4-2-2009

If You Aren't Part of the Solution, You're Part of the Precipitate! [10th-12th grade]

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: If you aren't part of the solution, you're part of the precipitate!

Grade Level: 10^{th}-12^{th} Grade

Subject/Topic Area(s): Chemistry

Designed By: Dustin Demoin

Time Frame: 10 days

School District: Northside ISD

School: John Marshall High School

School Address and Phone:

8000 Lobo Lane
San Antonio, TX 78240
(210) 397-7100

Brief Summary of Unit (Including curricular context and unit goals):
This unit attempts to provide students with a deeper understanding of the properties of solutions, the process of dissolving, and the role of solvent. Students will explore both the concepts and the applications of basic solution theory. Students will investigate the role of a solvent, including its properties necessary to dissolve the solute. They will also see the affects of changing the colligative properties and how the concentration of a solution changes those properties in different ways.

Unit: If you aren't part of the solution, you're part of the precipitate!
Grades: 10-12

Stage 1: Desired Results

Content Standards (TEKS)

(4) Science concepts. The student knows the characteristics of matter. The student is expected to:
- C. investigate and identify properties of mixtures and pure substances.

(12) Science concepts. The student knows the factors that influence the solubility of solutes in a solvent. The student is expected to:
- A. demonstrate and explain effects of temperature and the nature of solid solutes on the solubility of solids;
- B. develop general rules for solubility through investigations with aqueous solutions; and
- C. evaluate the significance of water as a solvent in living organisms and in the environment.

(13) Science concepts. The student knows relationships among the concentration, electrical conductivity, and colligative properties of a solution. The student is expected to:
- A. compare unsaturated, saturated, and supersaturated solutions;
- B. interpret relationships among ionic and covalent compounds, electrical conductivity, and colligative properties of water; and
- C. measure and compare the rates of reaction of a solid reactant in solutions of varying concentration.

Understandings

Students will understand that…

1. Factors affect the rate of solution (particle size, temperature, concentration, solvent, etc.)
2. Solutions follow different rules than pure substances.
3. Solutions can be solids, liquids, gases, and mixtures of the two.
4. Water solutions affect our world and the survival of all life.
5. Molecular compound solutions are different than ionic compound solutions.

Essential Questions

- How do solutions affect my life?
  - Why can't I get my iced tea sweet enough?
  - How can I make ice cream without a freezer?
  - Why do we put ice on the roads during winter?
  - Why do we put salt in our pasta water?
- What happens to the solute when it dissolves?

Knowledge

Students will know:

- A solution is a homogeneous mixture composed of a solute that gets dissolved and a solvent that does the dissolving.
- Dissolving is a physical change because no new substances are produced.
- Solutions are usually liquids, but can also be gases (like air) or solids (like metal alloys).
- The rate at which a solid solute dissolves generally increases as:
  - The temperature increases
  - The surface area increases
  - The mixture is stirred or shaken
  - The concentration decreases
- Solubility is defined as the mass of solute that can be dissolved in 100. grams water under given conditions (temperature, gas pressure).
- In general "like dissolves like" – polar solutes dissolve in polar solvents; non-polar in non-polar.
- The solubility of a gaseous solute decreases as the temperature of the solvent increases.
- Water is called the "universal solvent" because so many substances dissolve in it.
- Water has interesting properties (adhesion, cohesion, viscosity, relatively high boiling and freezing points, and less dense in solid than in liquid).

Skills

Students will be able to:

- Determine in which solvent the solute will dissolve.
- Explain why salting the roads causes them to de-ice.
- Explain how ice cream is made using rock salt.
- Identify possible ways to increase the amount of solute dissolved in the solvent.
- Calculate the molarity of the solution.
- Use the molarity of a solution to discuss reaction rates and concentration.
- Use molarity to calculate the amount of solution needed for a reaction.
- Explain why some solutes dissolve in a solvent and why others do not.
- Explain why water has some of the interesting properties it has.
- Determine if the solution is saturated, unsaturated, or supersaturated.
- Explain the difference between how molecular compounds dissolve and how ionic compounds dissolve.
- Discuss the affects of increased solute on colligative properties.

