# General Chemistry Lab II

## CHEM1225

## Course Description

This laboratory course complements the second semester of General Chemistry and is designed to deepen students' understanding of inorganic chemistry through hands-on experiments. Emphasizing the practical application of concepts discussed in lectures, this course covers a range of topics including chemical kinetics, equilibrium, electrochemistry, and qualitative analysis. Students will engage in experiments that illustrate how theoretical knowledge is applied in real-world contexts, such as analyzing the mass composition of household substances (vinegar).

A key component of this course is the ***rigorous use of lab notebooks***. Students will learn to meticulously document their experimental procedures, results, and analyses, developing skills crucial for scientific reporting and professional practice.

Throughout the course, students will refine their laboratory techniques, enhance their ability to analyze and interpret data, and develop rigorous documentation skills. The lab is structured to foster critical thinking, problem-solving, and effective communication, preparing students for advanced studies in chemistry or related fields.

Experiments are not only designed to teach specific chemical principles but also to introduce students to proper laboratory practices and safety procedures.

By the end of the course, students will be proficient in using a variety of laboratory equipment, understand the importance of precise measurement, and be able to confidently handle chemical reagents. Additionally, through rigorous use and maintenance of lab notebooks, students will hone their documentation skills, ensuring accurate and detailed recording of experimental procedures and outcomes, which is fundamental for professional scientific practice.

This course is essential for students pursuing chemistry as a major or minor, preprofessional studies, or careers in the health sciences. It aims to ensure that all participants develop a solid

foundation in essential laboratory skills, scientific thinking, and professional communication, underscored by the comprehensive use of lab notebooks.

## Your Course Learning Outcomes

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Upon successful completion of this laboratory course, you will be able to:

1. **Demonstrate Proficiency with Advanced Laboratory Techniques:**
    - Master the use of advanced analytical instruments and techniques relevant to inorganic chemistry experiments.
    - Perform qualitative analysis & characterization experiments.
    - Perform all experiments safely and accurately.
2. **Apply Theoretical Knowledge to Practical Scenarios:**
    - Relate underlying chemical theories to the experimental outcomes in areas such as kinetics, equilibrium, electrochemistry, and qualitative analysis.
    - Use qualitative analysis schemes to accurately identify unknown anions and cations based on their chemical reactions and properties.
    - Evaluate experimental data to understand chemical behaviors and properties.
3. **Develop Competence in Scientific Documentation:**
    - Maintain a detailed and organized lab notebook that adheres to professional standards, suitable for academic and industrial settings.
    - Clearly document experimental procedures, results, and analyses, ensuring that all entries are sequential, complete, and legible.
    - Prepare formal documents like certificates of analysis to demonstrate compliance with industry standards, simulating professional reporting as an FDA lab employee.
4. **Enhance Data Analysis Skills:**
    - Utilize statistical and graphical analysis techniques to interpret experimental data.
    - Employ software tools such as Excel for data processing and presentation.
5. **Cultivate Critical Thinking and Problem Solving:**
    - Identify and troubleshoot experimental errors and anomalies.

- Develop hypotheses based on observed experimental data and test these hypotheses through systematic experimentation.

6. **Foster Professional Communication and Teamwork:**
   - Effectively communicate experimental findings in writing, to a scientific audience.
   - Collaborate with peers to conduct experiments, share findings, and discuss results.
7. **Prepare for Professional Practices:**
   - Understand the importance of ethics in scientific research, particularly in the documentation and presentation of data.
   - Appreciate the role of a lab notebook in the broader context of scientific research, patent applications, and publication.
8. **Implement Industry Standards in Experimental Procedures:**
   - Apply FDA standards to assess the quality of common consumer products, such as household vinegar.
   - Interpret and report experimental results in accordance with regulatory requirements, emphasizing the practical application of these standards in a professional setting.

These outcomes are designed to provide you with a robust set of skills and knowledge that are crucial for success in chemistry and related fields, ensuring that they are well prepared for future academic and professional endeavors.

