REPORT SHEET: POTENTIOMETRIC ANALYSIS OF A HCl – H_3PO_4 MIXTURE

Name Gillispie, Nathan Date: 02/24/22 Sample No.: 7

Please print; last name first

Standardization of NaOH – Titration Against KHP (using phenolphthalein)

	Trial 1	Trial 2	Trial 3	Trial 4
mass of KHP	0.4011 g			
volume NaOH	0.01738 L			
M_{NaOH}	0.1130 M			

Average molarity of NaOH (4 sig. figs.): 0.1130 M

Circle all values used to determine the average molarity of NaOH.

Standardization of NaOH: Data from the Gran and First Derivative Plots

From the Gran Plot	V_{eq} = 17.28 mL	K_a(KHP) = 6.263
From the First Derivative Plot	V_{eq} = 17.38 mL	
M_{NaOH} (calculated using V_{eq} from the first derivative plot)	M_{NaOH} = 0.1130 M	

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Analysis of the Mixed Acid

	Trial 1	Trial 2 (if needed)
volume of mixed acid taken for analysis	10.0 mL	
volume of NaOH to reach *first* eq. pt. from 1st deriv. plot	8.67 mL	
volume of NaOH to reach *second* eq. pt. from 1st deriv. plot	11.96 mL	
M_{HCl} H_2SO_4	0.030397 M	
M_{H3PO4}	0.037177 M	

Show all calculations for one trial on the back of this page.

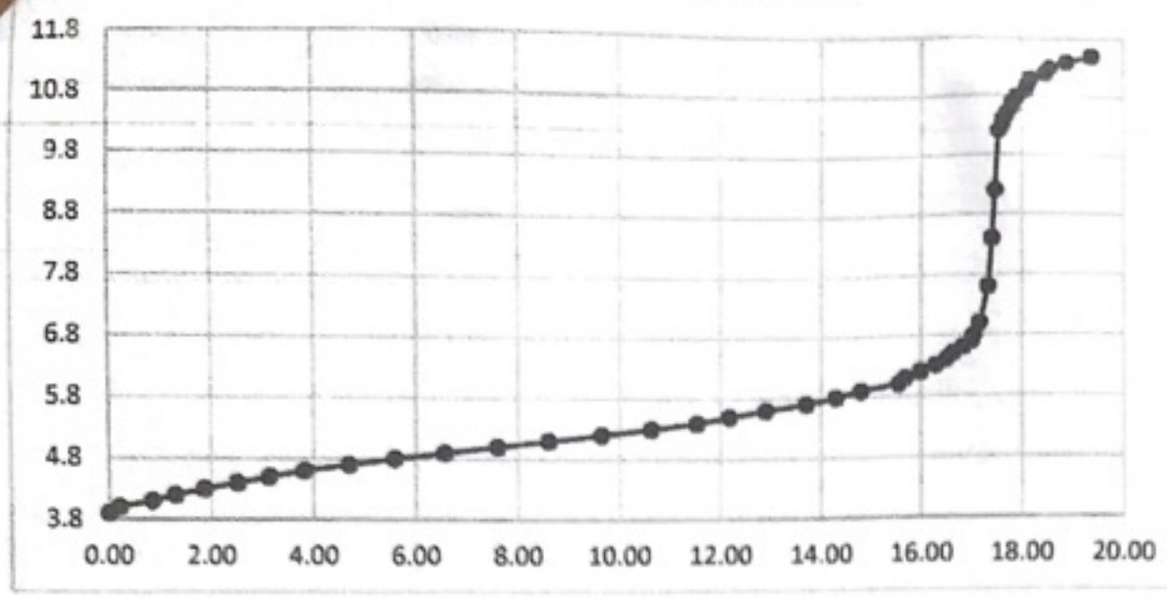
$$.4011\text{ g KHP}\left(\frac{1\text{ mol KHP}}{204.222\text{ g}}\right)\left(\frac{1\text{ mol NaOH}}{1\text{ mol KHP}}\right)\left(\frac{1}{.01738\text{ L}}\right) = 0.1130\text{ M NaOH}$$

