

Center for Pre-College Programs  
New Jersey Institute of Technology  
RET 2015

Assessment  
And  
Student Work Products

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and  
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**Assessment –  
Provide assessment tools/activities that  
assess the learning objectives  
previously described.**

How do you know if the students “got it” during the lesson and after the lesson? Assessments should gauge what the students know about the topic at the beginning, and whether the students *met the learning objectives* at the end.



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**ASSESSMENT**

- In the most general sense, *assessment* is a process in which a judgment or measurement is made of the value of an entity.
- *Educational assessment* should involve gathering and evaluating data collected from learning activities or programs.
- “Assessment” is not simply a method to give students tests and assign them grades.
- Assessment of learning is one type of educational assessment designed to serve several related purposes including:
  - Provide direction for the processes of teaching and learning.
  - Provide feedback to students on their performance.
  - Provide feedback to teachers on instruction and curriculum.
  - Ensure that standards of progression are met.



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**Assessment of learning should involve communication to:**

- **Teachers** (feedback on teaching).
- **Students** (feedback on learning).
- **Curriculum designers** (feedback on curriculum).
- **Administrators** (feedback on use of resources and overall effectiveness of (curriculum, instruction, learning, and assessment strategies).



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**Classroom assessment should help teachers answer the following specific questions:**

- To what extent are my students achieving the stated objectives/outcomes?
- How should I allocate class and out-of-school time for the current topic?
- Can I teach this topic in a more efficient or effective way?
- What parts of this course/unit are my students finding most valuable or challenging?
- How will I change this course/unit the next time I teach it to improve effectiveness?
- What is the performance criterion for mastery that will describe how grades will be assigned to student work?



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**For students, learner assessment should answer a different set of questions:**

- Do I know what my instructor thinks is most important in terms of performance mastery?
- Am I mastering the course content?
- How can I improve the way I study or demonstrate my mastery in this course?
- What grade am I earning in this course based on my student work?



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**Assessment - Provides evaluation tools/activities for teachers to assess the learning objectives/outcomes described earlier.**

- Specification of learning objectives for a lesson is used to identify some skill(s) (process) and/or knowledge (content) that students should be able to acquire as a result of the lesson? A visible, observable student behavior or product should demonstrate that the objective has been achieved. The lesson is then designed so that a student work product provides evidence that the intended learning took place.
- How do you know if the students “got it” during the lesson and after the lesson? Assessments should gauge what the students know about the topic at the beginning, and whether the students *met the learning objectives* at the end.



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**A Poor Objective**



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**FORMS OF STUDENT WORK**

- Exams and quiz
- Homework
- Classroom participation
- Classroom work products
- Reports, oral or written
- Laboratory reports
- Student notebooks/journals – electronic portfolios
- Classroom observations



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By  
David  
L. KEANE

"I would've done better on the test but it asked all the wrong questions."



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### Lesson Topic: Analysis of particle size of solutes on the rate of dissolution in a solvent

**Learning Objectives:** students will be able to:

1. Use appropriate lab safety procedures
2. Calculate the surface area and volume of different sized materials.
3. Use balance, graduated cylinder and timer to measure mass, volume and time.
4. Use significant figures in calculations
5. Calculate values from experimental measurements
6. Graph data.

**Activity:**

- Given anhydrous calcium chloride pellets of different sizes, students are to separate them into different sizes using sieves.
- Assuming the pellets of sample to be spherical, and knowing the number of pellets in the sample, and the diameter of the sample, students can estimate the diameter of a pellet and its surface area.
- Dissolve a definite amount of solute in the solvent.
- Compare the rate of solubility with different sized particles.



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6. Graph data.

**Parameters to evaluate student work**

- Calculate the experimental values using the collected data.
- Calculate the surface area of different sized particles- and the solubility of anhydrous calcium chloride in water.
- Using the collected lab data, plot a graph.
- Based on the graph, what happens to the rate of dissolution when particle size increases?



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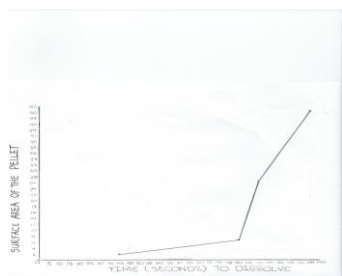
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**Lesson Topic: Analysis of particle size of solutes on the rate of dissolution in a solvent**  
**Grade – 9/10**



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**Lesson Topic: Rate of Reaction**

**Learning Objectives:** students will be able to:

1. Students will be able to solve the problems using molarity by calculating the number of moles in the solution, and they will present the problems on the board.
2. Students will be able to collect the data of measurements during chemical change of reaction of Alka Seltzer in different temperature and for different concentration of drug as function of time and draw graphs.

