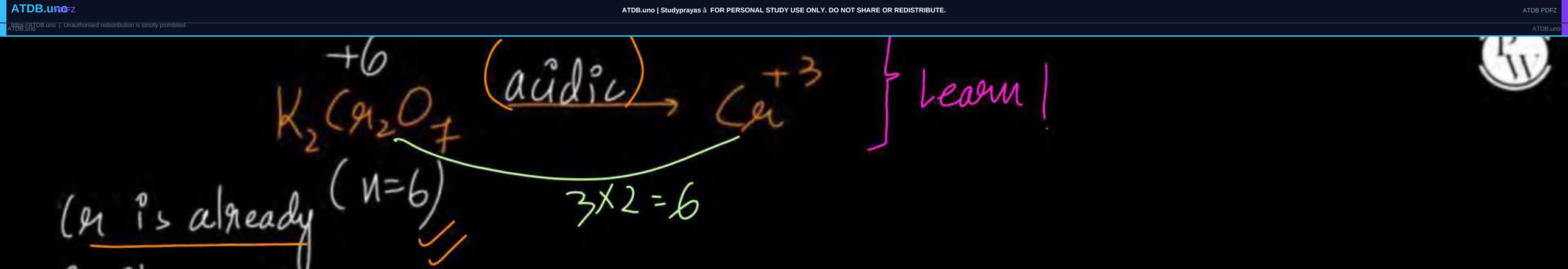

(n is already
in its max. O.s
So it can only
be reduced
So always behaves
like an Oxidising
agent or oxidant.

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Q

$$\underline{O.A} + \overset{+2\ \ -2}{CuS} \longrightarrow \overset{+2}{Cu} + \overset{+4}{SO_2}$$

$(n = 6)$

Eq. wt of CuS.

$$\text{Eq wt} = \frac{M_{CuS}}{n} = \frac{M_{CuS}}{6}$$

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Cu^{+1} Cuprous	Cu^{+2} Cupric
Fe^{+2} ferrous	Fe^{+3} ferric
Sn^{+2} Stannous	Sn^{+4} Stannic
Hg_2^{+2} Mercurous	Hg^{2+} Mercuric

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find out the Eq. wt of $Fe_2(C_2O_4)_3$ in this $a \times n$ –

$$O.A + Fe_2(C_2O_4)_3 \longrightarrow Fe^{+3} + CO_2$$

H.W.

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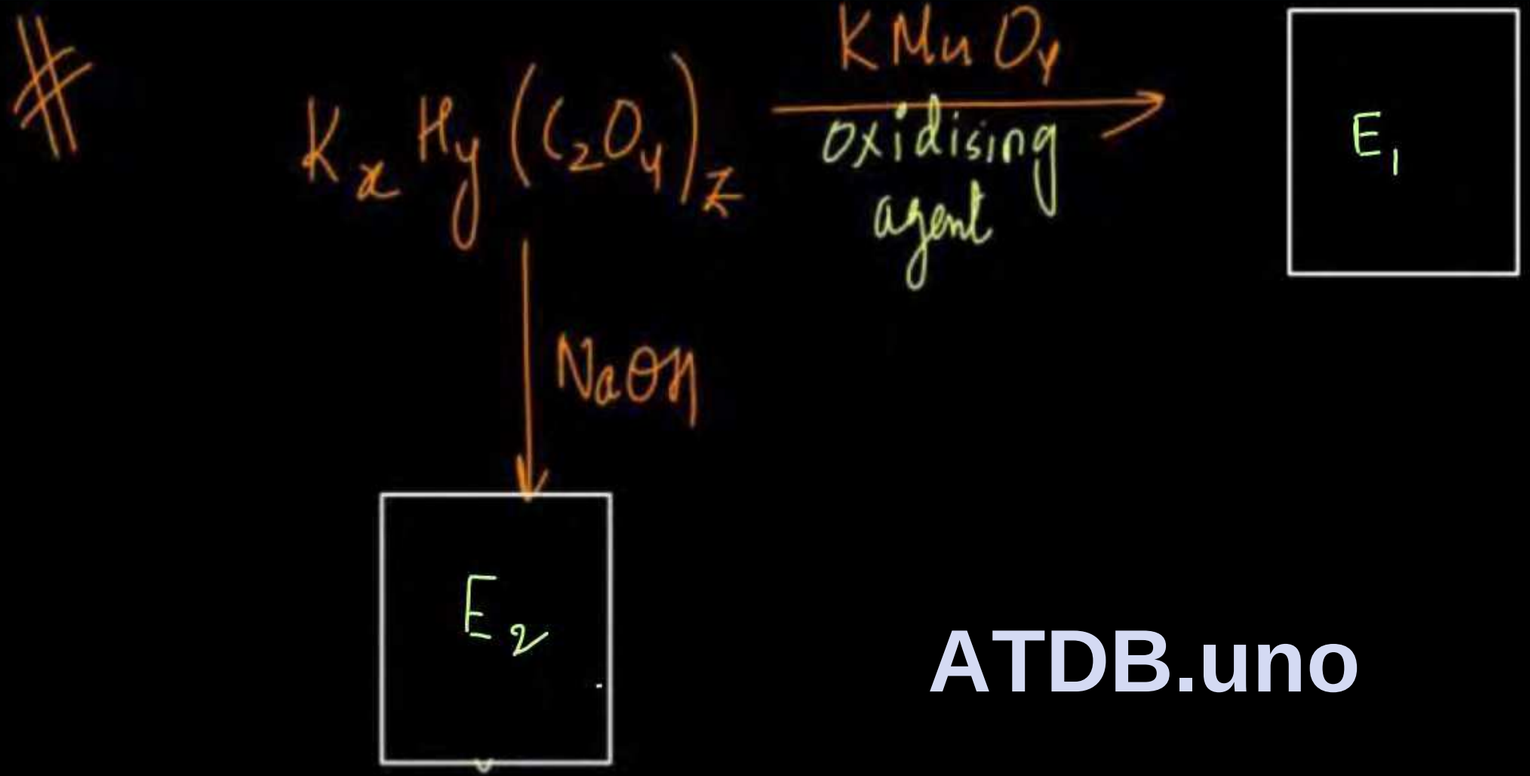

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