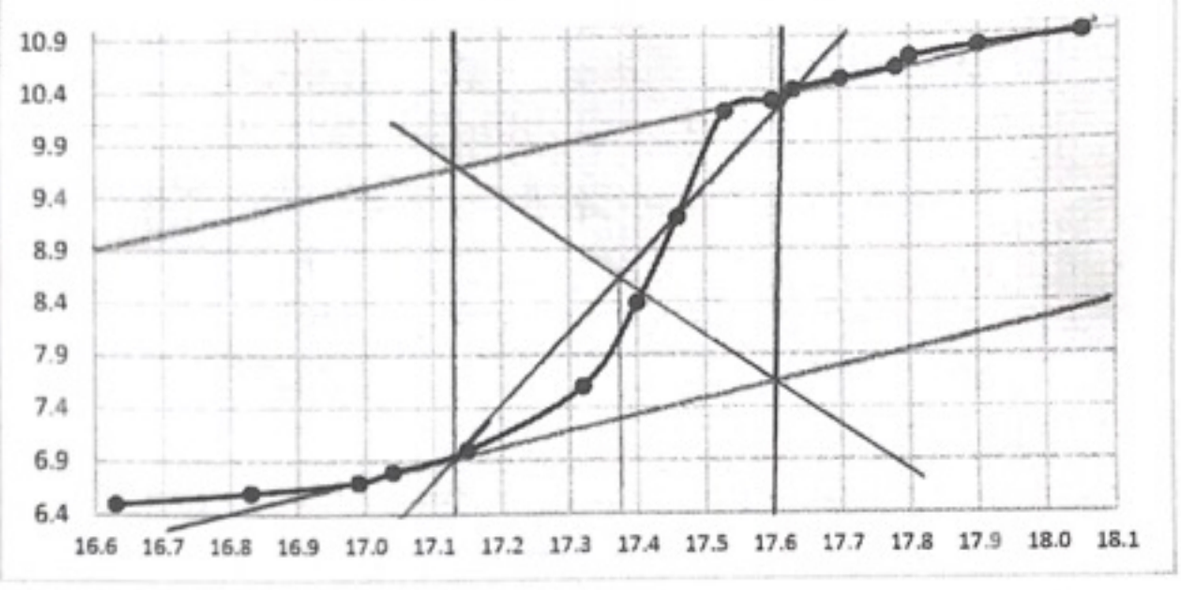
H_3PO_4

$$(11.96\text{ mL} - 8.67\text{ mL})\left(.1130\frac{\text{mol NaOH}}{\text{L NaOH}}\right)\left(\frac{1\text{ L NaOH}}{1000\text{ mL NaOH}}\right)\left(\frac{1\text{ mol } H_3PO_4}{1\text{ mol } OH^-}\right)\left(\frac{1}{10\text{ mL}}\right)\left(\frac{1000\text{ mL}}{\text{L}}\right) = 0.037177\text{ M}$$

