

YAKEEN NEET 2.0

2026

Redox Reaction

Physical Chemistry

Lecture -06

By- Amit Mahajan Sir





Topics to be covered

- 1 Revision of Last Class
- 2 Redox Reactions
- 3 MEDICS Test no 6
- 4 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.

Q 1 find Volume of 0.1N H_2SO_4 having 4 moles.

Ans
$$N = \frac{g \cdot eq}{V(L)}$$

$$0.1 = \frac{4 \times 2}{V(L)}$$

$$V(L) = \frac{8}{0.1} = 80L$$

Q2 find N of resulting mix. if 5ml of 1M H_2SO_4 is mixed with 495ml of 2M HNO_3 ?

Ans $[\text{H}^+]_{\text{Total}} = \frac{5 \times 1 \times 2 + 495 \times 2 \times 1}{500} = \frac{10 + 990}{500} = \frac{1000}{500} = 2$

Q3 If metal oxide has 40% oxygen. find eq. wt. of metal?

Ans $\frac{40\text{g O}_2}{60\text{g Metal}} = \frac{60}{E_M} = \frac{40}{5}$

$$E_M = \frac{60}{5} = 12\text{g}$$

Q4 Find Molarity of resulting mix. of substance left.
if 50ml of 2M HCl is mixed with 50ml of 1N NaOH?

Ans $[H^+]_{\text{left}} = \frac{50 \times 2 \times 1 - 50 \times 1}{100}$

$$= \frac{50}{100} = \frac{1}{2} \text{ M} = 0.5 \text{ M}$$

Q5 find eq. mass of H_2SO_4 in following rxn?

$$M_{H_2SO_4} = 98g$$



$n_f = 1$

$$E_{H_2SO_4} = \frac{98}{1} = 98g$$

✓ (a) 98g

(b) 49g.

(c) 196g.

(d) None of these.

MEDICS test no: 7
Redox reactions & Volumetric Analysis





Redox Titrations



➤ One of the chemicals is oxidized and other is reduced during titration.





Types of Redox Titrations

(a) $\text{K}_2\text{Cr}_2\text{O}_7$ Titrations:

$\text{K}_2\text{Cr}_2\text{O}_7$ is a very good oxidizing agent in acidic medium.



