

PRAAYAS

JEE 2026

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PHYSICAL CHEMISTRY

REDOX REACTION

Lecture -05

FAISAL RAZAQ





Topics to be covered

A Law of Equivalence

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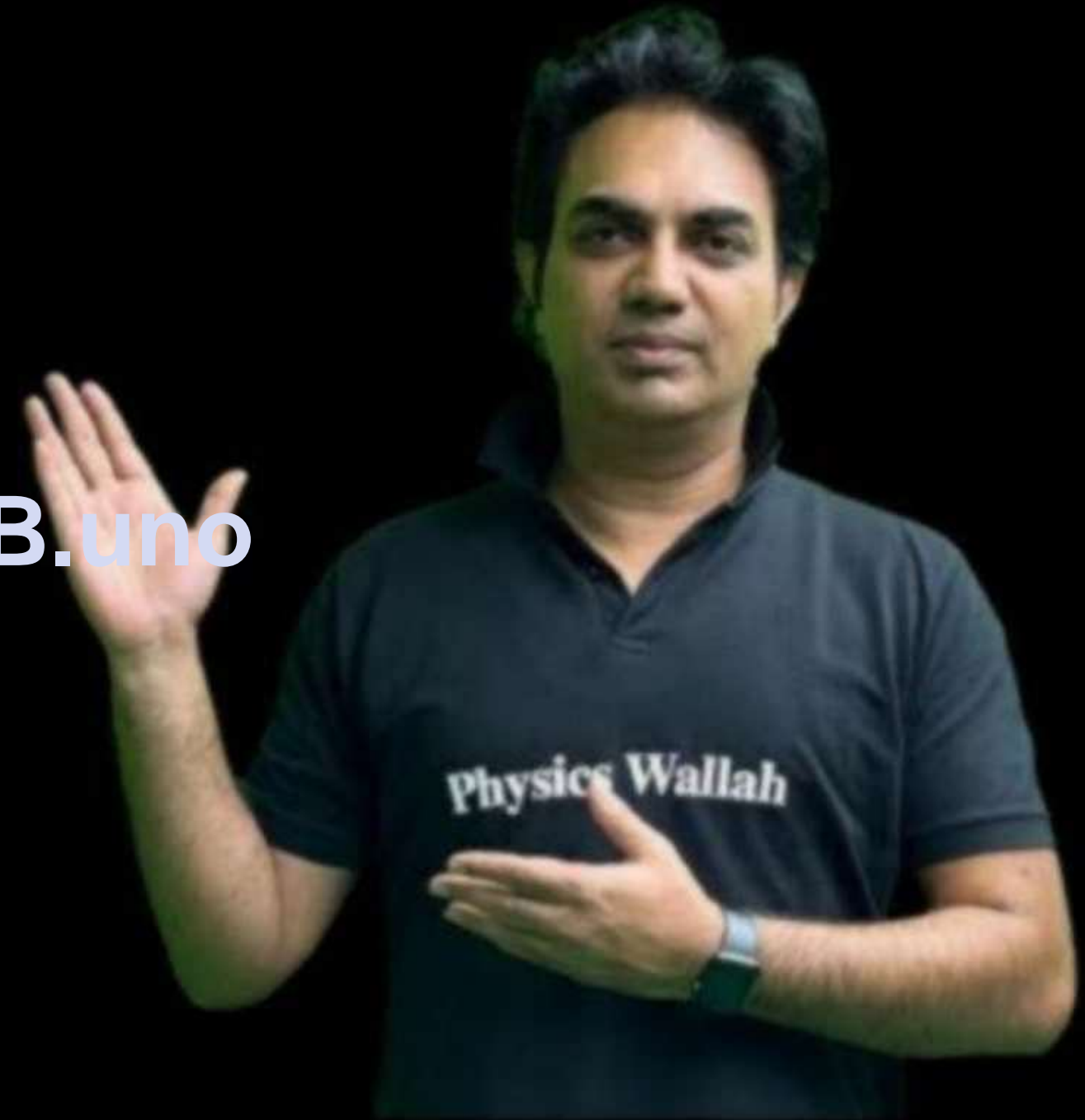




TELEGRAM GROUP BY FAISAL SIR



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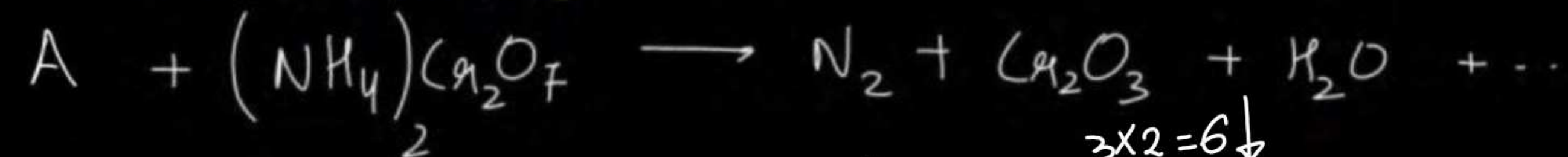


