

SOL

Name: _____

Partner's Name(s): _____

Lab Date: _____ Lab Instructor Name: _____

AN EXPLORATION OF FACTORS AFFECTING SOLUBILITY 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). Pencils, markers, highlighters, and correction fluid (white-out) are not permitted. 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 SOL 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. 17–26.

PROCEDURE

PART A. EXPLORING TEMPERATURE EFFECTS

Write a summary or step-by-step procedure for this part of the experiment in the space below.

PART B. EXPLORING SOLUTE-SOLVENT INTERACTION

Write a summary or step-by-step procedure for this part of the experiment in the space below.

PART C. FURTHER EXPLORATION OF SOLUTE-SOLVENT INTERACTIONS

Write a summary or step-by-step procedure for this part of the experiment in the space below.

PART D. EXPLORING TEMPERATURE EFFECTS CONTINUED

Write a summary or step-by-step procedure for this part of the experiment in the space below.

CLEAN UP AND WASTE DISPOSAL

Falcon tubes should be emptied into your personal waste beaker, and rinsed. The rinse should also be collected in your personal waste beaker. Rinsed Falcon tubes should be discarded into the Blue Solid Waste bucket under your reagent cart. All waste should be disposed of in the class Chemical Waste beakers in Hood B. Be sure to fill out the Chemical Waste Disposal Form. Used weigh boats may be thrown in the trash. 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

When recording quantitative data, be sure to record all significant figures: all digits displayed on a balance, the appropriate precision of any glassware used, etc. For qualitative data, be as descriptive as possible.

Be sure you answer all questions shown in the Data and Observations section below. Your lab instructor will check these before you leave. Responses to these questions are needed in each group member's notebook for full participation credit.

PART A. EXPLORING TEMPERATURE EFFECTS

Mass of sodium acetate trihydrate used (g) [Step 2] _____

Actual volume of distilled water used (mL) _____

OBSERVATIONS OF SOLUTION BEFORE HEATING

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Indicate if the solution is saturated, unsaturated, or supersaturated before heating.	
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*Conc. of solute in solution when all solids dissolve (M) _____

*Conc. of solute in solution when all solids dissolve (g solute/100 g solvent) _____

AT ROOM TEMPERATURE THE MAXIMUM AMOUNT OF SOLID SODIUM ACETATE TRIHYDRATE THAT CAN DISSOLVE IN 100 g OF WATER IS 50.4 g. WHAT MAXIMUM AMOUNT OF THE SOLID CAN YOU DISSOLVE IN THE VOLUME OF WATER YOU HAVE IN THE SODIUM ACETATE SOLUTION?

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PART B. EXPLORING SOLUTE–SOLVENT INTERACTIONS

Target moles of solute (mol) 0.0060

*Target mass of sodium chloride (g) _____

*Target mass of salicylic acid (g) _____

Observations and solubility of solutes in *water* after mixing (initial tube):

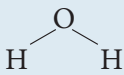
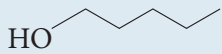
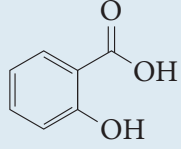
	NaCl–H ₂ O	SALICYLIC ACID–H ₂ O
Actual mass of solute used (g) [Step 8]		
Actual volume of solvent used (mL)		
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution after mixing.		

Observations and solubility of solutes in *1-pentanol* after mixing (initial tube):

	NaCl–PENTANOL	SALICYLIC ACID–PENTANOL
Actual mass of solute used (g) [Step 8]		
Actual volume of solvent used (mL)		
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution after mixing.		

Describe the intermolecular forces associated with the following species:

Molecules: © Van-Griner, LLC

WATER	1-PENTANOL	SODIUM CHLORIDE	SALICYLIC ACID
		$\text{Na} - \text{Cl}$	

Observations and solubility of solutes in *water* after adding the second portion of solute:

	NaCl-H ₂ O	SALICYLIC ACID-H ₂ O
Actual mass of solute added (g) [Step 10]		
*Total mass of solute in solution (g) [Step 8 + 10]		
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution after mixing.		

Observations and solubility of solutes in 1-pentanol after adding the second portion of solute:

	NaCl-PENTANOL	SALICYLIC ACID-PENTANOL
Actual mass of solute added (g) [Step 10]		
*Total mass of solute in solution (g) [Step 8 + 10]		
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution after mixing.		

IN YOUR OWN WORDS, DESCRIBE WHY YOU OBSERVED DIFFERENT SOLUBILITIES FOR EACH SOLUTE/SOLVENT COMBINATION.

Blank area for student response.

PART C. FURTHER EXPLORATION OF SOLUTE–SOLVENT INTERACTIONS

Observations before adding base:

	NaCl–H ₂ O	SALICYLIC ACID–H ₂ O
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution before adding the NaOH.		

Observations after adding base:

	NaCl–H ₂ O	SALICYLIC ACID–H ₂ O
Concentration of NaOH solution added (M)		
Volume of NaOH added (mL)		
Indicate if the solution is saturated, unsaturated, or supersaturated.		
Observations of the solution after adding the NaOH.		

DID THE ADDITION OF BASE CHANGE THE SOLUBILITY OF THE SOLUTES? DID THE ADDITION OF BASE CHANGE THE IDENTITY OF THE SOLUTES? IF SO, INDICATE THEIR NEW IDENTITY. EXPLAIN YOUR REASONING.

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PART D. EXPLORING TEMPERATURE EFFECTS CONTINUED

OBSERVATIONS OF COOLED SOLUTION BEFORE ADDING SINGLE SEED CRYSTAL

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Indicate if the cooled solution is saturated, unsaturated, or supersaturated.

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OBSERVATIONS OF COOLED SOLUTION AFTER ADDING SINGLE SEED CRYSTAL

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Indicate if the solution is saturated, unsaturated, or supersaturated after adding the seed crystal.	
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* Indicates value is calculated.