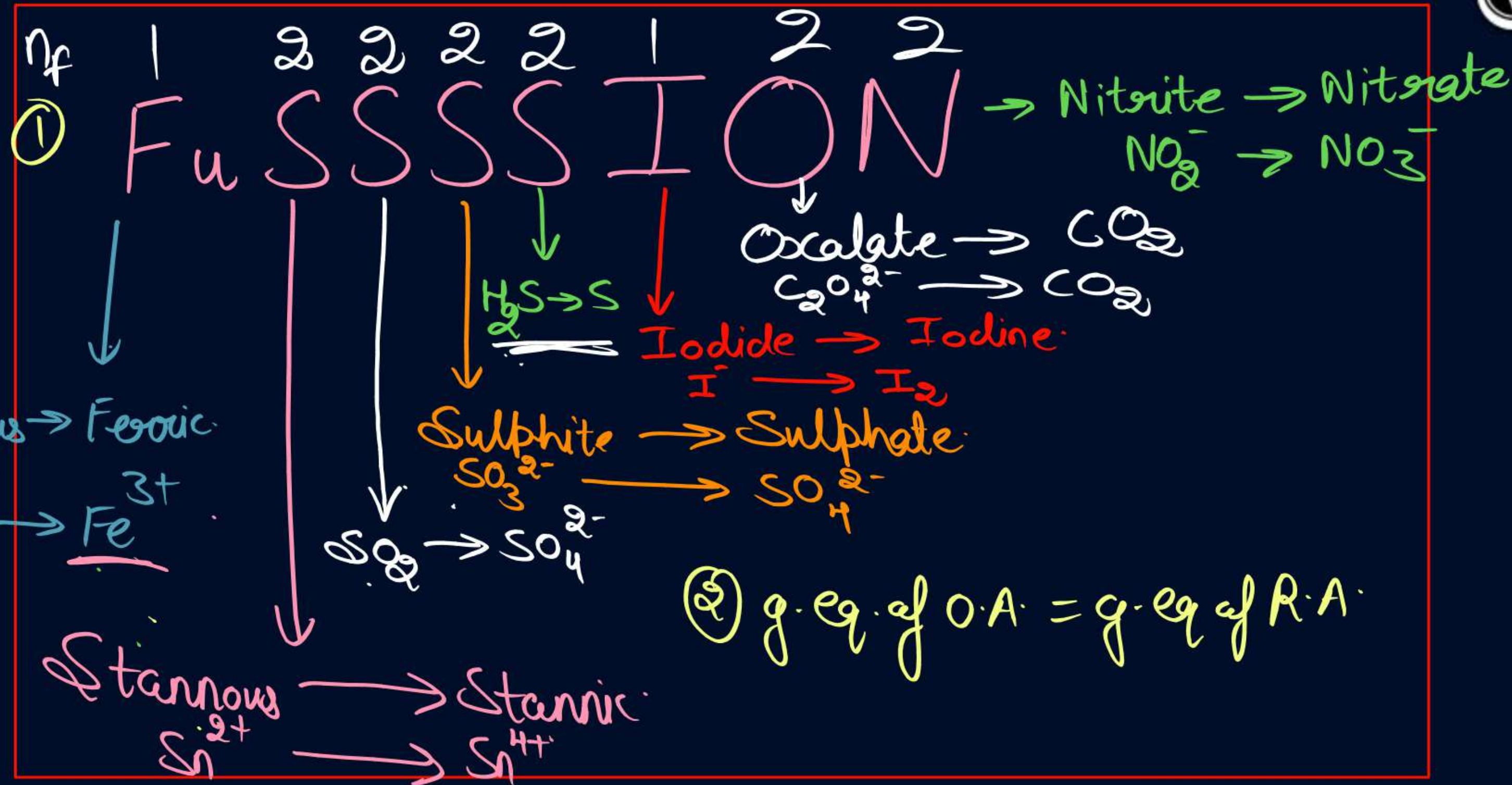
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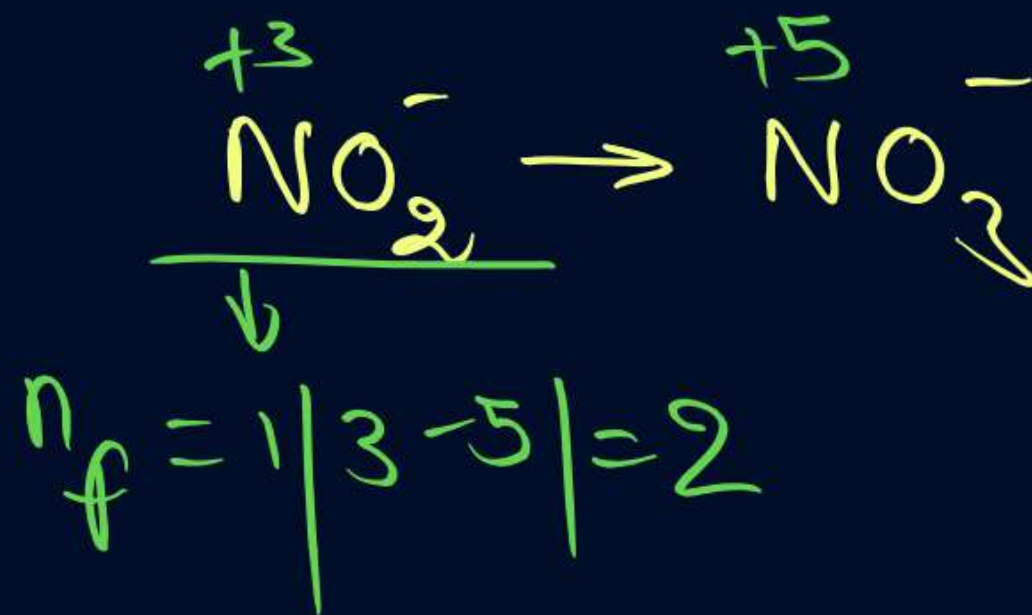
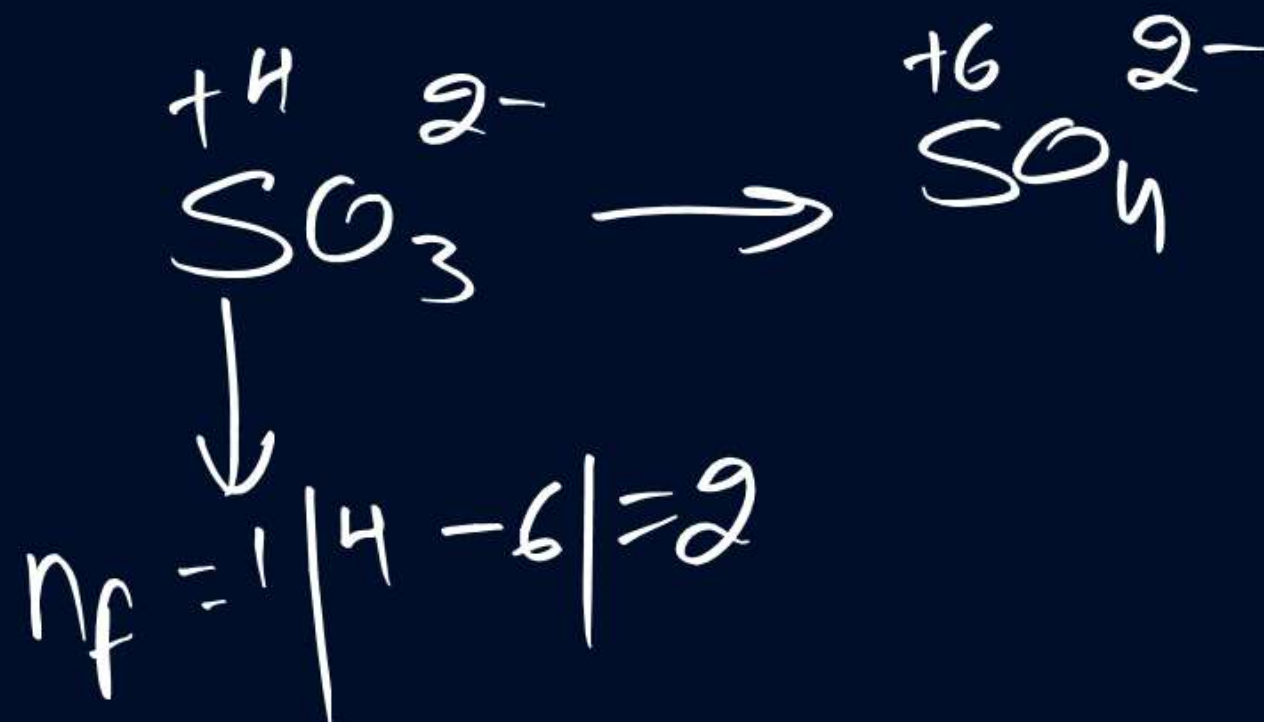
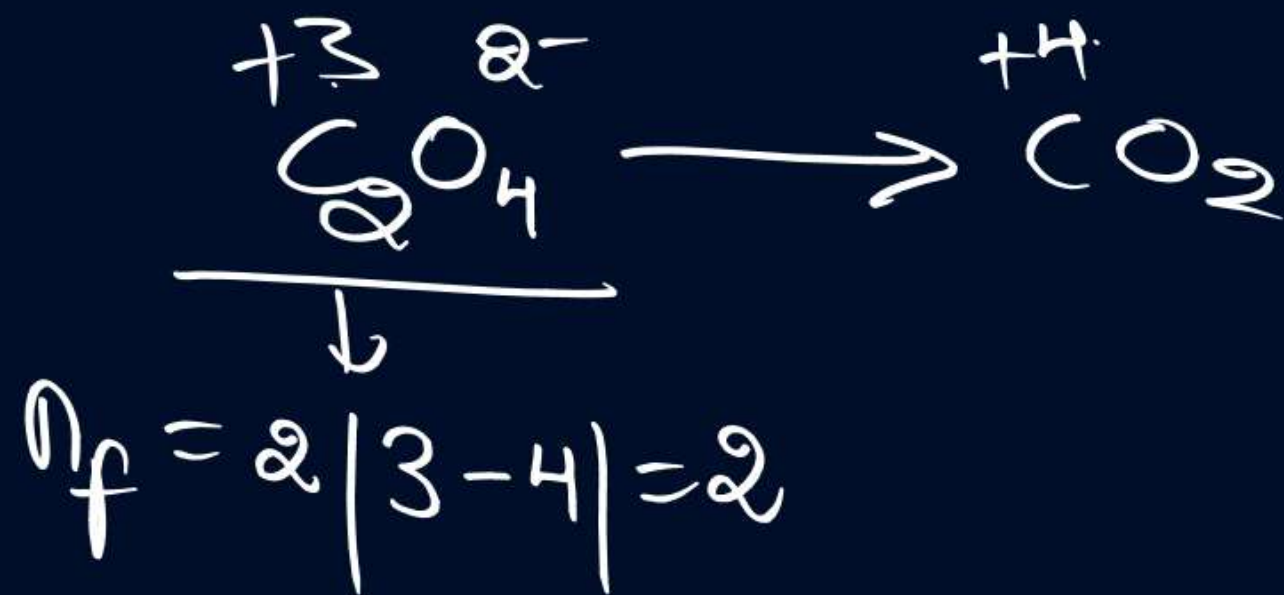
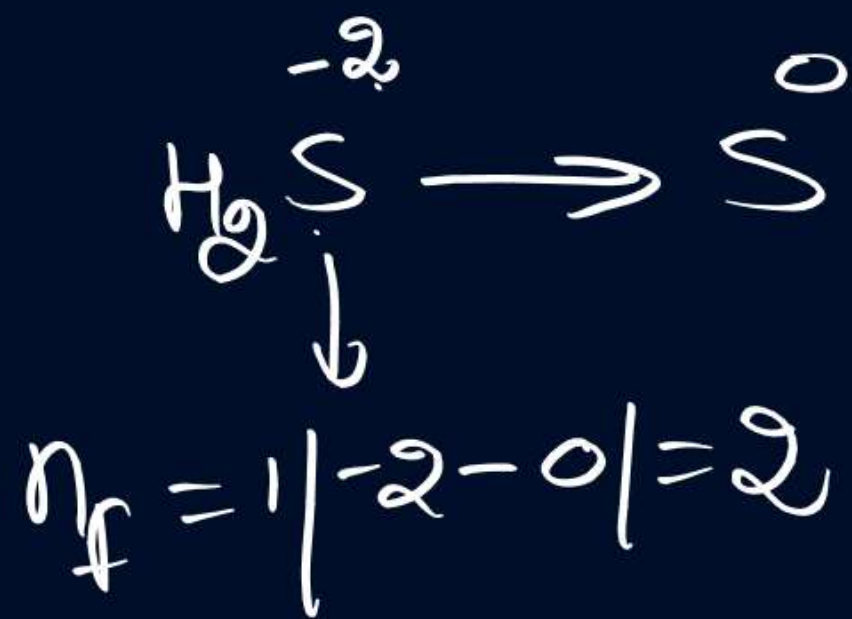
$$n_f = 2|6 - 3| = 6$$

(b) $\text{K}_2\text{Cr}_2\text{O}_7$ titrations

Indicator used in $\text{K}_3[\text{Fe}(\text{CN})_6]$ or Diphenylamine.