• Water covers 70% of the earth and composes about 70% of living cells, making it critical for cellular transport. • A saturated solution contains all the solute that it can dissolve at given conditions of temperature and pressure. • An unsaturated solution can still dissolve more solute. • A supersaturated solution contains more solute than can be dissolved at the given conditions because the solute had been dissolved under different conditions • Most ionic and some molecular (covalent) compounds dissolve in water to produce ions. • Many molecular compounds that do dissolve in water do not produce ions when they are dissolved. • Solutions that contain ions conduct electrical current and are called electrolytes; solutions that contain no charged particles do not conduct electricity and are called non-electrolytes. • Colligative properties are solutions' properties that change proportionally to the number of solute particles in the solution. • As the concentration of solute particles increases, the boiling point of the solution increases and its freezing point decreases • According to collision theory, as the concentration of a solution increases, the rate of reaction of a solid in the solution will increase	

Stage 2: Assessment Evidence

Performance Task:

What's in a solution?

Students will be asked to determine the solute and solvent of a particular solution. The groups will be required to create a "model" or "simulation" of their solute dissolving in the solvent. The students will also include a discussion of the changes in colligative properties and use of the solution. A rubric will be provided to help the students organize what exceeds, meets, and does not meet expectations.

Other evidence:

(quizzes, tests, academic prompts, etc. note – these are usually included where appropriate in Stage 3 as well)

Solutions quiz: Ask for students to answer questions in a TAKS format about the information covered by the unit (one page).

Tests: Culminating test to ask some basic knowledge, but two questions at the end. Test Form A: The rock cycle and explaining it and the other about making sweet tea. Test Form B: Steps in water purification on a filter and ocean water salinity.

Student Work: Worksheets, Homework Questions, and Labs.

I am: _____ I am in _____ period.

What's in a solution?

Your class has been asked to find out of what a group of solutions are made. You and your partner must investigate the solution and correctly identify the solute and solvent. In order to help you, you will have the opportunity to research and create a model of the solution. We will work in groups of two to create the models and present them to the class. Also, you will discuss what occurs to the solvent's freezing and boiling points. The solution you could make will be useful in the world somehow. You will need to figure out how the solution could be useful and discuss that in your final written project as well as during your speech. Thus, there will be two components to your project. The written or visual component will require you to turn something in to Mr. Demoin and the presentation component will require you to explain your model to the class and dissolving your compound in the correct solvent.

What do I have to have?

A model that shows your solute dissolving in the correct solvent
A discussion of the model both written and oral
An explanation of how the solvent's freezing and boiling points would change when the solute is dissolved
A possible use for the solution
Correct usage of vocabulary terms
Proof of your work (something tangible)
Correct citation of your resources
A presentation for the class

What do I get to choose?

Your solution
Your partner
How to present your ideas (poster, PowerPoint, script, science backboard, video, etc.)
What you turn in with your ideas (poster, paper, script, science backboard, video, etc.) to Mr. Demoin

When do I do it?

Day 1, April 2, 2008

- Choose a partner
- Choose a solution
- Let Mr. Demoin know
- Start Brainstorming what you need and set up a plan

Day 2, April 3, 2008 (Computer Lab _____)

- Solving Problems
    - Determine the solute and solvent in your solution
    - Figure out how your solute will dissolve
    - Figure out what kind of model you will make to show the dissolving process
    - Figure out what your solute will do to the freezing and boiling points
    - Any other interesting changes in the physical properties of the solution?

    - Decide what you will do to present the information to the class
- **<u>Turn-in a completed research sheet to Mr. Demoin</u>**

Day 3, April 4, 2008 (Computer Lab _____)

- Work on your model
    - What happens first? Second? Third? Etc.?
    - Things to think about:
        - What is the nature of the solute? The solvent?
        - How does the solute interact with the solvent?
        - How can I show the dissolving process effectively?
        - Do manufacturers have to do anything to make the solute dissolve? Or to keep it dissolved?
        - Should I use the computer or is something else more appropriate?
- **<u>Turn-in a completed research sheet to Mr. Demoin</u>**