LIST OF IONS



Cl⁻	chloride	C₂O₄²⁻	oxalate
Br⁻	bromide	NO₃⁻	nitrate
F⁻	fluoride	N³⁻	nitride
I⁻	iodide	NO₂⁻	nitrite
CO₃²⁻	carbonate	ClO₄⁻	perchlorate
CN⁻	cyanide	ClO₃⁻	chlorate
NC⁻	isocyanide	ClO₂⁻	chlorite
SO₄²⁻	sulphate	ClO⁻	hypochlorite
SO₃²⁻	sulphite	CrO₄²⁻	chromate
S₂O₃²⁻	thiosulphate	Cr₂O₇²⁻	dichromate
S²⁻	sulphide	MnO₄⁻	permanganate
P³⁻	phosphide	PO₄³⁻	phosphate

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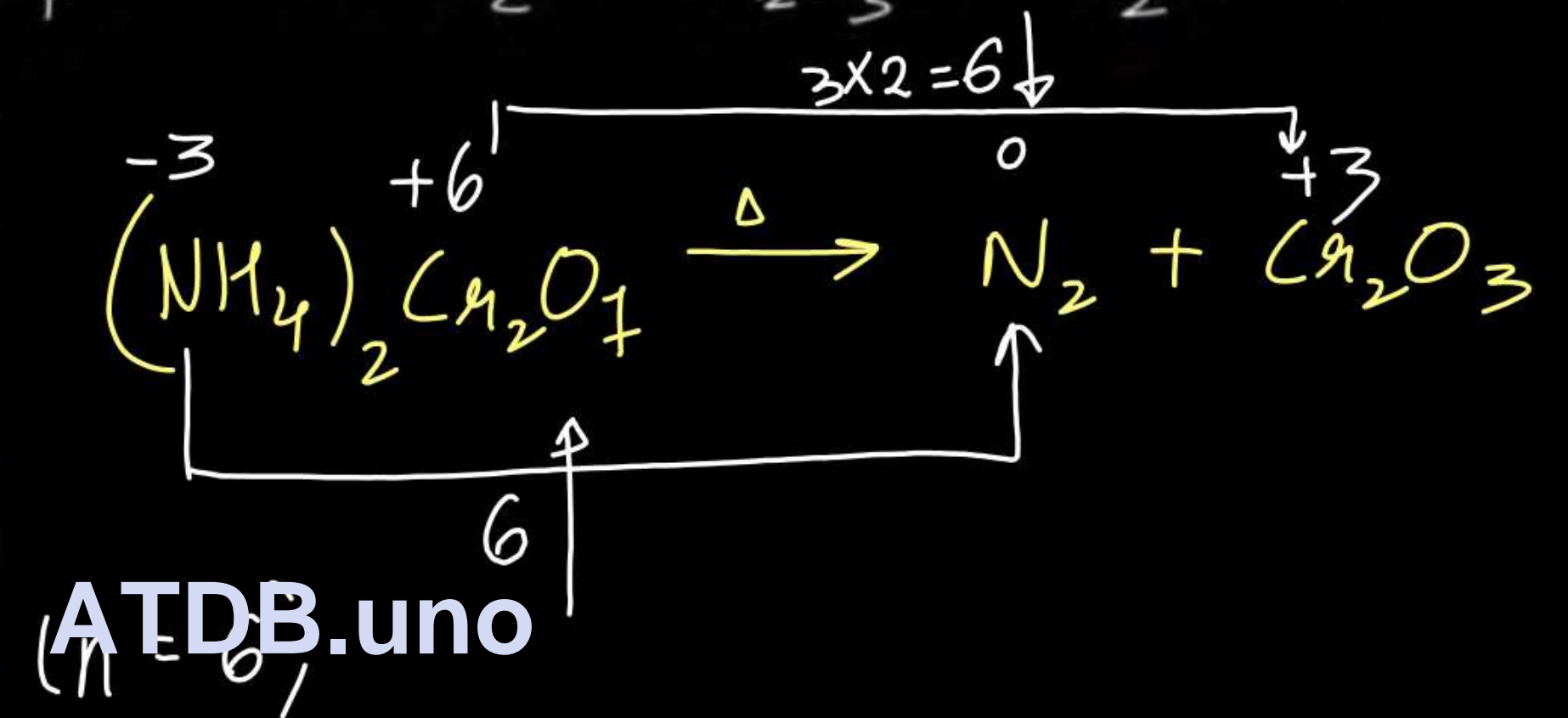
#

+
 NH_4
 $x + 4 = +1$
 $x = -3$

Behaviour of A —

- i) O.A
- ii) R.A
- iii) Both
- iv) None
- v) Mujhe kya pata

$C_{12}O_7^{2-}$
 $2x - 14 = -2$
 $x = +6$



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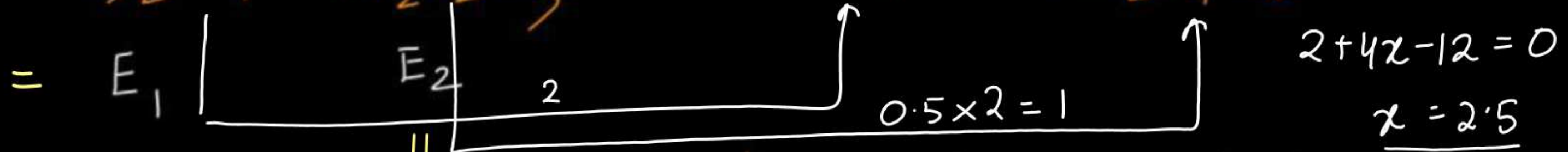
Question

Learn (Hypo solution)



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

$$\frac{M_{I_2}}{2}$$



Find out E_1 and E_2 in terms of M_1 and M_2 .