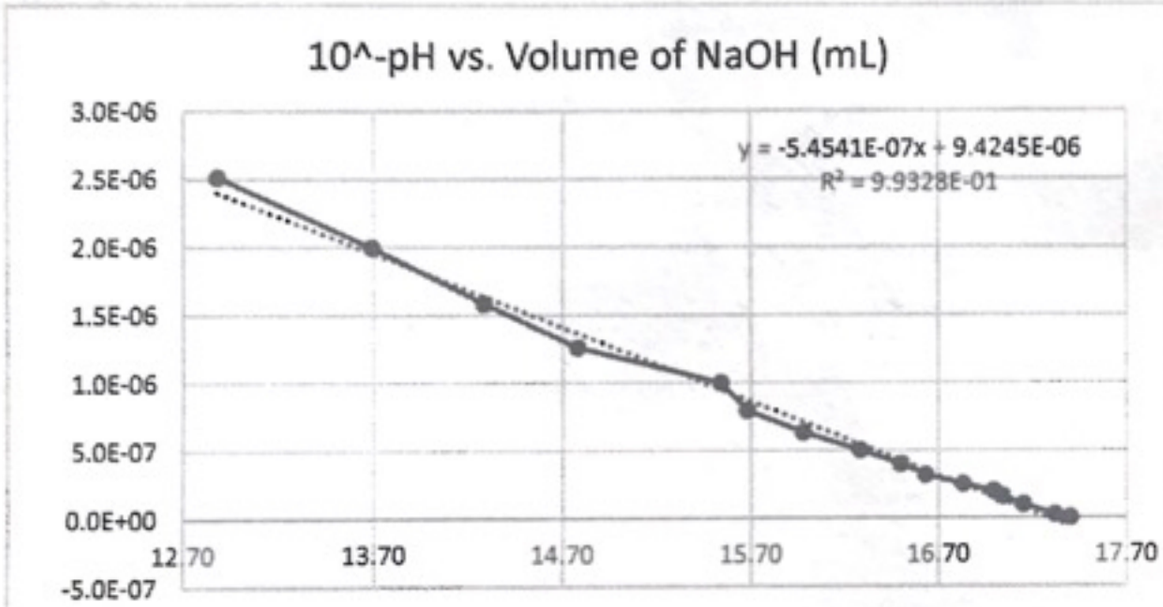
H_2SO_4

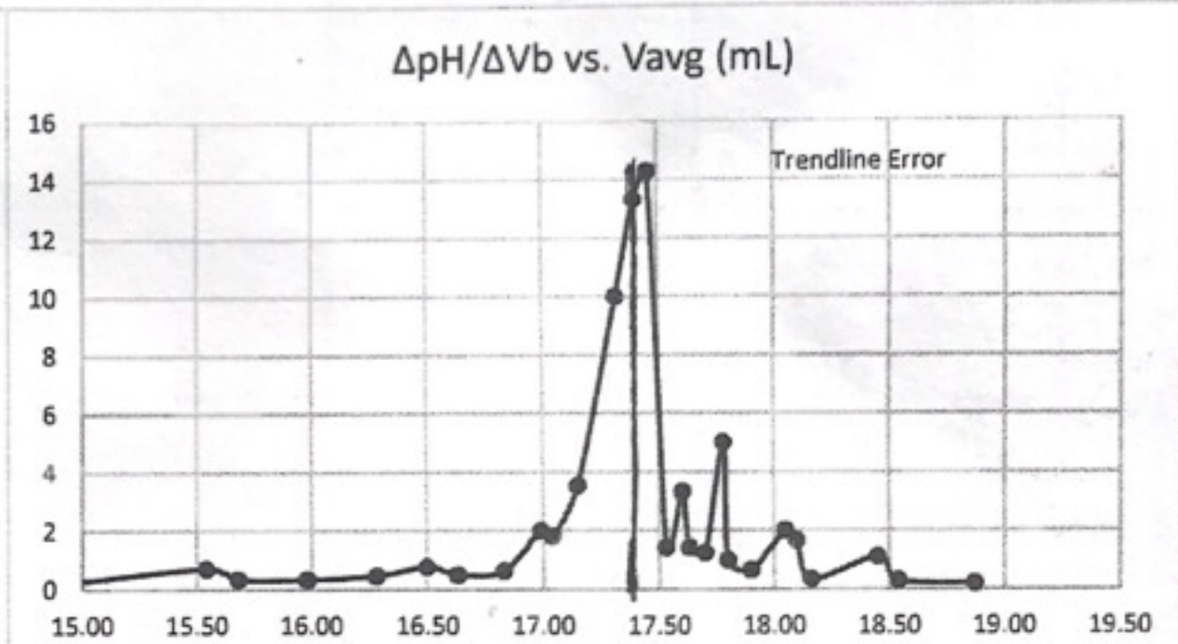
$$(8.67 - (11.96 - 8.67\text{ mL})\left(.1130\frac{\text{mol NaOH}}{\text{L NaOH}}\right)\left(\frac{1\text{ mol } H_2SO_4}{2\text{ mol } OH^-}\right)\left(\frac{1}{10\text{ mL}}\right) = .030397\text{ M}$$