## Transfer/Certification/Licensure/Employment Information

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**Academic Transfer:** Chemistry 1225 is fully transferable within the state system of higher education and to most other universities and colleges. Students planning to transfer to another institution should verify the transferability of credits with the receiving institution.

**Certification and Licensure:** While this course does not directly lead to certification or licensure in the field of chemistry, the foundational skills and understanding developed here are essential for students pursuing professional certification in scientific and technical fields. Students interested in certifications such as those offered by the American Chemical Society (ACS) should consider additional coursework and laboratory experience.

**Employment:** The practical skills, analytical techniques, and scientific documentation abilities cultivated in Chemistry 1225 are valuable for various roles in research, quality control, environmental monitoring, and more within chemical, pharmaceutical, and biotechnological industries. This course provides a strong foundation for entry-level positions that require a background in chemistry and may enhance job prospects in technical or laboratory-based roles.

**Further Education and Professional Studies:** Completing this course successfully also sets the groundwork for advanced studies in chemistry and related sciences, crucial for careers that may require a graduate degree such as a chemist, materials scientist, or pharmacologist.

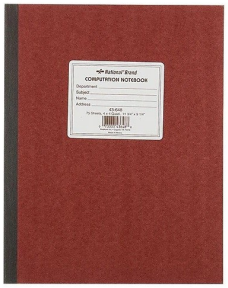
## College Wide Student Learning Outcomes

- Link to SLCC's Learning Outcome https://www.slcc.edu/gened/learning-outcomes.aspx

## Course Prerequisites

College Algebra, CHEM 1220 (lecture), completed or currently enrolled.

## Required Text or Materials



**Title: COMP NOTEBK 9.25x11.75 75SH QU**

**Subtitle:** https://www.bkstr.com/slccstore/course-materials-result shopBy=course&divisionDisplayName=&departmentDisplayNam

For more information on textbook accessibility, contact Accessibility & Disability Services at ads@slcc.edu.

## Required Course Materials

- **Splash-Proof Goggles:** Students must wear ANSI Z87.1 certified splash-proof goggles during all lab sessions. These goggles should have indirect ventilation to prevent chemical splashes and minimize fogging. They must be made of chemicalresistant polycarbonate and fit securely around the eyes. The goggles must also be compatible with prescription glasses. The 3M model, as it comfortably allows for reading glasses to be worn on the outside and is highly recommended. (The school does have alternate splash-proof googles that you may use that are shared by other sections)
- **Ruler:** A standard 30 cm ruler is required to ensure straight edges when drawing tables and lines in your lab notebook.
- **Black Ball-Point Pens:** Use black (or dark blue) ball-point pens only, for all written lab work to ensure legibility and permanence of records.
- **Specified Lab Notebook:** A designated lab notebook is required to maintain a detailed and organized record of all lab activities. Please refer to our active OneNote page on lab notebook pedagogy (or use tinyurl.com/WhyLabnotebooks ).
  Please note the required reading highlighted in his document.
- **Scotch Tape or Stapler:** Needed for securing loose pages or attaching additional notes or data sheets in your lab notebook.

## Brief Description of Assignments/Exams

**Each lab consists of five parts:**

1. **Pre-lab Quiz:** A quiz designed to familiarize students with the concepts, procedures, and safety concerns for each lab. These quizzes are due before the start of the respective lab. Pre-lab quizzes will not be accepted late!
2. **Lab Notebook Prep:** You will submit a photo-pdf of your prepared lab notebook pages, which is due just prior to the start of the lab. This includes all introduction, outline, procedure, and data table pages for the respective lab.
3. **Lab Notebook Data:** You will submit a photo-pdf of all pages with new entries, observations, and actions recorded during the lab period. This submission is due just prior to leaving the lab.

4. **Lab Notebook Conclusion:** Results, processed data, discussion, and conclusion will be due 4 days after the respective lab by midnight. Late submissions of lab reports are accepted but can incur a 30% penalty!
5. **Post-lab Quiz:** A quiz meant to reinforce the concepts taught in the lab. These quizzes are due 4 days after the respective lab by midnight. Late submissions of post-lab quizzes are accepted but can incur a 30% penalty!

