Chemistry: Laboratory Notebook Rubric

	Meets or Exceeds Expectations 4 to 5 points	Below Expectations 2 to 3 points	Far Below Expectations 0 to 1 point
1. Format	All sections are complete in correct order with no mistakes and easy to follow. The Title is appropriate.	Sections missing appropriate information. The title is not proper or the sections are out of order	Sections missing a significant amount of the required data
2. Pre-Lab *Claim* *Chemicals / Equipment* *Methods*	1. Claim accurately describes the theory that is intended to be reinforced by performing the lab. 2. Chemicals and Equipment are listed. 3. Methods are a brief summary of the steps taken in completing the lab, NOT an exhaustive description containing minute detail. 4. Balanced Chemical Equations are included if applicable.	The Pre-Lab fails to meet one of the expectations.	The Pre-Lab fails to meet two or more of the expectations.
3. Evidence	1. All data from experiment is included – both qualitative and quantitative. 2. Data is neatly organized (in tables if appropriate), and is easy to interpret. 3. All data is correct with regards to significant figures and labels.	The data fails to meet one of the expectations	The Data fails to meet two or more of the expectations
4. Post-Lab *Analysis:* *Calculations* *Graphs* *Reasoning and Errors*	1. Includes all of the required calculations (showing the fundamental equation used, has correct labels, descriptions, significant figures, etc…) 2. Results of calculations are organized in Tables and (if needed) graphs completed properly. 3. Reasoning and Errors are included to state how the evidence refutes or supports the claim. Variables are discussed and experimental errors are included to show how they influenced results.	The Post-Lab fails to meet one of the expectations.	The Post-Lab fails to meet two or more of the expectations.

Chemistry: Laboratory Notebook Score Sheet

LABS: _____ NAME: _____ Per: ____ TOTAL: _____

	Meets or Exceeds Expectations 4 to 5 points		Below Expectations 2 to 3 points		Far Below Expectations 0 to 1 point	
1. Format	5	4	3	2	1	0
2. Pre-Lab	5	4	3	2	1	0
3. Evidence	5	4	3	2	1	0
4. Post-Lab	5	4	3	2	1	0

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The following table gives examples of some laboratory answers for a "Density of Salt Solutions" lab.

<table>
<tr><th></th><th>Meets or Exceeds Expectations – 4 to 5 points</th><th>Below Expectations – 2 to 3 points</th><th>Far below 0 to 1</th></tr>
<tr><td>1. FORMAT:
Title. Date, Neatness, and Organization.</td><td>"Determination of the Relationship Between the Density and Concentration of Sodium Chloride Solutions"</td><td>"Salt Solution Density Lab"</td><td></td></tr>
<tr><td>2. PRE-LAB
Claim

Chemicals / Equipment

Methods</td><td>"The claim of the lab is to develop a mathematical model relating the concentration of a solution to its density, and to use this model to determine the concentration of solutions of unknown concentration from their densities."

"NaCl = Sodium Chloride
10-mL Graduated Cylinder (+/- 0.01mL)
Centogram Balance (+/- 0.001g)

Using a centogram balance, masses of 10.00 mL NaCl samples of each of the solutions of known concentration and 2 unknown concentrations are measured. Density values are calculated and graphed against concentrations.</td><td>"The claim of the lab is to learn to find the density of salt solutions."

"I measured out 10.00 mL of the 5% NaCl solution using a pipet and a graduated cylinder, being careful not to lose any solution. I placed the graduated cylinder on a centogram balance and determined its mass to three decimal places. I recorded the mass in the lab book."</td><td></td></tr>
<tr><td>3. EVIDENCE</td><td>
<table>
<tr><th>% NaCl Masses for 10.00 mL Volumes</th><th>Trial 1 Mass (g)</th><th>Trial 2 Mass (g)</th><th>Trial 3 Mass (g)</th></tr>
<tr><td>5%</td><td>10.012</td><td>10.017</td><td>10.005</td></tr>
<tr><td>10%</td><td>10.180</td><td>10.204</td><td>10.174</td></tr>
<tr><td>15%</td><td>10.230</td><td>10.242</td><td>10.233</td></tr>
<tr><td>U1</td><td>10.074</td><td>10.062</td><td>10.085</td></tr>
</table>
</td><td>5% solution = 10.012 g
10% solution = 10.180 g
15% solution = 10.230</td><td></td></tr>
<tr><td>4. POST-LAB
Analysis:

Calculations

Graphs

Organized Table</td><td>Density = m/V (fundamental equation shown)
<u>Density 5%</u>
Trial 1 = 10.012 g/10.00 mL = 1.001 g/mL
Trial 2 = 10.017 g/10.00 mL = 1.002 g/mL
Trial 3 = 10.005 g/10.00 mL = 1.001 g/mL
(labels present throughout calculation, significant figures rules observed)

Graphs are included. The graph is Density (y) vs Concentration (x) and is used to get the equation for the best fit line. The equation is y = 0.00292x + 0.986. Solving for Concentration (x) = 8.2%

<table>
<tr><th></th><th>Trial 1 Density (g/mL)</th><th>Trial 2 Density (g/mL)</th><th>Trial 3 Density (g/mL)</th></tr>
<tr><td>5%</td><td>1.001</td><td>1.002</td><td>1.001</td></tr>
<tr><td>10%</td><td>1.016</td><td>1.015</td><td>1.017</td></tr>
<tr><td>15%</td><td>1.029</td><td>1.031</td><td>1.027</td></tr>
<tr><td>U1</td><td>1.010</td><td>1.012</td><td>1.008</td></tr>
</table>

<table>
<tr><th></th><th>Mean Concentration %</th></tr>
<tr><td>U1</td><td>8.2</td></tr>
</table>
</td><td>Density = 10.012 g/10.00 mL = 1.0012 g/mL (significant figures error) Density = 10.012/10.00 = 1.001 g/mL (labels not present in calculation)

Results table incomplete, Stats missing or not correct. Graphs (when appropriate or asked for) are missing, incomplete or contain mistakes.</td><td></td></tr>
</table>

Reasoning and Errors	"It is demonstrated that a linear relationship exists between the density and concentration of sodium chloride solutions, and that the relationship can be used to make predictions about the properties of solutions of unknown concentration. The concentration of Unknown Solution 1 was 8.2%. As the concentration of a solution increases, the density of the solution increases in linear fashion. The data supports this concept, within reasonable margins of error. The claim of the lab was fulfilled by using the mathematical model for this linear relationship to predict the concentration of solutions of unknown concentration based on their densities. The mass of the empty graduated cylinder was not recorded when finding the mass of the solutions. As a result, the mass of each solution was too high, and the resulting density was also too large."	"We demonstrated that it is possible to measure the densities of solutions, and to find the concentrations of unknowns. We showed that as the concentration of a solution increases, the density of the solution also increases linearly. Our data supports this conclusion. The claim of the lab was fulfilled. We failed to take into account the mass of the graduated cylinder when finding the mass of the solutions."	