$$\frac{M_{Na_2S_2O_3}}{1}$$

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N - Factor Calculation in a Disproportionation Reaction

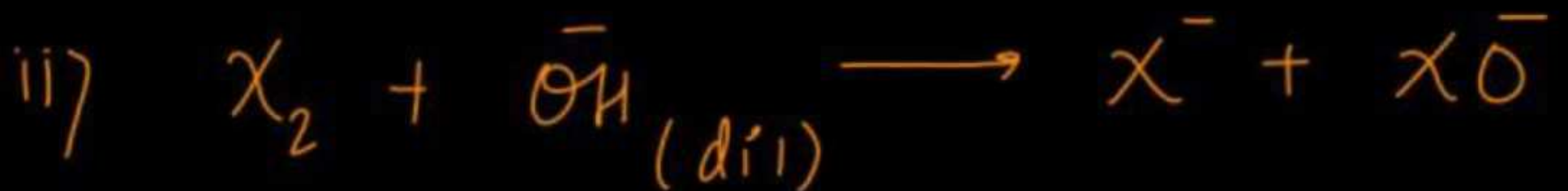


A redox reaction in which a same element present in a particular compound in a definite O.S is oxidised as well as reduced.

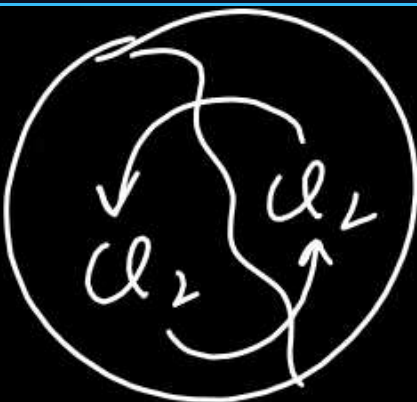
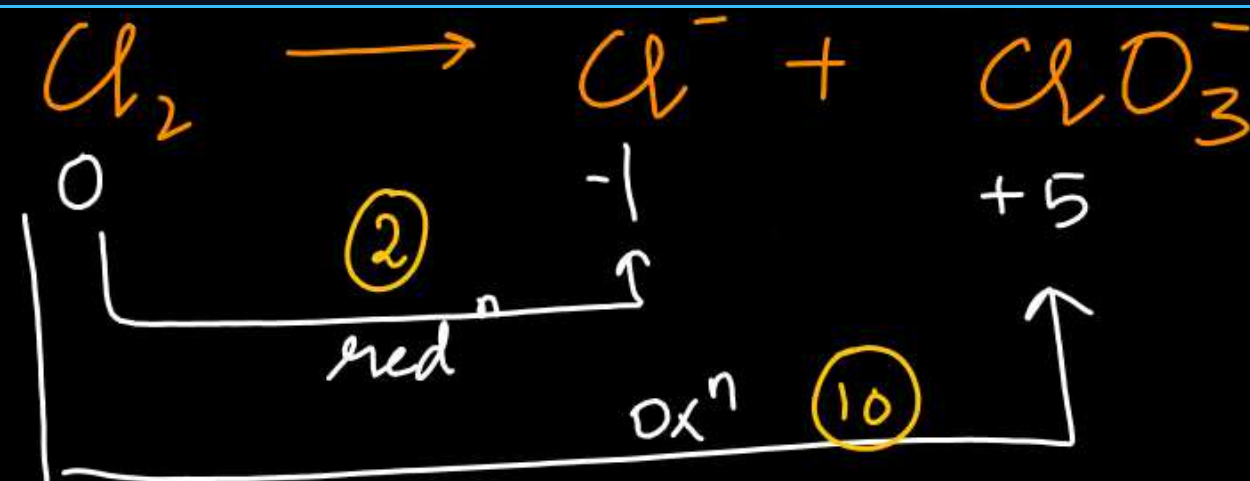
One of the reactant in a disproportionation reaction always contain an element that can exist in an atleast three oxidation state.

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Some example of disproportionation K_x^n



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$$\frac{1}{n_{\text{net}}} = \frac{1}{2} + \frac{1}{10}$$

Jugaad!

$$E_{\text{net}} = E_1 + E_2$$

$$\frac{M}{n_{\text{net}}} = \frac{M}{n_1} + \frac{M}{n_2}$$

$$n_{\text{net}} = \frac{5}{3}$$

$$\frac{1}{n_{\text{net}}} = \frac{1}{n_1} + \frac{1}{n_2}$$

Question: find out the eq. wt of Cl_2 in this disproportionation reaction.

$$E_{\text{net}} = \frac{M}{n_{\text{net}}} = \frac{71}{5/3} = \frac{71 \times 3}{5}$$



