

Redox Titration

Student's name

Institution affiliation

Course code

Date

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**Redox titration**

|   | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Trial 6 |
|---|---------|---------|---------|---------|---------|---------|
| 1. Mass of H <sub>2</sub> O <sub>2</sub> solution | 0.705   | 0738    | 0.992   | 0.810   | 0.856   | 0.736   |
| 2. Initial burette reading                        | 0ml     | 0ml     | 0ml     | 0ml     | 0ml     | 0ml     |
| 3. Final burette reading                          | 14ml    | 14.04ml | 20.02ml | 15.08ml | 17.0ml  | 32ml    |
| 4. Volume of KMnO <sub>4</sub> used               | 14ml    | 14.04ml | 20.02ml | 15.08ml | 17.0ml  | 32ml    |
| 5. Moles of KMnO <sub>4</sub>                     | 0.00829 | 0.00868 | 0.01166 | 0.00952 | 0.01007 | 0.00866 |
| 6. Moles of H <sub>2</sub> O <sub>2</sub>         | 0.0207  | 0.0217  | 0.0292  | 0.0238  | 0.0252  | 0.0216  |
| 7. Grams of H <sub>2</sub> O <sub>2</sub>         | 1.05    | 1.05    | 1.13    | 1.13    | 1.28    | 2.39    |

8. Q-Calculated value

$$\text{Range} = 2.39 - 1.05 = 1.34$$

$$\text{GAP} = 2.39 - 1.28 = 1.11$$

$$1.11/1.34 = 0.83$$

9. Q-table value

$$N=6 \quad \text{Q table value; } 0.56$$

Since 0.83 is larger than 0.56; we should reject value 2.39

10. Average grams of H<sub>2</sub>O<sub>2</sub>

$$(1.05 + 1.05 + 1.13 + 1.13 + 1.28)/5 = 1.13$$

11. Standard deviation for grams of H<sub>2</sub>O<sub>2</sub>

$$\text{Mean} = 1.33$$

$$(1.33-1.13)^2=0.04$$

$$(1.33-1.13)^2=0.04$$

$$(1.13-1.13)^2=0$$

$$(1.13-1.13)^2=0$$

$$(1.28-1.13)^2=0.15$$

$$\text{Sum} = \text{square root } (0.23/4) = 0.24$$

## 12. Calculations for trials 1-6



$$\text{Molar mass H}_2\text{O}_2 = 34.0147$$

$$\text{Moles of H}_2\text{O}_2 = \text{mass/molar mass}$$

$$0.705/34.0147 = 0.020726$$

$$0.738/34.0147 = 0.021697$$

$$0.992/34.0147 = 0.02916$$

$$0.810/34.0147 = 0.02381$$

$$0.856/34.0147 = 0.025166$$

$$0.736/34.0147 = 0.02164$$

$$\text{Ratio of H}_2\text{O}_2 \text{ to KMnO}_4$$

$$5: 2$$

Trials

$$0.020726 * 2/5 = 0.00829$$

$$0.021697 * 2/5 = 0.00868$$

$$0.02916 \times 2/5 = 0.01166$$

$$0.02381 \times 2/5 = 0.00952$$

$$0.025166 \times 2/5 = 0.01007$$

$$0.02164 \times 2/5 = 0.008656$$

grams of H<sub>2</sub>O<sub>2</sub>

$$\{0.0207 \times 14 / 0.00829\} \times 3/100 = 1.05$$

$$[0.0217 \times 14.04 / 0.00868] \times 3/100 = 1.05$$

$$[0.0292 \times 20.2 / 0.01166] \times 3/100 = 1.13$$

$$[0.0238 \times 15.08 / 0.00952] \times 3/100 = 1.13$$

$$[0.0252 \times 17.0 / 0.01007] \times 3/100 = 1.28$$

$$[0.0216 \times 32 / 0.00866] \times 3/100 = 2.39$$

Molarity of KMnO<sub>4</sub>

Average no of moles for 5 trials

$$= (0.00829 + 0.00868 + 0.01166 + 0.00952 + 0.01007) / 5 = 0.009644$$

Average volume

$$(14 + 14.04 + 20.02 + 15.08 + 17) / 5 = 16.028 \text{ ml} / 1000 = 0.016028 \text{ L}$$

Moles/Liters

$$= 0.009644 / 0.016028$$

$$= 0.602 \text{ M}$$