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QUESTION -

Find volume of 0.1 M $\text{K}_2\text{Cr}_2\text{O}_7$ which will react with 3 moles of FeSO_4 ?

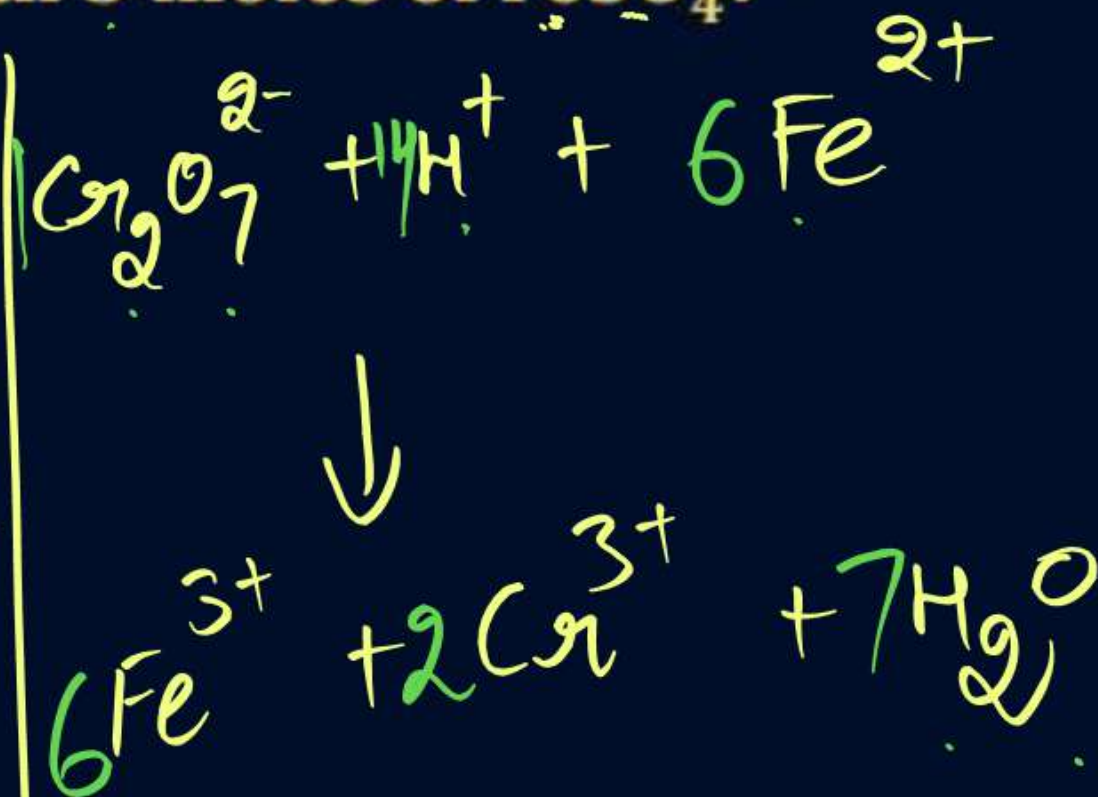
Ans

$$V(L) = ?$$

$$\text{g. eq of } \text{K}_2\text{Cr}_2\text{O}_7 = \text{g. eq of } \text{FeSO}_4$$

$$V(L) \times 0.1 \times 6 = 3 \times 1$$

$$V(L) = \frac{1}{0.2} = \frac{10}{2} = 5L$$



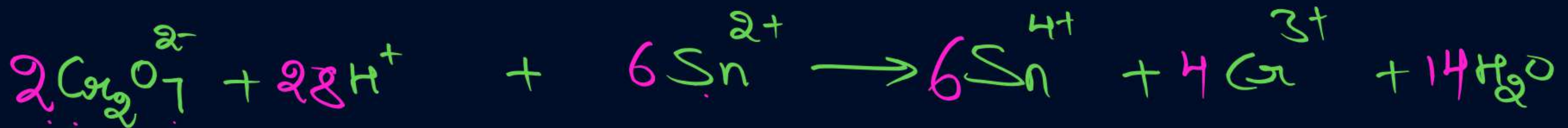
QUESTION -



Find moles of Sn^{2+} which will react with 5 L of 2M $\text{K}_2\text{Cr}_2\text{O}_7$ in acidic medium?

$$\text{moles} \times \cancel{2} = 5 \times \cancel{2} \times 6$$

$$\rightarrow \text{moles} = 30$$



QUESTION –



The mass of potassium dichromate crystals required to oxidise 750 cm³ of 0.6 M Mohr's salt solution is (molar mass of K₂Cr₂O₇ = 294)

- ☒ A 0.49 g
- ☐ B 0.45 g
- ☐ C 22.05 g
- ☐ D 2.2 g

$$W_{K_2Cr_2O_7} = ?$$

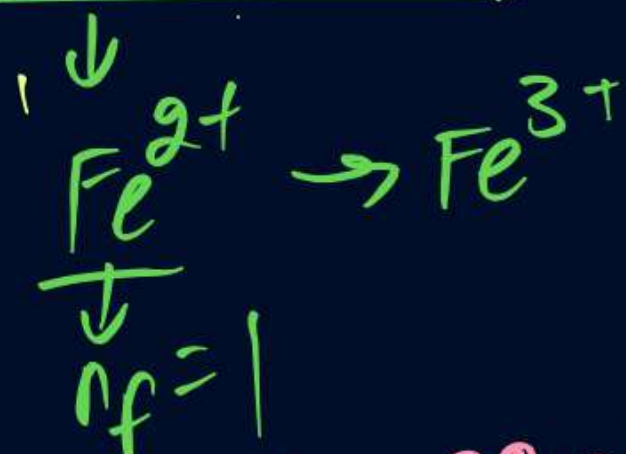
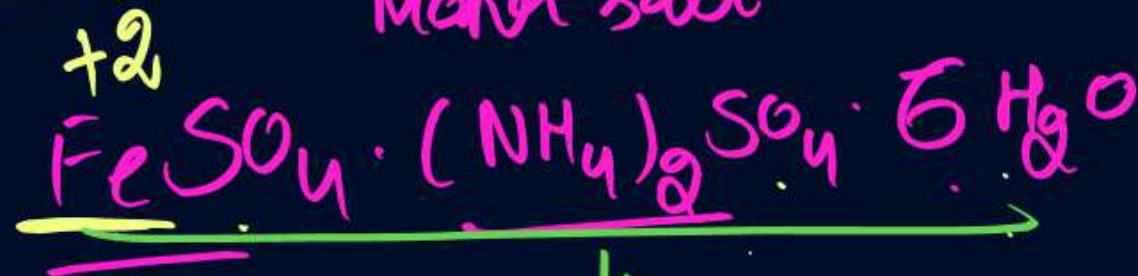
$$E_{K_2Cr_2O_7} = \frac{294}{6} = 49$$