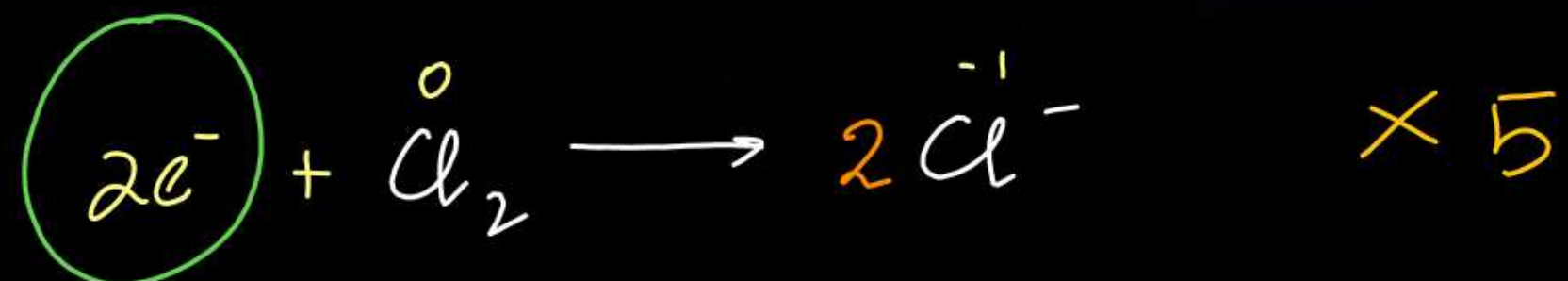
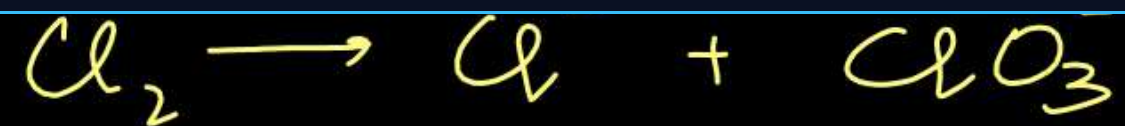
Kob

* Cl_2 as an OA, n-factor = 2

* Cl_2 as RA, n-factor = 10

* Overall n-factor = $\frac{5}{3}$

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According to balance chemical eqⁿ