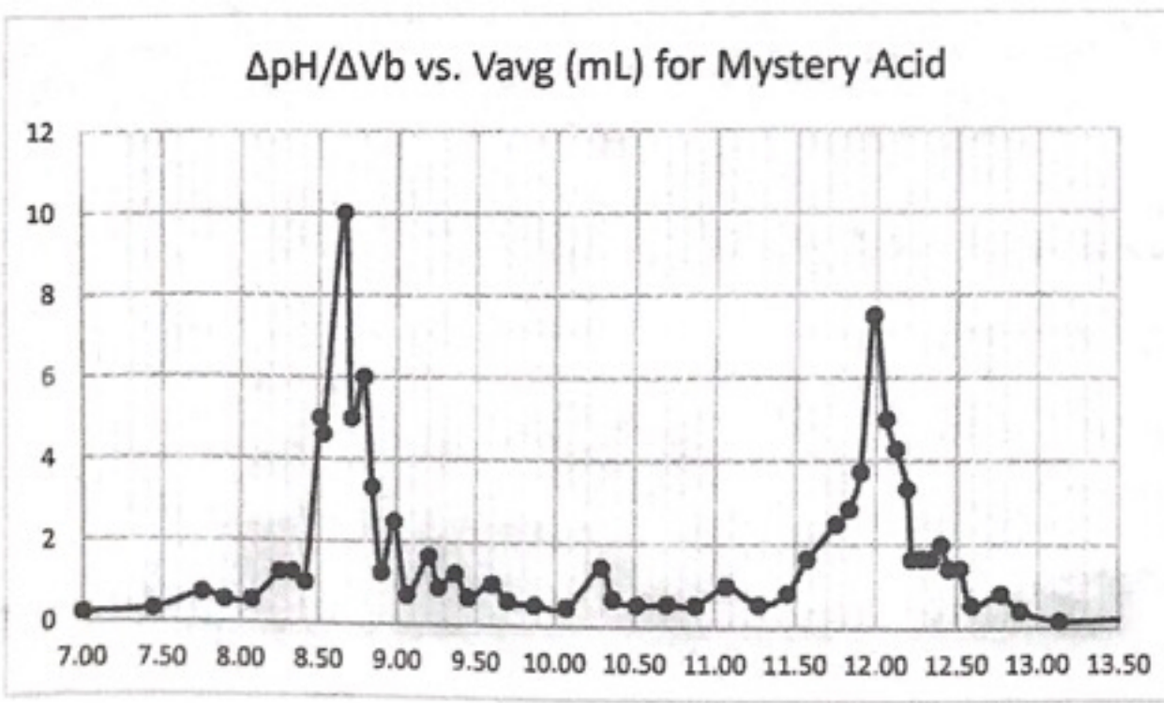
17.38 mL

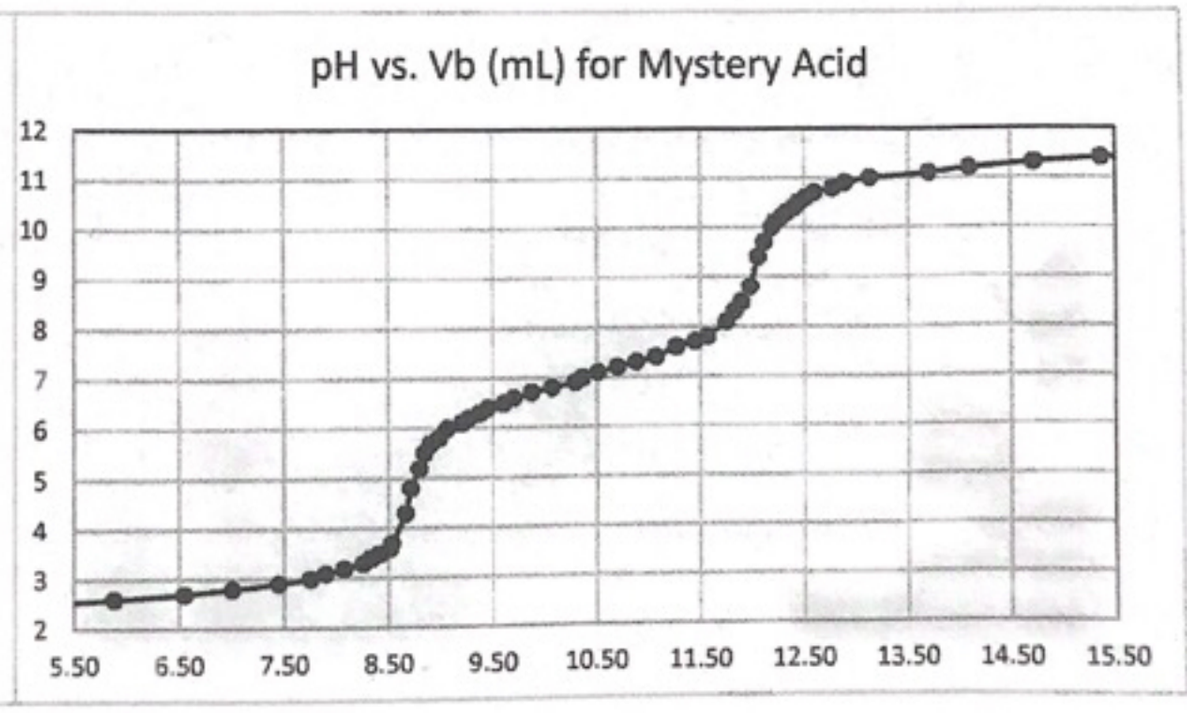




$K_a = 5.4541 \times 10^{-7} \Rightarrow pK_a = 6.2633$

17.38 mL





8.67 mL

11.98 mL