$$g\text{-eq of } K_2Cr_2O_7 = g\text{-eq of Mohr salt}$$

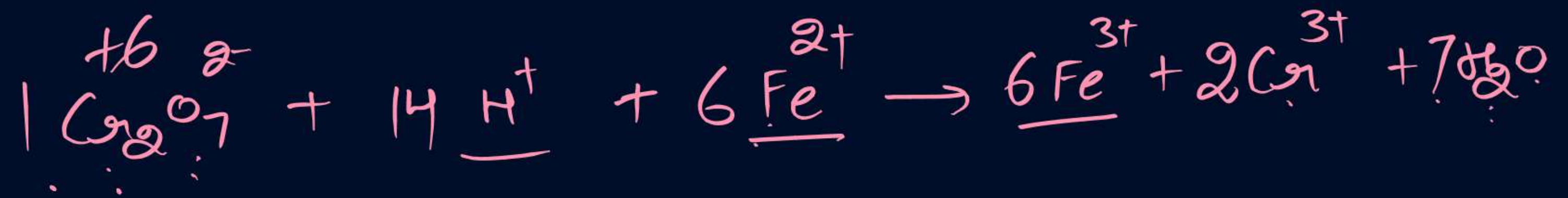
$$\frac{W_{K_2Cr_2O_7}}{49} = \frac{750 \times 0.6 \times 1}{1000 \times 10}$$

$$W_{K_2Cr_2O_7} = \frac{49 \times 6 \times 3}{2 \times 10} = 44.1$$

Mohr salt:



$$= \frac{44.1}{20} = 22.05g$$



QUESTION –

Consider a titration of potassium dichromate solution with acidified Mohr's salt solution. The number of moles of Mohr's salt required per mole of dichromate is

$$\begin{aligned} \text{g eq of Mohr salt} &= \text{g eq dichromate} \\ \text{moles} \times 1 &= 1 \times 6 \end{aligned}$$

$$\text{moles} = 6$$

A 3

B 4

C 5

D 6

QUESTION -



The volume, in mL of 0.02 M $K_2Cr_2O_7$ solution required to react with 0.288 g of ferrous oxalate in acidic medium is (Molar mass of Fe = 56 g/mol)

$$V(\text{mL}) = ?$$

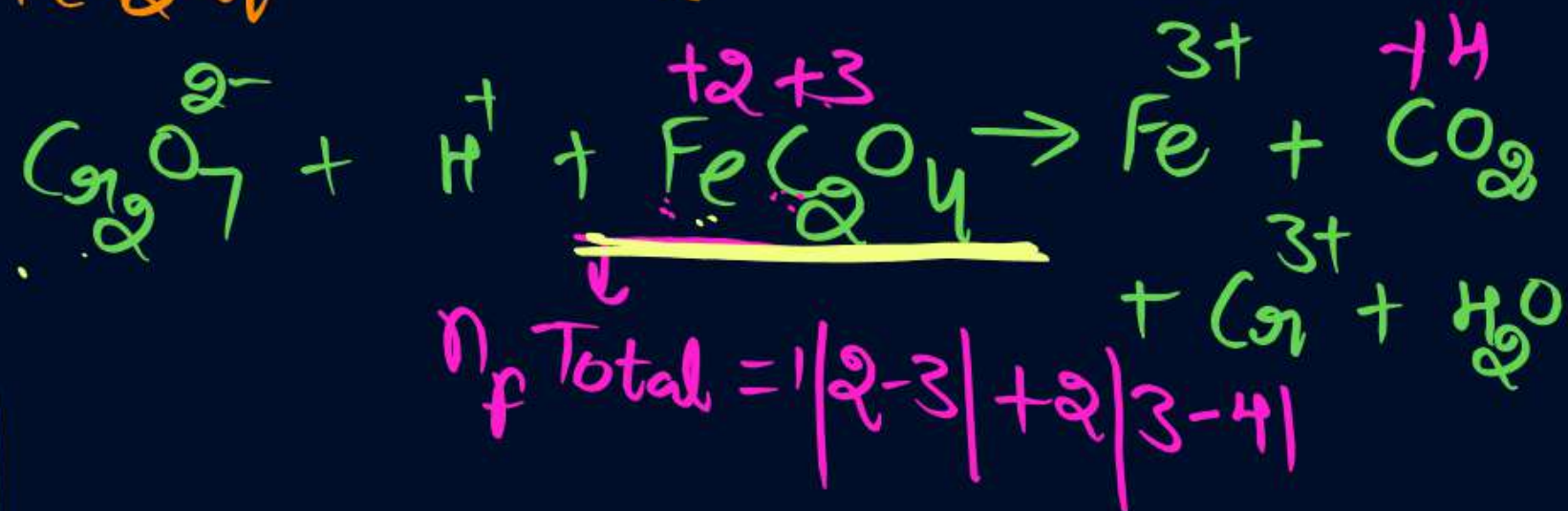
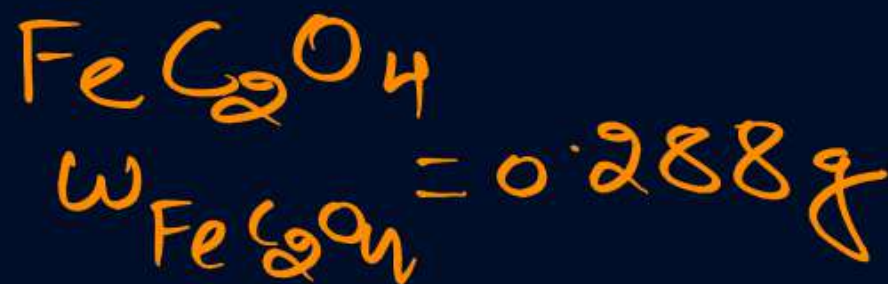
$$M = 0.02 \text{ M}$$

$$V(L) \times 0.02 \times 6 = \frac{w_{FeC_2O_4}}{E_{FeC_2O_4}}$$

$$V(L) = \frac{0.288 \times 3}{114 \times 0.02 \times 6 \times 10^3}$$

$$V(L) = \frac{1}{20} = 0.05 \text{ L}$$

$$V(\text{mL}) = 0.05 \times 1000 = 50 \text{ mL}$$



$$E_{FeC_2O_4} = \frac{56 + 24 + 64}{3} = 1 + 2 = 3$$

$$= \frac{144}{3}$$

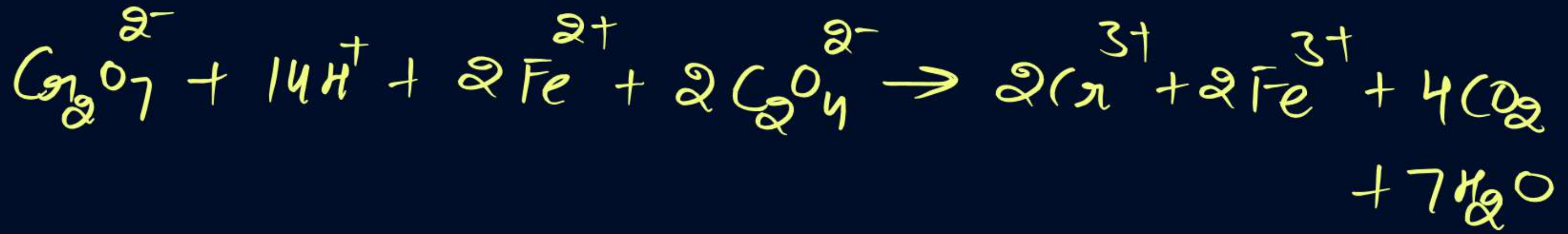


21 + 24 = 45 oxy

1 Hyd.

24 oxy.

