Lab 10 Name _____

General Chemistry 2 Colorimetric pH measurement

Observations (task 1-5): Calculations (needs pKa, see below):

Solution name	Color of universal indicator	Color of chosen indicator	A405	A 540	$\frac{A540-A405}{A540+A405}$	%A-	%AH	pH
Standard								
Standard								
Standard								

Indicator used (circle): Methyl red Phenol red

pH standard used: pH = _____ ionic strength: _____

pKa of the indicator (triplicate measurement, separate solutions)

#1 #2 #3 average: _____

Show how you calculated the pH using the Henderson-Hasselbalch equation for the first row:

$$\mathrm{pH} = \mathrm{pKa} + \log\left(\frac{[\mathrm{deprotonated}]}{[\mathrm{protonated}]}\right)$$

Discussion and comparison with other measurements (after finishing task 10):

What were the main differences between your results and that of the other group working on the same set of solutions?

Did you find any source of systematic errors?

What are the main sources of random errors?

How does the colorimetric pH determination compare to using a pH electrode. Under which circumstances would you want to use …

… the colorimetric determination

… the pH electrode

Reflect on your experience today

Lab 10 Name _____

General Chemistry 2 Colorimetric pH measurement

Tasks 9 + 10: how much does the pH change?

Observations: Calculations:

Solution name	Color before adding HCl	Color after adding HCl	A405	A 540	$\frac{A540-A405}{A540+A405}$	%A-	%AH	pH

Show how you calculated the pH using the Henderson-Hasselbalch equation for the first row:

$$\mathrm{pH} = \mathrm{pKa} + \log\left(\frac{[\mathrm{deprotonated}]}{[\mathrm{protonated}]}\right)$$

Which solution had the greatest pH change? _____ (this has the lowest buffer capacity)

Which solution had the smallest change in pH? _____ (this has the highest buffer capacity)

How could you explain your observations?

Discussion and comparison with other measurements (after finishing task 10):

What were the main differences between your results and that of the other group working on the same set of solutions?

Did you find any source of systematic errors?

What are the main sources of random errors?

How does the colorimetric pH determination compare to using a pH electrode. Under which circumstances would you want to use …

… the colorimetric determination

… the pH electrode

Reflect on your experience today