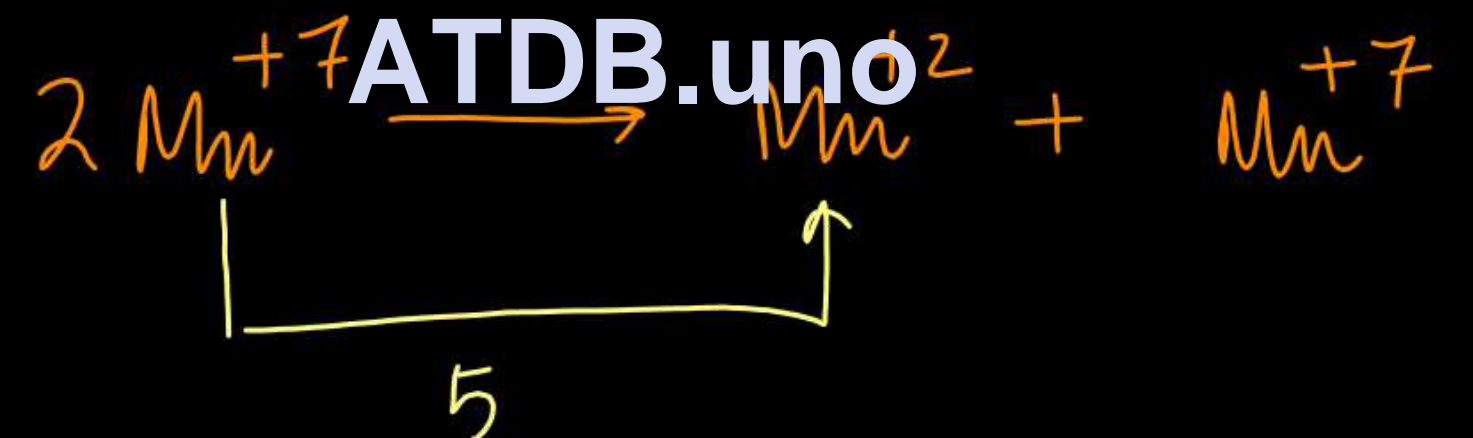
6 mol Cl₂ transferring 10 mol. e^s

| " " " " $\frac{10}{6}$ " e^s

$$\textcircled{\frac{5}{3}}$$

QuestionImp

$$n\text{-factor} = \frac{3+5}{2} = 4$$

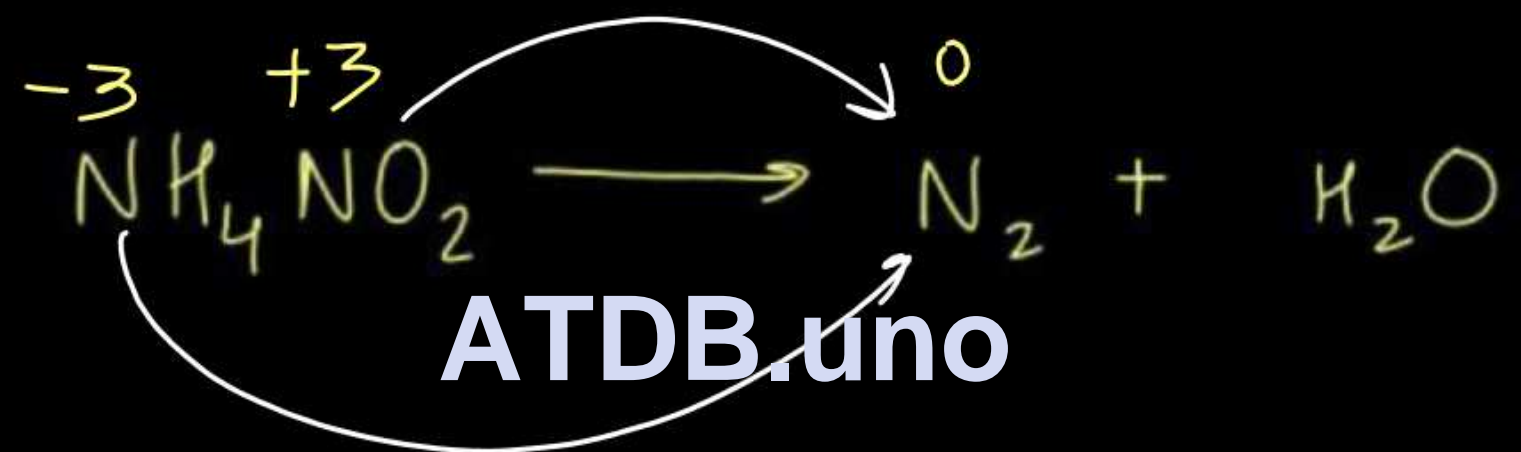
QuestionImp

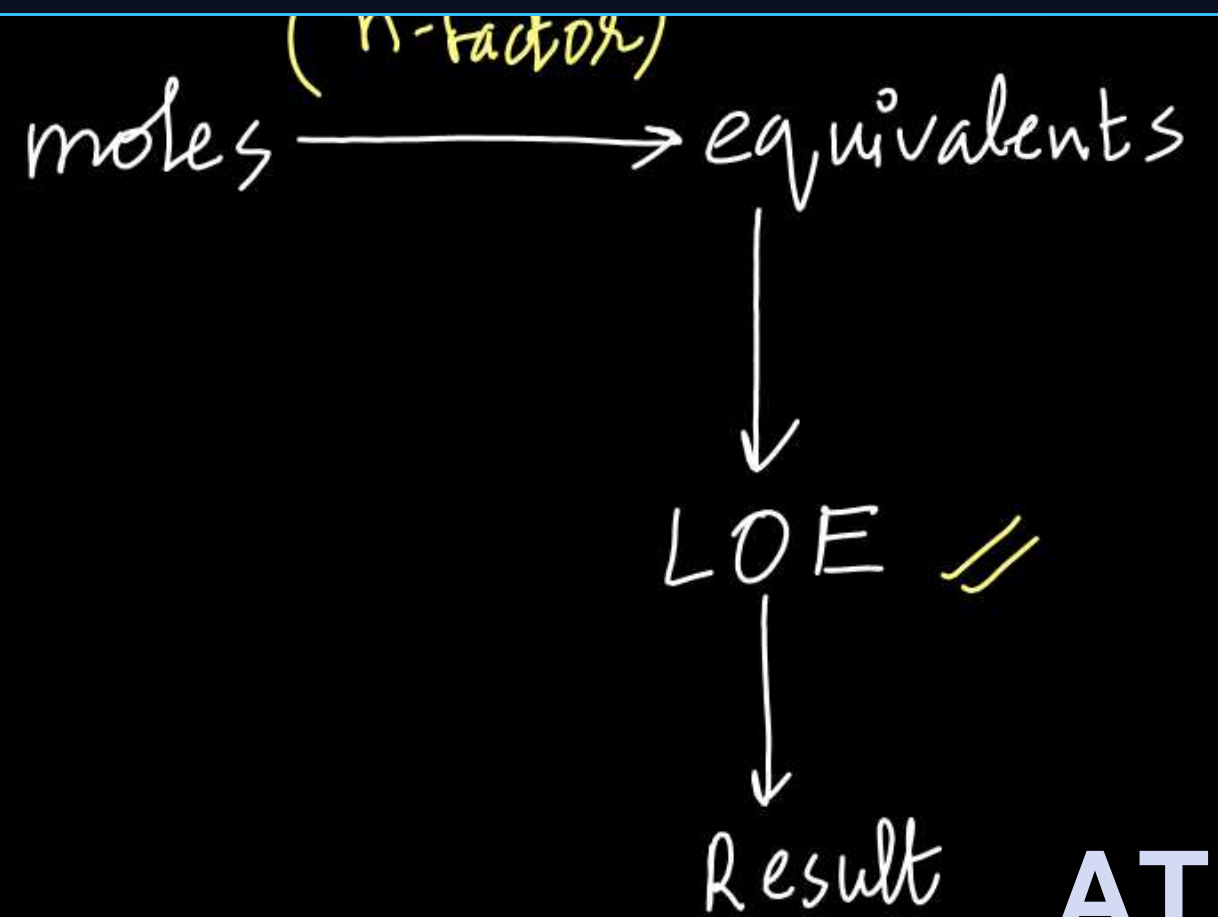
$$n\text{-factor} = \frac{5}{2}$$



Comproportionation Reaction

A class of redox reaction in which element from two different oxidation state gets converted into single O.S.





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Important



* Equivalents = moles \times n-Factor

* Equivalents = $\frac{\text{wt of substance}}{\text{equivalent wt}}$ $\left[\text{eq. wt} = \frac{\text{Mol. wt}}{n} \right]$

* Equivalents = Normality \times Vol of solution in lt.