42 Hyd

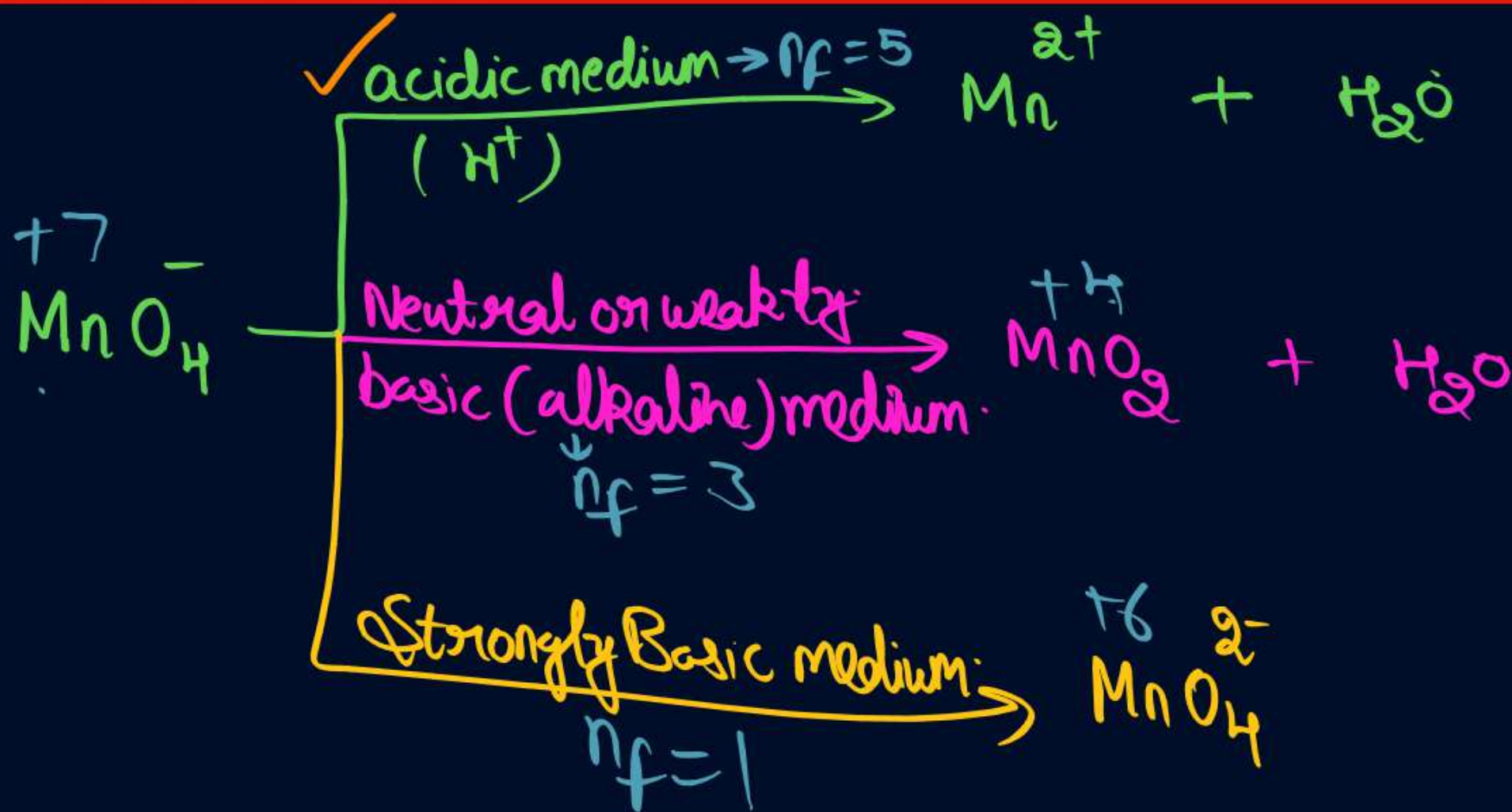




Potassium Permanganate Titrations



- KMnO_4 is a very good oxidizing agent in acidic medium, basic medium and neutral medium.



① KMnO_4 is very good oxid. agent in acidic medium.



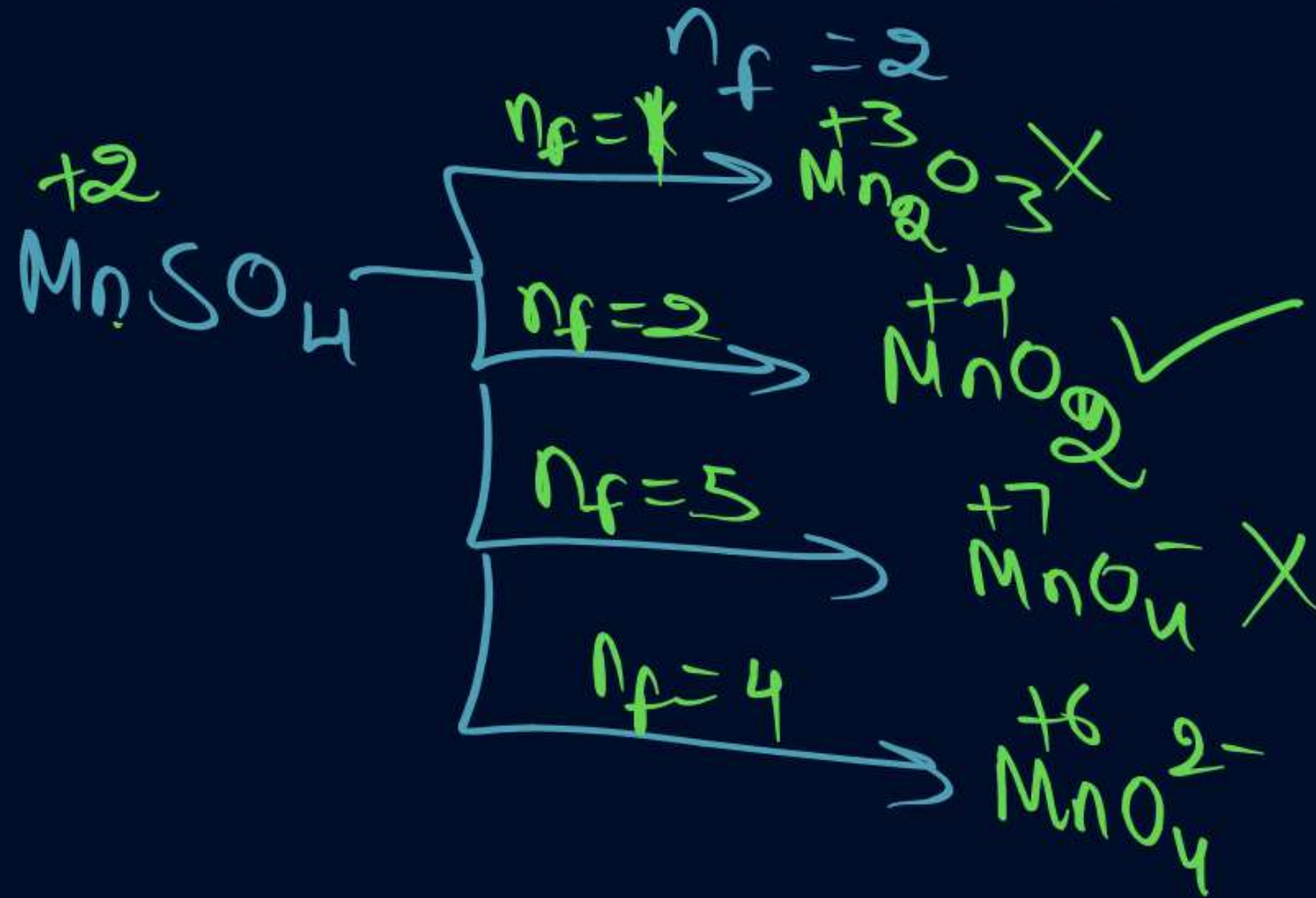
② KMnO_4 is self indicator.

