

# SAL

Name: \_\_\_\_\_

Partner's Name(s): \_\_\_\_\_

Lab Date: \_\_\_\_\_ Lab Instructor Name: \_\_\_\_\_

## INVESTIGATION OF THE ACID-BASE PROPERTIES OF SALT SOLUTIONS LAB NOTEBOOK PAGES

All purpose, procedure(s), and data/observations must be recorded in the lab notebook in pen with permanent, waterproof ink (black or blue). No information can be recorded elsewhere and transferred after leaving the lab. Lab notebooks can be digital or paper; you may write directly on the lab notebook pages in your lab manual or download a digital copy onto your electronic device and then write in it. Refer to the Guide for Success in the General Chemistry Laboratory section in the front of this lab manual for more detailed instructions.

- ⦿ **Before Lab:** Make sure to complete the Purpose and Procedure sections in your lab notebook pages.
- ⦿ **After Lab:** Upload your notebook pages to the appropriate Carmen assignment within 48 hours after the start time of your in-person lab session. If you used the notebook pages in your paper copy of your lab manual, you should scan or take photos of the pages. Do not remove them from your lab manual. Refer to the SAL Notebook upload assignment in Carmen for more detailed instructions.

### PURPOSE \_\_\_\_\_

Describe the what, why, and how of the experiment in bullet points or a few sentences. Consult the Expected Learning Outcomes and the procedure for the experiment to develop the purpose.

### PROCEDURE CITATION \_\_\_\_\_

*Chemistry 1220: General Chemistry Laboratory Manual*, Fall 2025–Summer 2026.; Weaver, T. A., Opoku-Agyeman, B., Fontes N. Da Silva, C., Welch, A. N., Stern, J. E., Wroblewski, R. A., Walter, C., van Helmond, A. Eds.; Van-Griner Learning: Cincinnati, OH; pp. 117–127.

## PROCEDURE

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### PART A. HOW DOES THE APPEARANCE OF THE pH INDICATOR CHANGE?

**Before lab:** Write a *step-by-step* procedure you plan to use. Be as detailed as possible.

**During lab:** Note any updates/adjustments to your procedure before you leave the lab.

## PART B. DO AQUEOUS CATIONS AFFECT THE pH?

**Before lab:** Write a *step-by-step* procedure you plan to use. Be as detailed as possible and include the salts you plan to test in this section.

**During lab:** Note any updates/adjustments to your procedure before you leave the lab.

## PART C. DO AQUEOUS ANIONS AFFECT THE pH?

**Before lab:** Write a *step-by-step* procedure you plan to use. Be as detailed as possible and include the salts you plan to test in this section.

**During lab:** Note any updates/adjustments to your procedure before you leave the lab.

## CLEAN UP AND WASTE DISPOSAL

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All used, emptied microcentrifuge tubes and Falcon tubes should be rinsed with distilled water. The rinse should be collected in your personal waste beaker. Rinsed tubes should be shown to your lab instructor and then collected in the Blue Solid Waste bucket on the bottom of the reagent cart. All solutions and excess solids should be collected in a personal waste beaker at your station, then disposed of in the class Chemical Waste beaker in Hood B. After cleaning up, wipe down your work area with 70% ethanol spray and a paper towel. Wash your hands thoroughly after completing this experiment.

## DATA AND OBSERVATIONS

### PART A. HOW DOES THE APPEARANCE OF THE pH INDICATOR CHANGE?

LOW pH ↔ HIGH pH						
pH						
Appearance						

Initial reference color of indicator in distilled water \_\_\_\_\_

Indicator color change with HCl \_\_\_\_\_ Approx. pH (whole #) \_\_\_\_\_

Indicator color change with NaOH \_\_\_\_\_ Approx. pH (whole #) \_\_\_\_\_

### PART B. DO AQUEOUS CATIONS AFFECT THE pH?

Use what you learned from testing KCl and FeCl<sub>3</sub> to determine what happened with the other solids you tested. Write a balanced reaction for each salt tested (note that N.R. alone does not satisfy this requirement).

SALT	OBSERVATIONS (REPEAT TESTS AS NEEDED)	MULTIPLE CHOICE: REACTION INVOLVING THE CATION. WHAT HAPPENED? <sup>2</sup>
KCl		A. $K^+ + H_2O \rightleftharpoons KH + OH^-$ B. $K^+ + H_2O \rightleftharpoons KOH + H^+$ C. $K^+ + H_2O \rightarrow N.R.$
FeCl <sub>3</sub>		A. $Fe^{3+} + 6 H_2O \rightleftharpoons [Fe(H_2O)_5H]^{4+} + OH^-$ B. $[Fe(H_2O)_6]^{3+} + H_2O \rightleftharpoons [Fe(H_2O)_5(OH)]^{2+} + H_3O^+$ C. $Fe^{3+} + 6 H_2O \rightarrow N.R.$

<sup>2</sup>You may be unfamiliar with this description of the FeCl<sub>3</sub> cation and why it is shown with six FeCl<sub>3</sub> molecules. Figure 16.18 in your textbook provides more information. Also, this topic will be examined more fully in Chapter 23. At this point, identifying the solution as acidic, basic, or neutral is the main objective.

If you need more space, this table continues on the next page.





SALT	OBSERVATIONS (REPEAT TESTS AS NEEDED)	REACTION INVOLVING THE ANION. WHAT HAPPENED?

## DATA ANALYSIS OF CATIONS

	LIST EXAMPLES FROM YOUR INVESTIGATION	WHAT DO THE CATIONS IN THIS GROUP HAVE IN COMMON? BE THOROUGH IN YOUR ANALYSIS. <sup>3</sup>
<b>Cations</b> that are neutral		
<b>Cations</b> that are acids		
<b>Cations</b> that are bases		

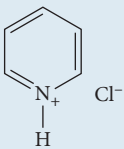
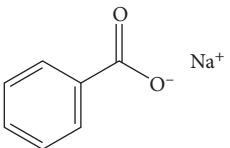
<sup>3</sup>Consider things like placement on the periodic table, oxidation state, and conjugates. Look for patterns. You must be able to apply your generalizations to make predictions and offer explanations. Be sure to analyze all cations investigated in this experiment.

## DATA ANALYSIS OF ANIONS

	LIST EXAMPLES FROM YOUR INVESTIGATION	WHAT DO THE ANIONS IN THIS GROUP HAVE IN COMMON? BE THOROUGH IN YOUR ANALYSIS.
<b>Anions</b> that are neutral		
<b>Anions</b> that are acids		
<b>Anions</b> that are bases		

## IN-LAB QUESTIONS

Based on your findings, predict whether the following salts are acidic, basic, or neutral and record your answers in your laboratory notebook or lab manual. Then, discuss your hypothesis with classmates and check with your lab instructor to see if you are correct.

SUBSTANCE	ACIDIC, BASIC, OR NEUTRAL?	WHY?
RbCl		
LiCl		
C <sub>5</sub> H <sub>6</sub> NCl (pyridinium chloride) 		
K <sub>2</sub> S		
KNO <sub>3</sub>		
C <sub>7</sub> H <sub>5</sub> NaO <sub>2</sub> (sodium benzoate) 		
CH <sub>3</sub> NH <sub>3</sub> Br		
NaCN		