## Attendance

**Attendance:**

Attendance is mandatory to receive points for lab submissions. Roll will be taken at each lab session and directly constitutes approximately 20% of your overall grade, reflecting both attendance and participation.

**Missed Labs:**

If you are unable to attend a scheduled lab due to illness, unavoidable business trips, or major life trauma, you must notify the instructor or lab coordinator at least 24 hours in advance. You may be able to make up the missed lab in another section during the same week, subject to space availability. Please obtain approval from the instructor of the make-up lab session before attending. ***( If you are contagious, or seriously ill, please don't come to school! Get a note from HCW if needed. If none of these options work, let me know, we might be able to work something out.)***

| Experiment | Tuesdays | Wednesdays | Thursdays |
|---|---|---|---|
| **No Lab Meetings** | 8/20/2024 | 8/21/2024 | 8/22/2024 |
| Safety/Syllabus | 8/27/2024 | 8/28/2024 | 8/29/2024 |
| Brass Analysis | 9/3/2024 | 9/4/2024 | 9/5/2024 |
| Kinetics, week 1 | 9/10/2024 | 9/11/2024 | 9/12/2024 |

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|---|---|---|---|
| Kinetics, week 2 | 9/17/2024 | 9/18/2024 | 9/19/2024 |
| Shifts | 9/24/2024 | 9/25/2024 | 9/26/2024 |
| Ksp | 10/1/2024 | 10/2/2024 | 10/3/2024 |
| Vinegar | 10/8/2024 | 10/9/2024 | 10/10/2024 |
| Carbonates/Bicarbonates | 10/15/2024 | 10/16/2024 | *10/17/2024 |
| Anions | 10/22/2024 | 10/23/2024 | 10/24/2024 |
| Cations | 10/29/2024 | 10/30/2024 | 10/31/2024 |
| Galvanic Cell | 11/5/2024 | 11/6/2024 | 11/7/2024 |
| Electrolysis | 11/12/2024 | 11/13/2024 | 11/14/2024 |
| Aspirin | 11/19/2024 | 11/20/2024 | 11/21/2024 |
| **No Lab Meetings** | 11/26/2024 | 11/27/2024 | 11/28/2024 |
| **No Lab Meeting**s | 12/3/2024 | 12/4/2024 | 12/5/2024 |

*Fall break. Watch the respective video to complete the lab assignment as if you were in the lab.

| Lab Section | Day | Time Start | Time Finish | Campus | Room | Instructor |
|---|---|---|---|---|---|---|
| 1225-403 | T | 7:00 PM | 9:20 PM | Taylorsville | SI-260 | |
| 1225-402 | W | 12:30 PM | 2:50 PM | Taylorsville | SI-260 | |
| 1225-401 | R | 10:00 AM | 12:20 PM | Taylorsville | SI-260 | |
| 1225-404 | R | 2:30 PM | 4:20 PM | Taylorsville | SI-260 | |

If you attend a make-up lab, you will be integrated with existing groups. Ensure that the lab instructor of that session signs your lab notebook with the date and time before you leave, confirming your attendance and participation.

## Grading Scale

**Grading Breakdown for Chemistry 1225-402 Lab:**

1. **Attendance and Participation:** 20%
    - Attending on time and actively participating in lab sessions.
2. **Pre-lab Quizzes:** 15%
    - Assessing readiness and understanding of upcoming lab procedures and safety requirements.
3. **Lab Notebook Prep:** 10%
    - Preparation of the lab notebook with introduction, objectives, purpose, and questions the lab should answer, along with outlines, flowcharts and procedural plans. (Due before entering the lab)
4. **In-Lab Work:** 10%
    - Performance during the lab, including all new entries, observations, and actions recorded during the lab period. (Due before leaving lab)
5. **Lab Notebook Submission:** 25%
    - Comprehensive documentation of the lab process, including data recording and analysis in the lab notebook.
        - **Data Table/Graphs Complete & Accurate Values:** 15%
        - **Discussion:** 8%
        - **Conclusion:** 2%
    - **Deductions:** Up to 20% of the total points available for this section may be deducted for failing to meet the Detailed Lab Notebook Standards and Assessment Rubric. For details, visit Lab Notebook Standards or tinyurl.com/Labnotation
6. **Post-lab Quizzes:** 15%
    - Quizzes following each lab to reinforce and assess understanding of the lab's core concepts.
7. **Canvas Discussions:** 5%

- Participation in online discussions related to the lab content, fostering a collaborative learning environment.