③ FUSSSSSION

QUESTION –

The equivalent mass of MnSO_4 is half of its molecular mass it is converted to

$$E_{\text{MnSO}_4} = \frac{M_{\text{MnSO}_4}}{2} = \frac{M_{\text{MnSO}_4}}{n_f}$$



QUESTION –

⁺⁷

The value of n in, $\text{MnO}_4^- + 8\text{H}^+ + \underline{n}\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$ is

☒ A

5

☐ B

4

☐ C

3

☐ D

2

QUESTION –

The number of mole of oxalate ions oxidized by one mole of MnO_4^- is

$$n_{\text{ox.}} \times 2 = 1 \times 5$$

$$n_{\text{ox.}} = \frac{5}{2} = 2.5$$

A $1/5$

B $2/5$

☒ C $5/2$

D 5



$n_f = 3$

- $$3\text{MnO}_4^- + 24\text{H}^+ + \underline{5\text{FeC}_2\text{O}_4} \rightarrow 5\text{Fe}^{3+} + 10\text{CO}_2 + 3\text{Mn}^{2+} + 12\text{H}_2\text{O}$$
- 3 ox 2 ox

QUESTION –

The number of mole of KMnO_4 that will be needed to react with one mole of sulphite ion in acidic solution is

☒ A SO_3^{2-} $\frac{2}{5}$

☐ B $\frac{3}{5}$

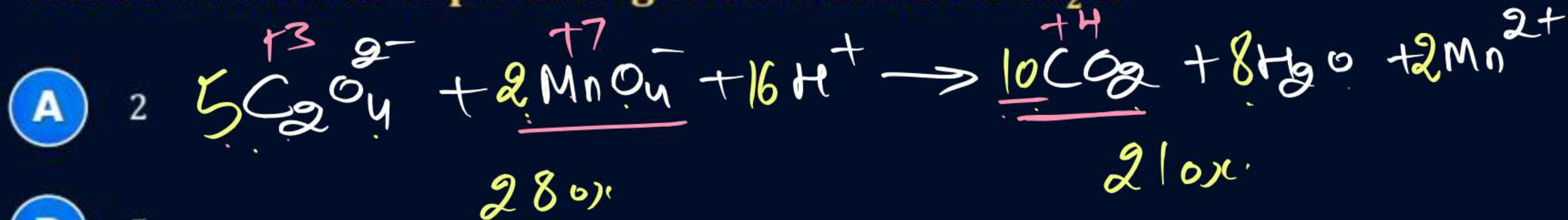
☐ C $\frac{4}{5}$

☐ D 1

$$n \times 5 = 1 \times 2$$
$$n = \frac{2}{5}$$

QUESTION –

In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecules of CO_2 is



B 5

C 1

D 10

QUESTION –

Reduction of the metal centre in aqueous permanganate ion involves:

- ☒ **A** 3 electrons in neutral medium
- ☐ **B** 5 electrons in neutral medium
- ☐ **C** 3 electrons in strongly alkaline medium
- ☒ **D** 5 electrons in acidic medium

KMnO₄ is BAN
for 1 5 3 years

MIT

KMnO_4 is strong o.A. in neutral & basic medium.



$$n_f = |-1 - 5| = 6$$

Q find moles of KMnO_4 reacted in neutral & basic medium which react with 3 moles of KI ?

