

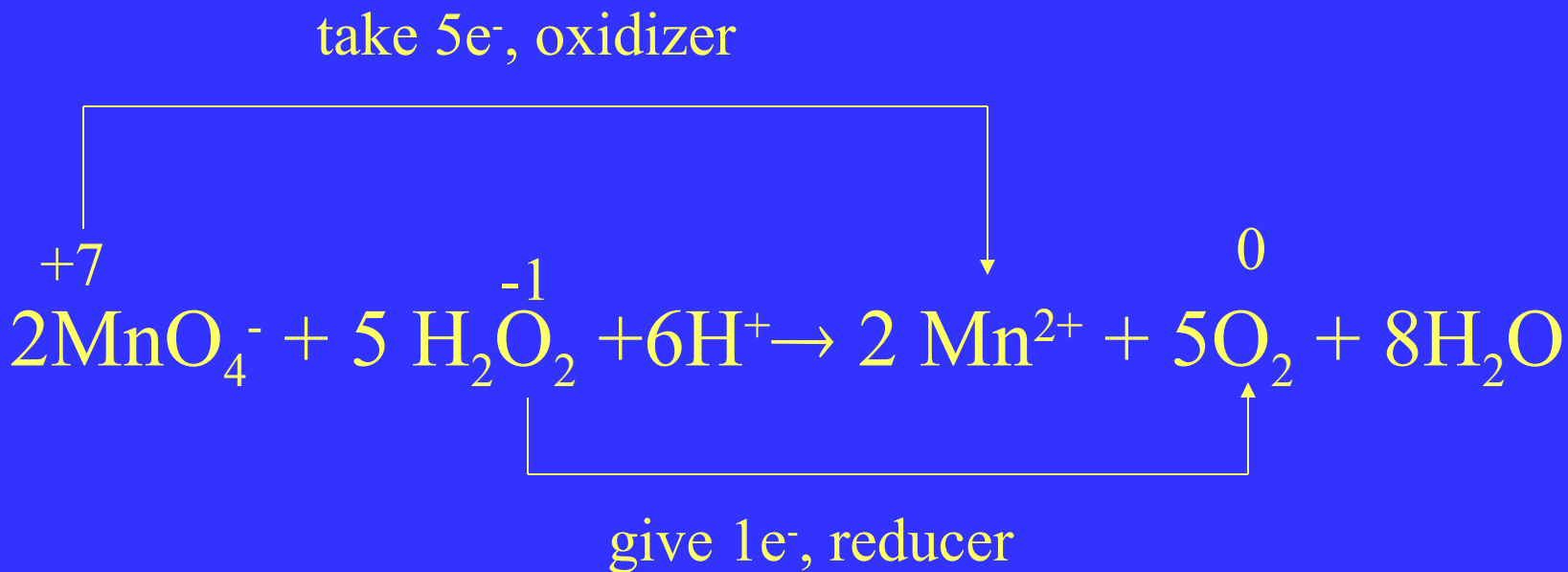
Handout

Redox Titration

- Part 1: To determine the percentage of H_2O_2 in aqueous solution
- Part 2: To determine the percentage of ascorbic acid in vitamin C

Principles

Concept of redox reaction



Procedures For Part 1

- Rinse the buret with KMnO_4 , 5 ml each time, three times
- Fill the buret with 0.02M KMnO_4 , record the initial volume in ml
- Mass of empty flask ____g

Procedure (Con.)

- Mass of flask + 20-22 drops H_2O_2 ___g
- Add 75 ml H_2O and 10 ml 6 M H_2SO_4 into the flask
- Titrate the H_2O_2 solution with KMnO_4 with constant swirling.

Procedure (Con.)

- Endpoint- the pink color persist for at least 30 seconds, record the final volume in ml
- Repeat two more times

Procedures for Part 2

- Rinse the buret with I_2 solution 3 times, 5 ml each time.
- Fill the buret with 0.05M I_2 solution
record the initial volume in ml
- Mass of weighing paper _____g
- Pulverize half vitamin C tablet.
- Mass of weighing paper + sample __g

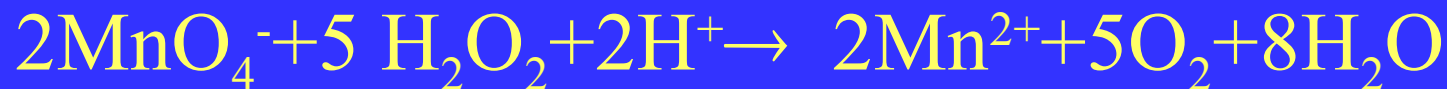
Procedure (Con.)

- Pour the sample into the flask
- Add 75 ml H₂O and 5 ml starch indicator
- Titrate with I₂ solution until the dark blue color persists for 30 or more seconds, record the final volume in ml
- Repeat two more times

Reminders

- Read the volume from the top of the meniscus
- No indicator is needed for part 1
- Put white piece of paper under the flask.
- Swirl the flask when you do the titration
- Put any unused solutions in waste container on side shelf

Calculations for Part 1



- moles of $\text{MnO}_4^- = \frac{\text{molarity}(0.02\text{M}) \times \text{volume}(\text{ml})}{1000(\text{mL/L})}$
- moles of $\text{H}_2\text{O}_2 = \text{moles of MnO}_4^- \times \frac{5}{2}$

Calculation(Con.)

- $\text{gram of H}_2\text{O}_2 = \text{moles of H}_2\text{O}_2 \times 34.01$
(MW of H_2O_2)
- $\% \text{ H}_2\text{O}_2 = \frac{\text{gram of H}_2\text{O}_2 \times 100\%}{\text{sample mass}}$
- $\text{sample mass (gram)} = \text{weight of (flask + 20-22 drops of H}_2\text{O}_2) - \text{weight of flask}$

Calculations for Part 2

- $\text{C}_6\text{H}_8\text{O}_6 + \text{I}_2 \rightarrow \text{C}_6\text{H}_6\text{O}_6 + 2\text{H}^+ + 2\text{I}^-$
- moles of $\text{I}_2 = \frac{\text{molarity (0.05M)} \times \text{volume(mL)}}{1000(\text{mL/L})}$
- moles of $\text{C}_6\text{H}_8\text{O}_6 = \text{moles of } \text{I}_2$
- grams of $\text{C}_6\text{H}_8\text{O}_6 = \text{moles of } \text{C}_6\text{H}_8\text{O}_6 \times 176.13$
(MW of $\text{C}_6\text{H}_8\text{O}_6$)

Calculation(Con.)

- $\%C_6H_8O_6 = \frac{\text{grams of } C_6H_8O_6}{\text{weight of sample}} \times 100\%$
- weight of sample (gram)
 $= W_{\text{sample+weighing paper}} - W_{\text{weighing paper}}$