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$\left[\text{Normality} = \frac{\text{Eq of solute}}{\text{Vol. of sol}^n \text{ in lt.}} \right]$

$$M \times V = \text{moles}$$

$$N \times V = \text{equivalents}$$

$$\frac{M}{N} = \frac{\text{moles}}{\text{equivalents}} = \frac{\cancel{\text{moles}}}{\cancel{\text{moles}} \times n\text{-factor}}$$

$$N = M \times n\text{-factor}$$

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$$* \text{Equivalents} = \text{moles} \times n\text{-factor}$$

$$* \text{Equivalents} = \frac{\text{given mass}}{\text{Eq. mass}}$$

$$* \text{Equivalent mass} = \frac{\text{Mol. wt.}}{n\text{-factor}}$$

$$* \text{Eq} = \text{normality} \times \text{volume}$$

$$= N \times V$$

$$= n\text{-factor} \times \text{molarity} \times \text{vol.}$$

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$$* \text{Normality} = \frac{\text{no. of equivalents of solute}}{\text{volume of solution in lt.}}$$

$$\text{Normality} = \frac{\text{no. of eq. of solute}}{\text{vol. of sol}^n \text{ in lt}}$$

$$= n\text{-factor} \times \left(\frac{\text{moles of solute}}{\text{vol. of sol}^n \text{ in lt.}} \right)$$

$$\text{Normality} = n\text{-factor} \times \text{Molarity}$$

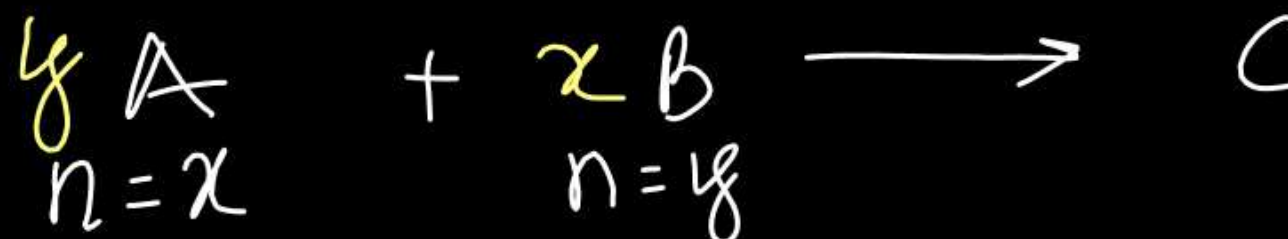
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no. of equivalents of solute = Normality \times vol. of solⁿ in lt.



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Law of Equivalence ^{नियम} जो भिन्न हैं उनके बराबर होते हैं!



According to LOE

— (i) Eq. of A = Eq. of B = Eq. of C

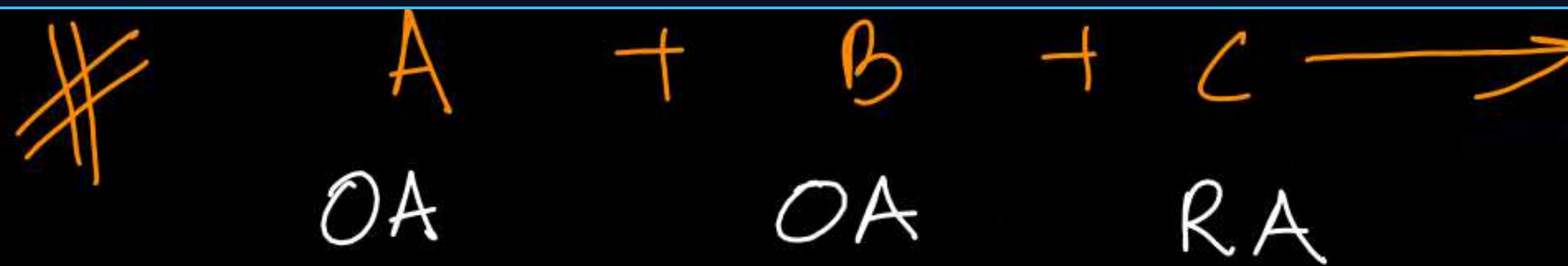
— (ii) If the n-factor ratio of A and B is $x:y$ then their molar ratio will be $y:x$.