Ans

$$\text{moles} \times \cancel{2} = 3 \times \cancel{6}$$

$$\text{moles } \text{KMnO}_4 = 3$$

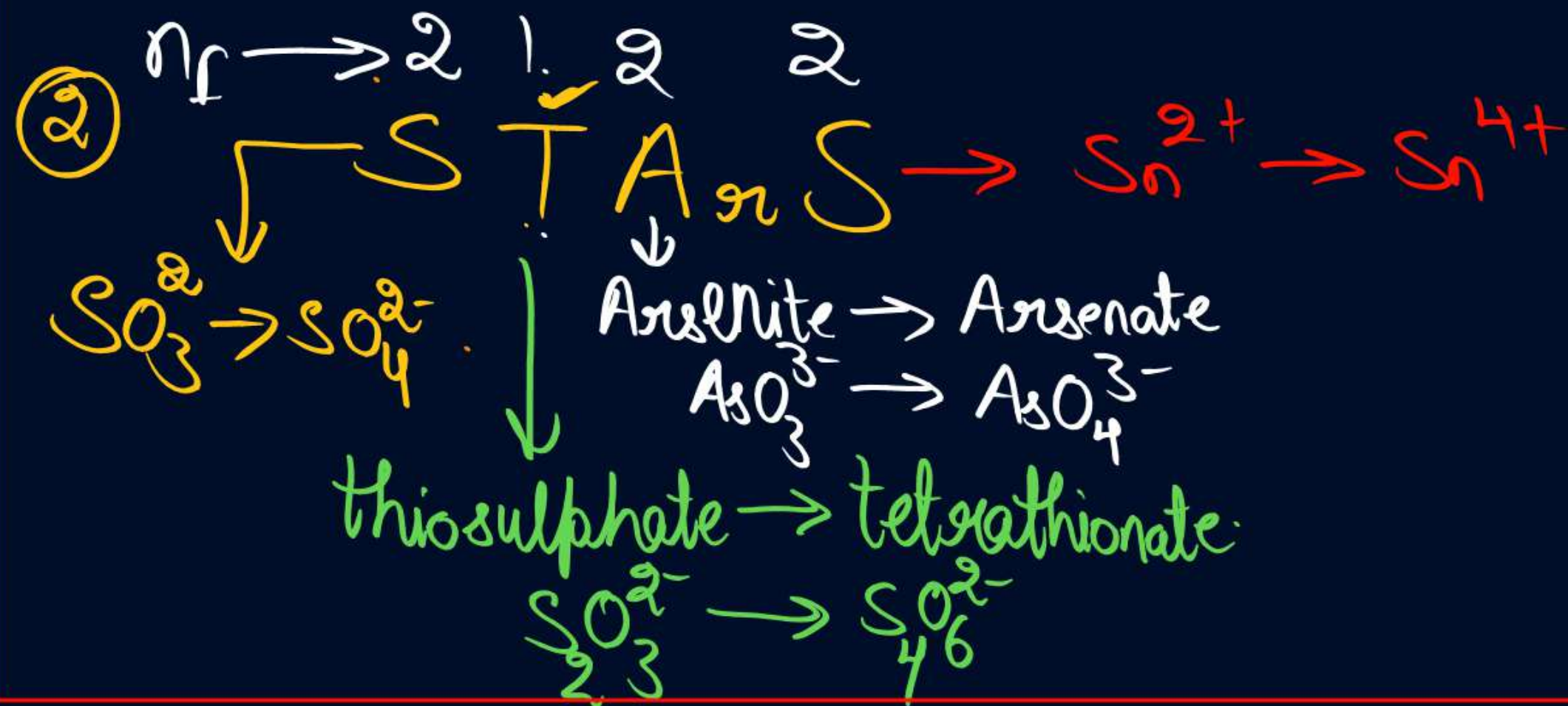
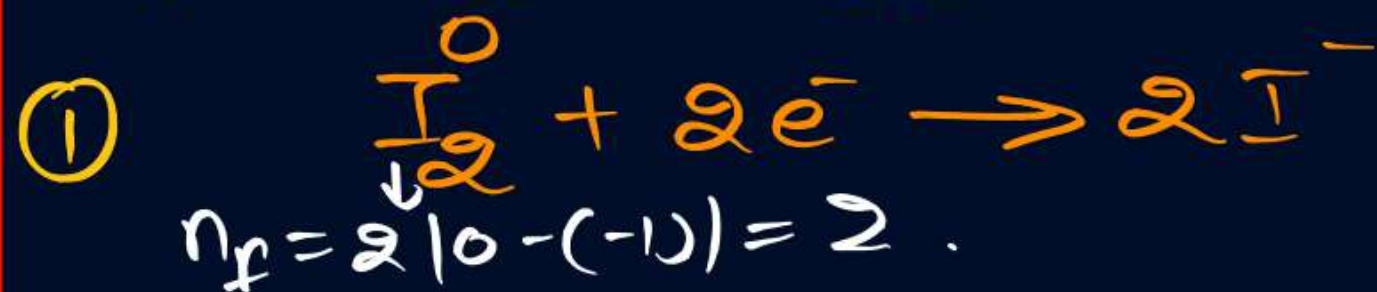


Iodimetric Titrations



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(Iodine) I_2 is a very good oxidizing agent.



QUESTION -



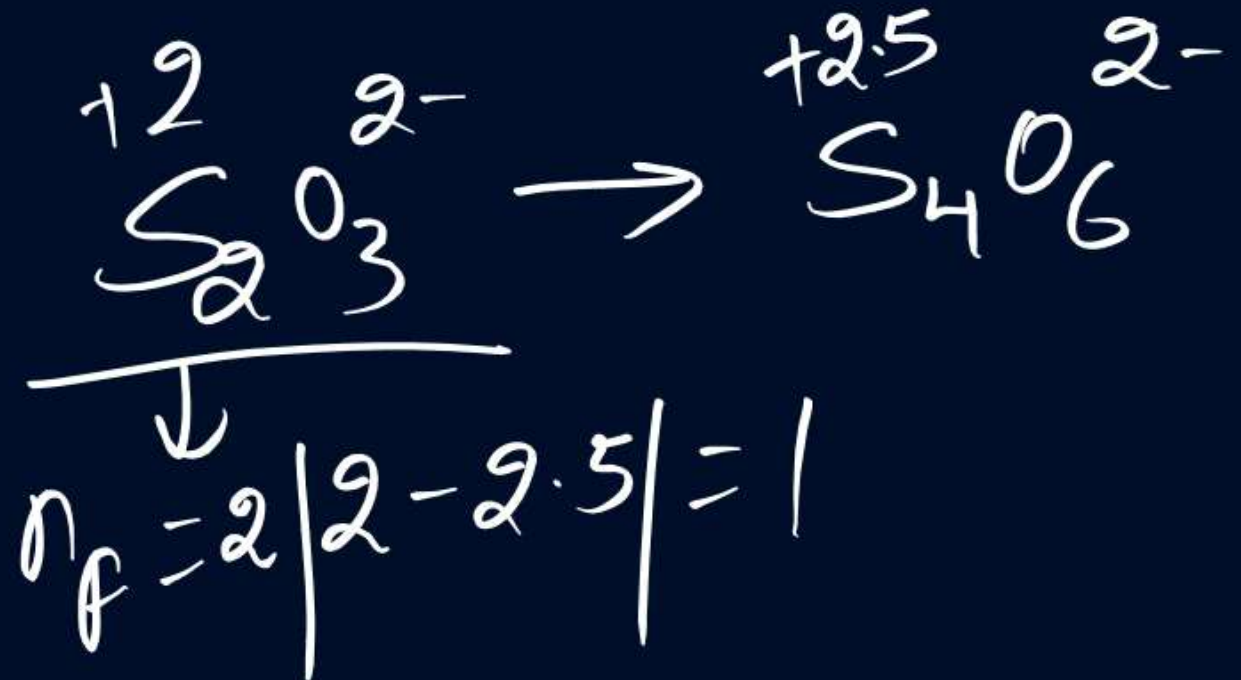
Find volume of 1M I_2 which will react with 5 moles of Hypo (Sodium thiosulphate) ($Na_2S_2O_3$)

Ans $V_{I_2} = ?$

$$g_{eq. I_2} = g_{eq. Hypo}$$

$$V(L) \times 1 \times 2 = 5 \times 1$$

$$V(L) = \frac{5}{2} = 2.5 L$$





Iodometric Titrations



I^- is a very good reducing agents.



$$n_f = |1 - 0| = 1$$





अभ्यास

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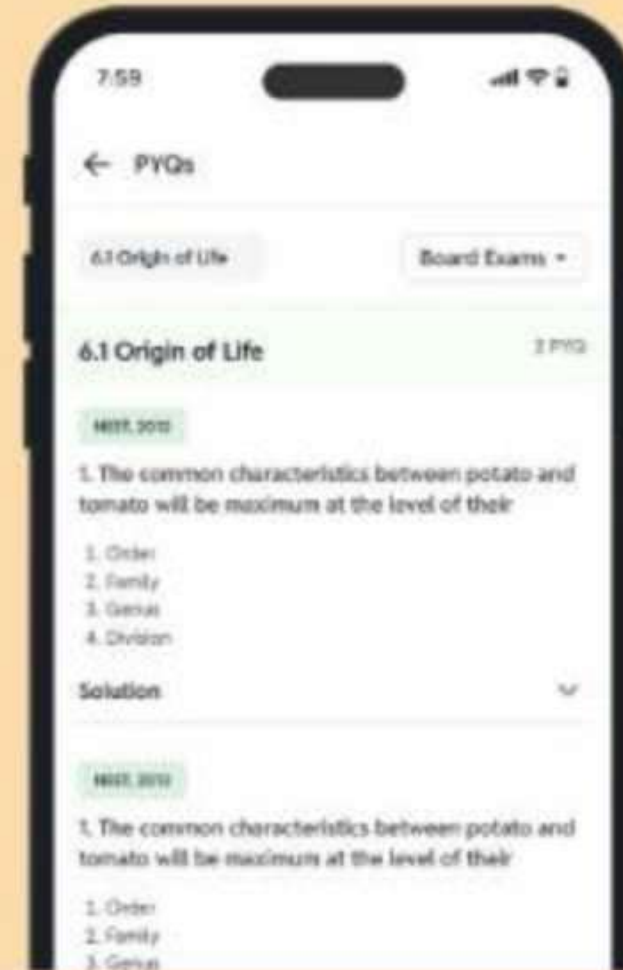
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SINGLE CHOICE QUESTIONS

QUESTION – (NCERT Exemplar)

Which of the following is not an example of redox reaction?

