

Lab 4: Mohr Titration of Sodium in Pickles

Questions

1. Standard A: $\frac{0.1034 \text{ g NaCl}}{42.42 \text{ mL} - 24.30 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}} \times \frac{1 \text{ mol AgNO}_3}{1 \text{ mol NaCl}} = 0.09764 \text{ M AgNO}_3$

Standard B: $\frac{0.0992 \text{ g NaCl}}{26.15 \text{ mL} - 9.18 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}} \times \frac{1 \text{ mol AgNO}_3}{1 \text{ mol NaCl}} = 0.100 \text{ M AgNO}_3$

Standard C: $\frac{0.0982 \text{ g NaCl}}{43.52 \text{ mL} - 26.39 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}} \times \frac{1 \text{ mol AgNO}_3}{1 \text{ mol NaCl}} = 0.0981 \text{ M AgNO}_3$

Average: $\bar{x} = \frac{\sum x_i}{N} = \frac{0.09764 \text{ M AgNO}_3 + 0.100 \text{ M AgNO}_3 + 0.0981 \text{ M AgNO}_3}{3} = 0.0990 \text{ M AgNO}_3$

Standard Deviation: $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}} =$

$$\sqrt{\frac{(0.09764 \text{ M AgNO}_3 - 0.0990 \text{ M AgNO}_3)^2 + (0.100 \text{ M AgNO}_3 - 0.0990 \text{ M AgNO}_3)^2 + (0.0981 \text{ M AgNO}_3 - 0.0990 \text{ M AgNO}_3)^2}{3-1}} = 0.0010 \text{ M AgNO}_3$$

2. Pickle Aliquot 1: $(30.37 \text{ mL} - 11.20 \text{ mL}) \times 0.0990 \text{ M AgNO}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ mol Na}}{1 \text{ mol AgNO}_3} \times \frac{22.990 \text{ g Na}}{1 \text{ mol Na}} = 0.0434 \text{ g Na}$

Pickle Aliquot 2: $(20.58 \text{ mL} - 0.98 \text{ mL}) \times 0.0990 \text{ M AgNO}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ mol Na}}{1 \text{ mol AgNO}_3} \times \frac{22.990 \text{ g Na}}{1 \text{ mol Na}} = 0.0444 \text{ g Na}$

Pickle Aliquot 3: $(40.27 \text{ mL} - 20.84 \text{ mL}) \times 0.0990 \text{ M AgNO}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ mol Na}}{1 \text{ mol AgNO}_3} \times \frac{22.990 \text{ g Na}}{1 \text{ mol Na}} = 0.0440 \text{ g Na}$

Average: $\bar{x} = \frac{\sum x_i}{N} = \frac{0.0434 \text{ g Na} + 0.0444 \text{ g Na} + 0.0440 \text{ g Na}}{3} = 0.04390 \text{ g Na}$

Standard Deviation: $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}} =$

$$\sqrt{\frac{(0.0434 \text{ g Na} - 0.04390 \text{ g Na})^2 + (0.0444 \text{ g Na} - 0.04390 \text{ g Na})^2 + (0.0440 \text{ g Na} - 0.04390 \text{ g Na})^2}{3-1}} = 0.00050 \text{ g Na}$$

Lab Notebook

Exp. No. <u>4</u>	Experiment/Subject <u>Mohr Titration for Analysis of Sodium in Pickles</u>	Date <u>2/13/25</u>	
Name <u>Nathaniel White</u>	Lab Partner <u>Lukas Rospko</u>	Locker/Desk No.	Course & Section No. <u>2322</u>

Objective: Determine concentration of Sodium in pickle, compare with listed nutrition facts.

Procedure:

A Blend a pickle into a liquid, having blotted it dry with a paper towel beforehand. Place this liquid to 100mL with water.

B Weigh three 0.1g samples. Place 0.1000g NaCl into 125mL erlenmeyer flasks three times. For each:

- Add 50mL DI & stirbar; mix
- Add sodium bicarbonate slowly until no fizzling.
- Add 2mL of 5% K₂CrO₄
- Fill buret with 0.1000M silver nitrate and titrate until red

C Take three 20mL aliquots of the pickle water from A and put them into 125mL erlenmeyer flasks. Follow steps in B for each.

Pickle nutritional label
Mt Olive bottle 280mg Na

Mass pickle: 32.5753 g

W/ OXALATES PRESENT

W/ OXALATES PRESENT	Vol. DI	Vol. K ₂ CrO ₄
Std A: 0.1034	50.08mL	2.01mL
Std B: 0.0992	49.71mL	2.03mL
Std C: 0.0982	49.24mL	1.90mL

Volume

Titration A: 24.30mL - 49.24mL
B: 9.18mL - 26.15mL
C: 26.39mL - 43.52mL

Pickle samples

	Vol DI	Vol K ₂ CrO ₄
1	50.0mL	1.91mL
2	49.2mL	2.00mL
3	49.0mL	2.00mL

Pickle titrations

4: 11.20mL - 30.37mL
2: 30.68mL - 49.00
added to 19.30
- 20.58
3: 20.84 - 40.27

Signature <u>Nathaniel White</u>	Date	Witness/TA <u>Grimmick</u>	Date <u>2/15/25</u>
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THE HAYDEN-McNEIL STUDENT LAB NOTEBOOK

Note: Place fold-over back cover under copy sheet before writing