≥ 93.00% A
≥ 90 and < 93 A- ≥
87 and < 90 B+
≥ 83 and < 87 B
≥ 80 and < 83 B- ≥
77 and < 80 C+
≥ 73 and < 77 C
≥ 70 and < 73 C- ≥
67 and < 70 D+
≥ 63 and < 67 D
≥ 60 and < 63 D-
< 60 E

## Keys for Success (how to succeed in the course)

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## Keys for Success in Chemistry 1225 Lab:

1. **Stay Organized:** Keep your lab notebook and other materials well-organized. This is crucial for tracking your experiments, results, and insights effectively.
2. **Prepare Ahead:** Always read the lab packet materials and prep your lab notebook before coming to lab. Familiarize yourself with the experiment's purpose and procedures in advance.
3. **Read the Rubric Carefully:** Before conducting each lab and again before submission, thoroughly review the rubric. This ensures you meet all requirements and understand how your work will be evaluated.
4. **Timely Submissions:** Adhere to submission deadlines rigorously. Submitting reports early helps you prepare for the next lab and keeps previous work from accumulating.

5. **Participate Actively:** Engage actively during lab sessions. Ask questions, discuss observations with peers, and fully participate in all activities.
6. **Follow Safety Guidelines:** Always adhere to the safety protocols. Proper lab attire and safety practices are critical for maintaining a safe working environment.
7. **Utilize Available Resources:** Make use of the STEM center located near our lab. It's a valuable resource for additional learning and support.
8. **Work on Team Skills:** Cooperate and collaborate effectively with your lab partners. Good communication and teamwork can enhance your results (share emails and phone numbers to stay in contact outside of lab).
9. **Practice Critical Thinking:** Apply lecture concepts to solve lab problems. Analyze results critically and explore explanations for unexpected outcomes.
10. **Enhance Your Writing Skills:** Pay special attention to the quality of your discussion and conclusions in lab reports. Clear and well-thought-out writing reflects your understanding and professionalism. Please, visit www.slcc.edu/swc
11. **Seek Feedback and Reflect:** Take any feedback seriously, whether it's on your lab technique, reports, or quizzes. Use it to improve your skills and understanding.
12. **Stay Curious and Motivated:** Maintain a curious and motivated mindset to overcome challenges and appreciate the fascinating aspects of chemistry.
13. **Stay in contact with me!** Don't be afraid to reach out. Reach out like you would to a friend or even family (even though I'm still Mr. E to you ;-)

## Institutional Policies

As members of our academic community, we would like to invite you to review the Institutional Syllabus which covers important policies and procedures. This document contains important links for students on the code of student rights and responsibilities, academic integrity, and grading policies, Title IX and other important acknowledgements. By familiarizing yourself with this information, you can help us create a safe and respectful environment for everyone.

You can access the document by clicking on the following link:
https://slcc.instructure.com/courses/530981/pages/institutional-syllabus

## Learning Support and Tutoring Services

We are pleased to offer a range of tutoring and learning support services to help you achieve your academic goals. Whether you need assistance with a specific subject or want to improve your study skills, you have many options for tutoring or other support.

To learn more about the services we offer and how to access them, please visit the Institutional Syllabus under the Tutoring and Learning Support tab: https://slcc.instructure.com/courses/530981/pages/institutional-syllabus. We encourage you to take advantage of these resources to help you succeed in your studies. If you have any questions or would like to schedule a tutoring session, please don't hesitate to reach out to us. We are here to support you in any way we can.

## Advising and Counseling Support Services

At our institution, we are committed to supporting your academic and personal growth. That's why we offer a range of advising and counseling services to help you navigate the challenges of college life. To learn more about the resources available to you and how to access them, please visit the Institutional Syllabus under the Advising and Counseling Support Services tab: https://slcc.instructure.com/courses/530981/pages/institutionalsyllabus. Our advising team and the support centers across campus are here to support you in achieving your goals and overcoming any obstacles you may face.