- A** $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$
- B** $\text{Fe}_2\text{O}_3 + 3\text{CO} \longrightarrow 2\text{Fe} + 3\text{CO}_2$
- C** $2\text{K} + \text{F}_2 \longrightarrow 2\text{KF}$
- D** $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$

QUESTION – (NCERT Exemplar)

The oxidation number of an element in a compound is evaluated on the basis of certain rules. Which of the following rules is not correct in this respect?

- A** The oxidation number of hydrogen is always +1.
- B** The algebraic sum of all the oxidation numbers in a compound is zero.
- C** An element in the free or the uncombined state bears oxidation number zero.
- D** In all its compounds, the oxidation number of fluorine is – 1.

QUESTION – (NCERT Exemplar)

Thiosulphate reacts differently with iodine and bromine in the reactions given below:



Which of the following statements justifies the above dual behavior of thiosulphate?

- A** Bromine is a stronger oxidant than iodine.
- B** Bromine is a weaker oxidant than iodine.
- C** Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reactions.
- D** Bromine undergoes oxidation and iodine undergoes reduction in these reactions.

QUESTION – (NCERT Exemplar)

In which of the following compounds, an element exhibits two different oxidation states.



QUESTION – (NCERT Exemplar)

Which of the following arrangements represent increasing oxidation number of the central atom?

- A** CrO_2^- , ClO_3^- , CrO_4^{2-} , MnO_4^-
- B** ClO_3^- , CrO_4^{2-} , MnO_4^- , CrO_2^-
- C** CrO_2^- , ClO_3^- , MnO_4^- , CrO_4^{2-}
- D** CrO_4^{2-} , MnO_4^- , CrO_2^- , ClO_3^-

QUESTION – (NCERT Exemplar)

The largest oxidation number exhibited by an element depends on its outer electronic configuration. With which of the following outer electronic configurations the element will exhibit largest oxidation number?

- A** $3d^1 4s^2$
- B** $3d^3 4s^2$
- C** $3d^5 4s^1$
- D** $3d^5 4s^2$

QUESTION – (NCERT Exemplar)

Identify disproportionation reaction

- A** $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- B** $\text{CH}_4 + 4\text{Cl}_2 \rightarrow \text{CCl}_4 + 4\text{HCl}$
- C** $2\text{F}_2 + 2\text{OH}^- \rightarrow 2\text{F}^- + \text{OF}_2 + \text{H}_2\text{O}$
- D** $2\text{NO}_2 + 2\text{OH}^- \rightarrow \text{NO}_2^- + \text{NO}_3^- + \text{H}_2\text{O}$

QUESTION – (NCERT Exemplar)

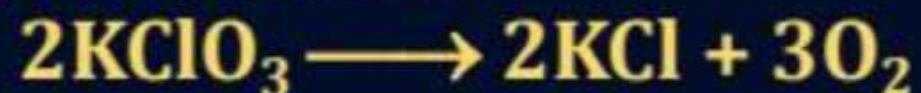
Which of the following elements does not show disproportionation tendency?

- A** Cl
- B** Br
- C** F
- D** I

MULTIPLE CHOICE QUESTIONS

QUESTION* – (NCERT Exemplar)

Which of the following statement(s) is/are not true about the following decomposition reaction.



- A** Potassium is undergoing oxidation.
- B** Chlorine is undergoing oxidation.
- C** Oxygen is reduced.
- D** None of the species are undergoing oxidation or reduction

QUESTION* – (NCERT Exemplar)

Identify the correct statement (s) in relation to the following reaction:



- A** Zinc is acting as an oxidant.
- B** Chlorine is acting as a reductant.
- C** Hydrogen ion is acting as an oxidant.
- D** Zinc is acting as a reductant.

QUESTION* – (NCERT Exemplar)

The exhibition of various oxidation states by an element is also related to the outer orbital electronic configuration of its atom. Atom(s) having which of the following outermost electronic configurations will exhibit more than one oxidation state in its compounds.

- A** $3s^1$
- B** $3d^1 4s^2$
- C** $3d^2 4s^2$
- D** $3s^2 3p^3$

QUESTION* – (NCERT Exemplar)

Identify the correct statements with reference to the given reaction



- A** Phosphorus is undergoing reduction only.
- B** Phosphorus is undergoing oxidation only.
- C** Phosphorus is undergoing oxidation as well as reduction.
- D** Hydrogen is undergoing neither oxidation nor reduction

MATRIX MATCH TYPE QUESTIONS

QUESTION – (NCERT Exemplar)

Match Column I with Column II for the oxidation states of the central atoms.

Column I

- (i) $\text{Cr}_2\text{O}_7^{2-}$
- (ii) MnO_4^-
- (iii) VO_3^-
- (iv) FeF_6^{3-}

Column II

- (a) + 3
- (b) + 4
- (c) + 5
- (d) + 6
- (e) + 7

QUESTION – (NCERT Exemplar)

Match the items in Column I with relevant items in Column II.

Column I	Column II
(i) Ions having positive charge	(a) + 7
(ii) The sum of oxidation number of all atoms in a neutral molecule	(b) - 1
(iii) Oxidation number of hydrogen ion (H^+)	(c) + 1
(iv) Oxidation number of fluorine in NaF	(d) 0
(v) Ions having negative charge	(e) Cation
	(f) Anion

ASSERTION AND REASON TYPE

QUESTION – (NCERT Exemplar)

Assertion (A) : Among halogens fluorine is the best oxidant.

Reason (R) : Fluorine is the most electronegative atom.

- A** Both A and R are true and R is the correct explanation of A.
- B** Both A and R are true but R is not the correct explanation of A.
- C** A is true but R is false.
- D** Both A and R are false.

QUESTION – (NCERT Exemplar)

Assertion (A) : In the reaction between potassium permanganate and potassium iodide, permanganate ions act as Oxidising agent.

Reason (R) : Oxidation state of manganese changes from +2 to +7 during the reaction.

- A** Both A and R are true and R is the correct explanation of A.
- B** Both A and R are true but R is not the correct explanation of A.
- C** A is true but R is false.
- D** Both A and R are false.

QUESTION – (NCERT Exemplar)

Assertion (A) : The decomposition of hydrogen peroxide to form water and oxygen is an example of disproportionation reaction.

Reason (R) : The oxygen of peroxide is in -1 oxidation state and it is converted to zero oxidation state in O_2 and -2 oxidation state in H_2O .

- A** Both A and R are true and R is the correct explanation of A.
- B** Both A and R are true but R is not the correct explanation of A.
- C** A is true but R is false.
- D** Both A and R are false.



Home work from modules



exercise - 4 Complete

THANK
YOU