Weekend, April 5-6, 2008

- Perhaps meet with your partner and discuss how you are going to present the project (if possible)
- Fill-in any gaps of your research and improve your project

Day 4, April 7, 2008 (Computer Lab _____)

- Prepare your five minute presentation with your partner *(share the time equally!)*
- Practice your presentation
- Make it creative!
- **<u>Turn-in your presentation to Mr. Demoin (or show us "what you have done")</u>**

Day 5 & 6, April 8-9, 2008

- All groups will be given exactly five (5) minutes to give their presentation
- **<u>All students will evaluate presentations</u>**
- The group presentation should be divided equally!
- **<u>You and your partner will evaluate one another on your contribution to the project</u>**
- **<u>Turn-in your tangible project items</u>**

Monday, April 14, 2008

- **Interactive Homework Due** (You can turn this in earlier)

Monday	Tuesday	Wednesday	Thursday	Friday
		2 Introduction of Project **Partner & Solute**	3 Solving Problems: **Solvent, Dissolving process, How to present** (Classroom)	4 Work: **Design your presentation and decide what you'll turn in** (Computer Lab)
7 Prepare **Presentations and Tangible Project** (Computer Lab)	8 Presentations **Partner Assessment**	9 Presentations **Presentation Assessment & Tangible Project**	10 Presentations (If Needed)	11
14 **Interactive Homework Due**				

What's in a solution? – Performance Assessment
Solution Choices

Anti-freeze (Ethylene glycol and water)
Bleach (Sodium Hypochlorite and water)
Hydrogen Peroxide Solution (3%)
Rubbing Alcohol (ethanol and water)
E85 (ethanol and octane)
Carbonic Acid (in your blood) [carbonic acid and water]
18K White Gold [gold and silver]
Tungsten Carbide [tungsten and carbon]
Carbonation (in sodas) [water and carbon dioxide]
Windshield washer fluid (methanol and water)
Car Battery (35% sulfuric acid electrolyte solution and water)
Ammonia (5-10% household solution for cleaning and water)
Vinegar (acetic acid and water)
Sea water (sodium chloride and water)
Acetone and Acetylene (for storage and transportation)
Base Bath (potassium hydroxide and water)
Soap and Water (Micelles and water)
Chlorine Shock in pools (calcium hypochlorite in water)

If you have any other ideas, then you can propose another solution.

Categories	Exceeds Expectations (100-85%)	Meets Expectations (84-75%)	Does Not Meet Expectations (74-50%)
Research (25 points)	❖ Uses a variety of sources (more than 3 total) ❖ Function, Identification of solvent and solute, and how solute dissolves are clearly stated ❖ Proper use of vocabulary terms ❖ Properly referenced to the source material (25-22 points)	❖ Uses at least 3 sources ❖ Function, Identification of solvent and solute, and how solute dissolves are clearly stated ❖ Proper use of vocabulary terms ❖ Properly referenced to the source material (21-19 points)	❖ Uses less than 3 sources ❖ Function, Identification of solvent and solute, and how solute dissolves are not clearly stated ❖ Incorrect use of Vocabulary terms ❖ Source material not properly cited (20-13 points)
Logical Discussion of Dissolution Model (10 points)	❖ Very logical from one step to the next ❖ Adequate information provided to support why this type of dissolving would occur (10-9 points)	❖ Clear logical progression from one event to the next; A few leaps in logic, from one step to the next ❖ Evidence is present, but not always well thought out and properly supported (8 points)	❖ No clear tie from one event to the next ❖ No evidence to support reasoning ❖ Events stated that are not true or not possible (i.e. the way all compounds dissolve) (7-5 points)
Properties (10 points)	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly. ❖ Discusses interesting properties and how those have changed due to the solution. (10-9 points)	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly. ❖ Adds some interesting properties of the solution, but not much discussion of how they have changed. (8 points)	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly. (7-5 points)
Model (30 points)	❖ The model shows the appropriate steps and adequately shows the process of dissolving. ❖ All of the information is correct, labeled, and easily understood.	❖ The model shows the appropriate steps and adequately shows the process of dissolving. ❖ All of the information is correct and easily understood.	❖ The model shows two little of the steps and does not adequately show the process of dissolving. ❖ All of the information is correct, but difficult to understand.
Creativity of Presentation (10 points)	❖ Very organized and prepared presentation ❖ Time is shared equally by all members ❖ Both visually and audibly appealing ❖ Shows much effort was spent preparing for the oral presentation ❖ Interesting (10 points)	❖ Well thought out presentation ❖ Time is equally shared by all members ❖ PowerPoint, Visuals, and voice inflection are properly used ❖ Some effort was spent preparing. ❖ Somewhat interesting (8 points)	❖ Haphazard presentation ❖ Time is not equally shared ❖ Visually and audibly unpleasant due to poor planning ❖ Shows little effort in preparing proposal ❖ Not interesting (6 points)
Interactive Homework (10 points)	❖ Returned before the deadline with parent signature (10 points)	❖ Returned on the deadline with parent signature (9 points)	❖ Returned after the deadline with parent signature (7 points)
Group Participation (15 points) [awarded by group members]	❖ Shared workload equally ❖ Was Helpful ❖ Would work with each other again (15-13 points)	❖ Most of the work was shared equally ❖ Was somewhat helpful ❖ Would work with each other again (12 points)	❖ The work was not shared equally ❖ You were not very helpful ❖ The group members would probably not work together again. (11-0 points)