## Student Academic Calendar

As students you should be aware of all important dates in the semester, such as the day that courses begin and end, as well as the drop date and the last day to withdraw. To learn more about those dates, navigate to the Student Academic Calendar below:

SLCC Student Academic Calendar

# Assignment Schedule

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | Beer's Lambert Law (Your classmate asked) | Discussion | 0 |
| | Data Sheet on Walmart Vinegar | Discussion | 0 |
| | Finding Your "Why" and Staying Focused on Your Goals | Discussion | 0 |
| | General Topics | Discussion | 0 |
| | Important Lab Report Reminders and Deadlines & The 30% Penalty | Discussion | 0 |
| | List of Tiny or Small URLs common for Mr. E's Chem 1225 | Discussion | 0 |
| | | | |
| | Photos to support Lab 1 - Spec. Analysis of Unknown Brass Sample | Discussion | 0 |
| | Roll Call Attendance | Assignment | 100 |
| | SLCC Writing Center, Please try it out! | Discussion | 5 |
| | Solubility Rules (Review) | Discussion | 0 |

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| | STEM Center Support and Tutor.com | Discussion | 1 |
| | Summer Term: Results of the 2016 ACS National Final (first 12 questions) | Discussion | 0 |
| | The Value of Lab Courses in Gaining Letters of Recommendation | Discussion | 0 |
| | Thursdays Lab prewrite up | Discussion | 0 |
| | Using Excel on a PC to set up a Calibration Curve Video | Discussion | 0.5 |
| | Videos of Respective Labs | Discussion | 0 |
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| 8/24 | Highlighted as "Required Reading" from the OneNote Page "Why Lab Notebooks" | Quiz | 3 |
| 8/26 | Master Rubric Now Available for Review | Discussion | 1 |
| 8/27 | What to Expect This Thursday (Important!) | Discussion | 1 |
| 8/28 | Photos/videos to support your reports. | Discussion | 0.5 |

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| 8/29 | ACS National Final Exam Gen Chem I Sample | Quiz | 1 |
| 8/29 | Safety/Syllabus: Safety Quiz | Quiz | 15 |
| 9/5 | Brass Analysis: Prelab Questions | Quiz | 5 |
| 9/5 | Lab Notebook Prep Upload: Brass | Assignment | 5 |
| 9/5 | In-Lab Work (Lab Notebook Upload): Brass | Assignment | 5 |
| 9/9 | Brass Analysis: Postlab Questions | Quiz | 5 |
| 9/9 | Brass Analysis: Lab Report | Assignment | 5 |
| 9/12 | Kinetics (Part 1): Prelab Questions | Quiz | 5 |
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| 9/12 | Lab Notebook Prep Upload: Kinetics (Part 1) | Assignment | 5 |
| 9/12 | In-Lab Work (Lab Notebook Upload): Kinetics (Part 1) | Assignment | 5 |
| 9/16 | Kinetics (Part 1): Postlab Questions | Quiz | 5 |
| 9/16 | Kinetics (Part 1): Lab Report | Assignment | 5 |

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| 9/18 | Developing Professional Communication Skills | Discussion | 1 |
| 9/19 | Kinetics (Part 2): Prelab Questions | Quiz | 5 |
| 9/19 | Lab Notebook Prep Upload: Kinetics (Part 2) | Assignment | 5 |
| 9/19 | In-Lab Work (Lab Notebook Upload): Kinetics (Part 2) | Assignment | 5 |
| 9/23 | Kinetics (Part 2): Postlab Questions | Quiz | 5 |
| 9/23 | Kinetics (Part 2): Lab Report | Assignment | 5 |
| 9/26 | Chemical Equilibrium: Prelab Questions | Quiz | 5 |
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| 9/26 | Lab Notebook Prep Upload: (Chem Equilibrium) | Assignment | 5 |
| 9/26 | In-Lab Work (Lab Notebook Upload): Chem Equilibrium | Assignment | 5 |
| 9/30 | Chemical Equilibrium: Postlab Questions | Quiz | 5 |
| 9/30 | Chemical Equilibrium: Lab Report | Assignment | 5 |
| 10/3 | Common Ion Effect: Prelab Questions | Quiz | 6 |