According to LOE $\text{Eq. of } A = \text{Eq. of } B = \text{Eq. of } C$ ✗

$$\text{Eq. of } A + \text{Eq. of } C = \text{Eq. of } B$$

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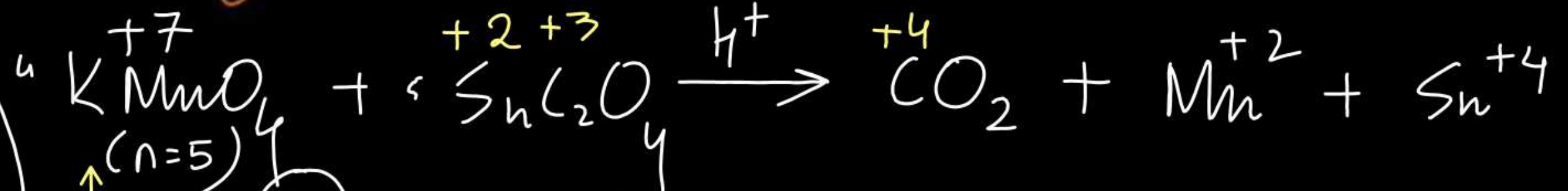
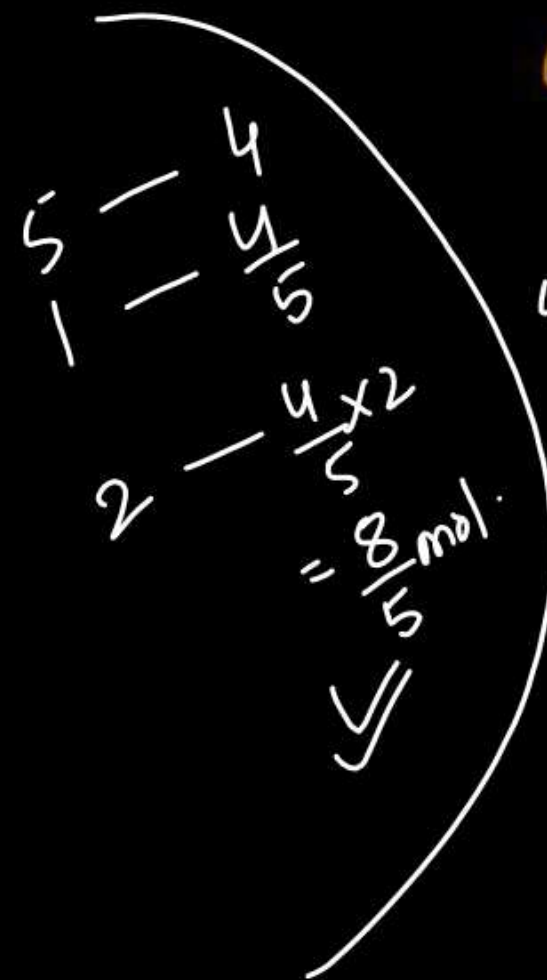
According to LOE

$$\text{Eq of A} + \text{Eq of B} = \text{Eq of C}$$

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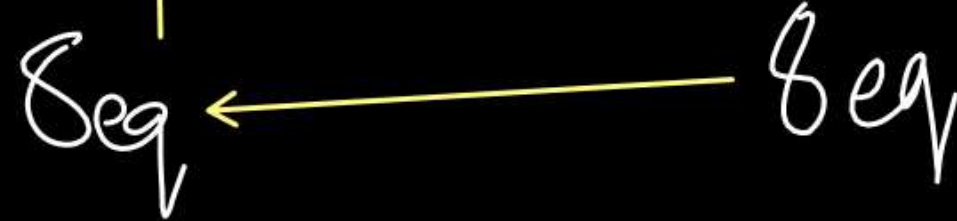
Question

How many moles of $KMnO_4$ are required to completely oxidise 2 moles of $SnCl_2O_4$ in acidic medium?



2 mol

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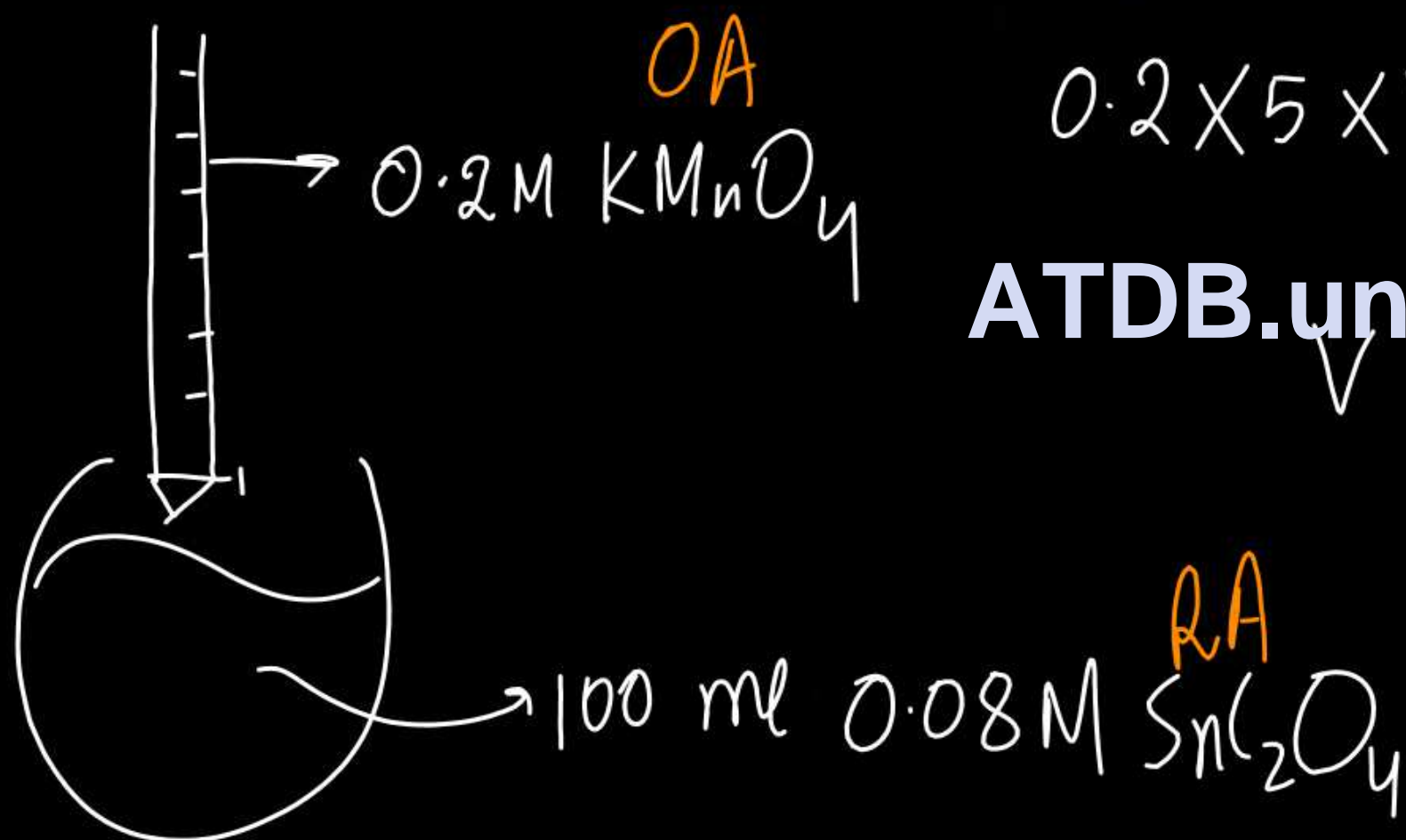