**NJ Standards & Indicators**

- 5.1.12.A.1-3
- 5.1.12.B.1-4, C.3, D.1-3
- 5.2.12.A.1



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**NJ Content Standards & Indicators**

- 5.1.12.A.1. Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
- 5.1.12.A.2. Develop and use mathematical, physical, and computational tools to build models and pose theories.
- 5.1.12.A.3. Use scientific principles and theories to build standards for data collection, posing controls, & presenting evidence.
- 5.1.12.B.1. Design investigations, collect evidence, analyze data, and evaluate evidence.
- 5.1.12.B.2. Build, refine, and represent evidence-based models.
- 5.1.12.B.3. Revise predictions and connect explanations to established scientific knowledge, and theories.
- 5.1.12.B.4. Develop quality controls to examine data sets & explanations.



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## NJ Content Standards & Indicators

- 5.1.12.C.3. Consider alternative theories to interpret and evaluate.
- 5.1.12.D.1. Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
- 5.1.12.D.2. Represent ideas using graphs, and tables.
- 5.1.12.D.3 Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
- 5.2.12.A.1. Use atomic models to predict the behaviors of atoms in interactions.



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## Lesson Topic: Rate of Reaction

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**Activity:**

- Students choose a partner.
- Students given brief overview of lab materials and equipment.
- Students given groups objective of the lab and what to do step by step and they were responsible to write the instructions in a lab notebook.
- Partners discussed procedure step by step
- Students start the experiment and collect data.
- At the completion of the lab they were to clean up and compare data and discuss their findings.



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**Homework activity**

- Practice problems
- Lab Report

**PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:**

- Lab report
- Works well together in a group.
- Listens instructions.
- Clean up procedures followed.



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**Lesson Topic: Rate of Reaction**

Lab Report	Comments	Points 87/100
Title	Very good	5/5
Objective	Perfect!	10/10
Materials	Missing sizes of equipment	5/5
Procedure	Missing one step	9/10
Data	Perfect!	25/25
Observation	Forgot states of matter. Eqn. missing Na.	8/10
Calculation	Perfect!	10/10
Conclusion	The graphs do not substitute the conclusion. You must use best fit line of graph to make a conclusion.	5/15
Participation	Perfect!	10/10



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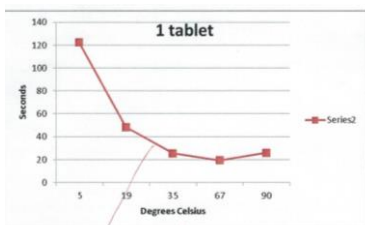
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**Lesson Topic: Rate of Reaction**



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**Lesson Topic: Rate of Reaction**

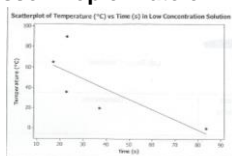


Figure 1 - Low Concentration

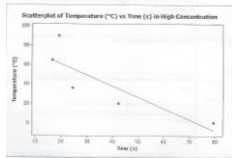


Figure 2 - High Concentration



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## Colorimetric Analysis of Copper Ore

### Learning Objectives:

- **Prepare** serial dilution of known Copper Sulfate solutions using micropipette and volumetric flasks and calculate their concentration in Molarity.
- **Correlate** the absorbance measured through the colorimetric analysis to the concentration of copper by plotting absorbance versus concentration.
- **Determine** the concentration of an unknown solution using a standard graph made by plotting absorbance versus concentration (M) using the Beer-Lambert law.



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## Colorimetric Analysis of Copper Ore (Cont.)

### Learning Experience:

- Students will learn how to handle a cuvette correctly and use a colorimeter by following the instructions.
- Students will make a series of solutions with different concentrations.
- Students will learn how to use the logger pro software and interpret the graph obtained from their colorimetric analysis.
- Students will use the graph to identify the concentration of an unknown solution.



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## Colorimetric Analysis of Copper Ore (Cont.)

### Assessment:

- Students will **calculate the concentration** (in M) of the standard copper solution.
- Students will **plot graphs (scatter plot)** of absorbance (A) vs. Concentration (M) of the standards solutions of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  using logger pro software.
- Students will **interpolate the concentration** of the unknown solution of copper ore dissolved in sulfuric acid using the **linear fit of the scattered graphs**.
- Students will **calculate the Percent purity** of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in the ore using the actual given value.
- Students will **answer the post laboratory questions**.
- Students will **write a formal lab** report following the provided rubric incorporating all the above items.



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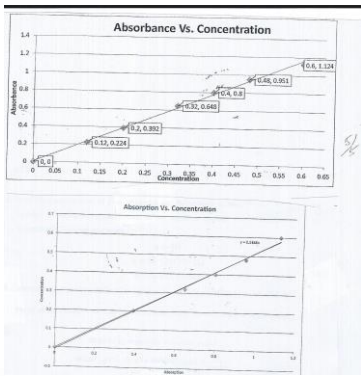
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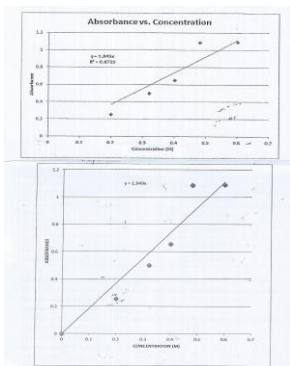
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Q & A




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