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| 10/3 | Lab Notebook Prep Upload: Common Ion Effect | Assignment | 5 |
| 10/3 | In-Lab Work (Lab Notebook Upload): Common Ion Effect | Assignment | 5 |
| 10/7 | Common Ion Effect: Postlab Questions | Quiz | 4 |
| 10/7 | Common Ion Effect: Lab Report | Assignment | 5 |
| 10/10 | Lab Notebook Prep Upload: Titration | Assignment | 5 |
| 10/10 | Titration of Vinegar: Prelab Questions | Quiz | 6 |
| 10/10 | In-Lab Work (Lab Notebook Upload): Titration | Assignment | 5 |
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| 10/14 | Titration of Vinegar: Postlab Questions | Quiz | 4 |
| 10/14 | Titration of Vinegar: Lab Report | Assignment | 10 |
| 10/24 | Lab Notebook Prep Upload: Anions | Assignment | 5 |
| 10/24 | Qualitative Analysis - Anions: Prelab Questions | Quiz | 5 |
| 10/24 | In-Lab Work (Lab Notebook Upload): Anions | Assignment | 5 |

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| 10/28 | Qualitative Analysis - Anions: Postlab Questions | Quiz | 5 |
| 10/28 | Qualitative Analysis - Anions: Lab Report | Assignment | 5 |
| 10/31 | Lab Notebook Prep Upload: Cations | Assignment | 5 |
| 10/31 | Qualitative Analysis - Cations: Prelab Questions | Quiz | 5 |
| 10/31 | In-Lab Work (Lab Notebook Upload): Cations | Assignment | 5 |
| 11/4 | Qualitative Analysis - Cations: Postlab Questions | Quiz | 5 |
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| 11/4 | Qualitative Analysis - Cations: Lab Report | Assignment | 5 |
| 11/7 | Lab Notebook Prep Upload: Voltaic Cell | Assignment | 5 |
| 11/7 | Voltaic Cell: Prelab Questions | Quiz | 6 |
| 11/7 | In-Lab Work (Lab Notebook Upload): Voltaic Cell | Assignment | 5 |
| 11/11 | Voltaic Cell: Postlab Questions | Quiz | 4 |
| 11/11 | Voltaic Cell: Lab Report | Assignment | 5 |

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| 11/14 | Electrolysis: Prelab Questions | Quiz | 5 |
| 11/14 | Lab Notebook Prep Upload: Electrolysis | Assignment | 5 |
| 11/14 | In-Lab Work (Lab Notebook Upload): Electrolysis | Assignment | 5 |
| 11/18 | Electrolysis: Lab Report and Postlab | Assignment | 10 |
| 11/21 | Lab Notebook Prep Upload: Aspirin | Assignment | 5 |
| 11/21 | Preparation of Aspirin: Prelab Questions | Quiz | 6 |
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| 11/21 | In-Lab Work (Lab Notebook Upload): Aspirin | Assignment | 5 |
| 11/25 | Preparation of Aspirin: Postlab Questions | Quiz | 4 |
| 11/25 | Preparation of Aspirin: Lab Report | Assignment | 0 |
| 12/9 | In-Lab Work (Lab Notebook Upload): Carbonates | Assignment | 5 |
| 12/9 | Lab Notebook Prep Upload: Carbonates | Assignment | 5 |

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| 12/9 | Percent Composition of Carbonate/Bicarbonat e in a Mixture: Postlab Questions | Quiz | 4 |
| 12/9 | Percent Composition of Carbonate/Bicarbonat e in a Mixture: Prelab Questions | Quiz | 6 |
| 12/9 | Percent Composition of Carbonate/Bicarbonat e in a Mixture: Lab Report | Assignment | 5 |
| 12/9 | Table of Contents | Assignment | 2 |