find out the volume of 0.2 M KMnO_4 consumed to completely oxidised 100 ml $0.08\text{ M SnCl}_2\text{O}_4$ soln in acidic medium.

$$\text{M. Eq of } \text{KMnO}_4 = \text{M. Eq of } \text{SnCl}_2\text{O}_4$$

$$0.2 \times 5 \times V = 0.08 \times 4 \times 100 \text{ (LOE)}$$

$$V = \frac{0.08 \times 4 \times 100}{0.2 \times 5} = 32 \text{ ml.}$$



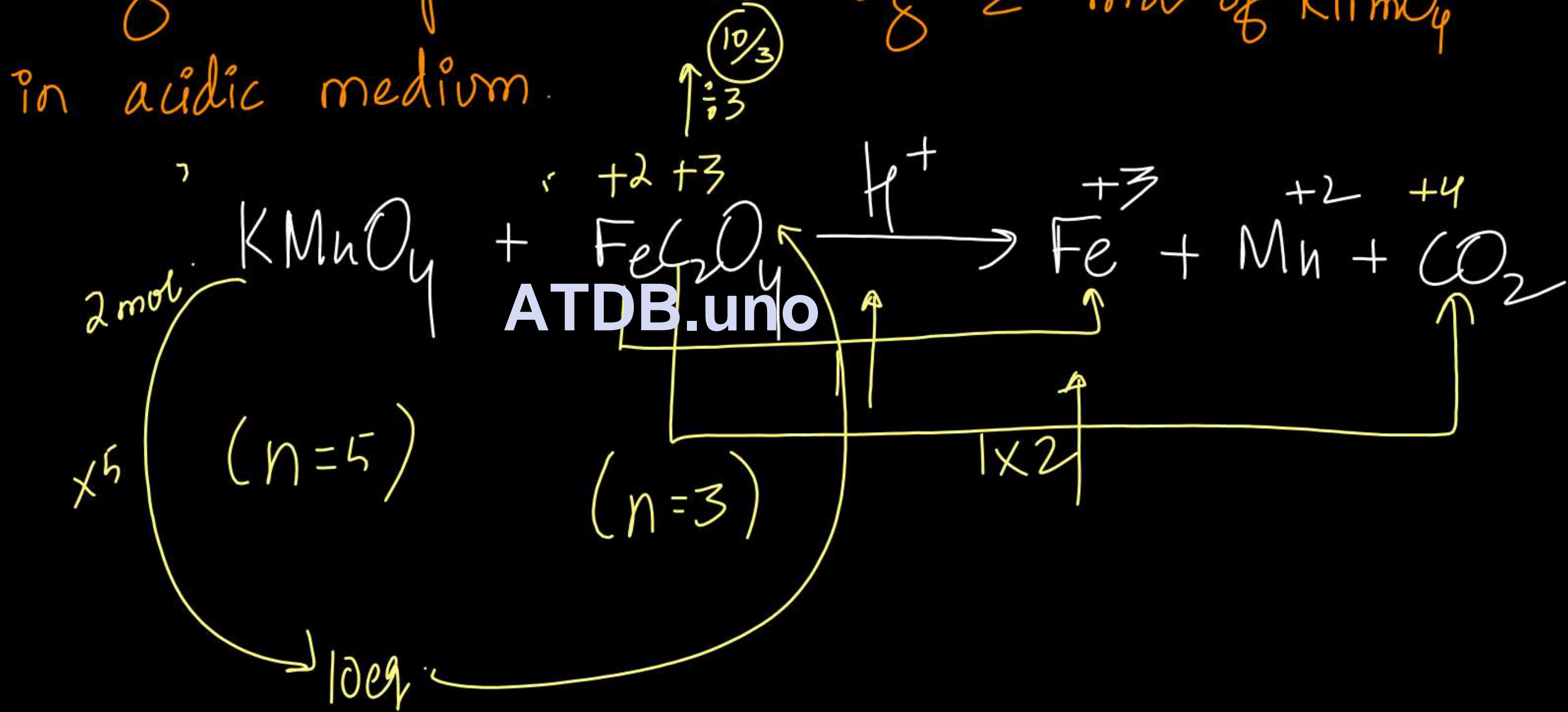


$$Eq = Normality \times vol.$$

$$Eq = Molarity \times n\text{-factor} \times vol.$$

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Question Find out the moles of FeC_2O_4 consumed during its complete oxidation by 2 mol of KMnO_4 in acidic medium.





THANK
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YOU