Name: _____ Period: ____ Date:_____

What's in a solution?

During the presentations you will need to score the presentations on a scale of 1-10 using the following table:

Group	Interesting (1-4)	Model (1-3)	Discussion (1-3)	Total (10 max)	Good (Yes or No)	Why or Why not?
1	1 2 3 4	1 2 3	1 2 3		Y N	
2	1 2 3 4	1 2 3	1 2 3		Y N	
3	1 2 3 4	1 2 3	1 2 3		Y N	
4	1 2 3 4	1 2 3	1 2 3		Y N	
5	1 2 3 4	1 2 3	1 2 3		Y N	
6	1 2 3 4	1 2 3	1 2 3		Y N	
7	1 2 3 4	1 2 3	1 2 3		Y N	
8	1 2 3 4	1 2 3	1 2 3		Y N	
9	1 2 3 4	1 2 3	1 2 3		Y N	
10	1 2 3 4	1 2 3	1 2 3		Y N	
11	1 2 3 4	1 2 3	1 2 3		Y N	
12	1 2 3 4	1 2 3	1 2 3		Y N	
13	1 2 3 4	1 2 3	1 2 3		Y N	
14	1 2 3 4	1 2 3	1 2 3		Y N	
15	1 2 3 4	1 2 3	1 2 3		Y N	
16	1 2 3 4	1 2 3	1 2 3		Y N	

What are two things that you learned during the presentations?

1)

2)

Do all solutes dissolve in the same way? Why or why not?

What is the coolest thing you learned about your solution?

Name: _____ Period:_____ Date:_____

My Partner's Name: _____

Please score your partner on the following criterion by circling one number in each of the columns (5 is the best; 1 the worst):

Shared the Workload Equally	Was Helpful	Would Work with him/her again	Additional Comments?
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	

Name: _____ Period:_____ Date:_____

My Partner's Name: _____

Please score your partner on the following criterion by circling one number in each of the columns (5 is the best; 1 the worst):

Shared the Workload Equally	Was Helpful	Would Work with him/her again	Additional Comments?
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	

Name: _____ Period:_____ Date:_____

My Partner's Name: _____

Please score your partner on the following criterion by circling one number in each of the columns (5 is the best; 1 the worst):

Shared the Workload Equally	Was Helpful	Would Work with him/her again	Additional Comments?
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	

Name: _____ Period:_____ Date:_____

My family partner is: _____ Relationship: _____

Date: _____

What's In a solution?

Dear Family Partner:
We are learning about solutions and how things dissolve. I have worked with a partner to identify how a specific solution is made. I have been asked by my instructor to discuss with you, the interesting aspects of my project, including how the freezing point and boiling point will be affected. This assignment is due _____.

Sincerely,

_____
Student's Signature

Objective: The objective of this assignment is to allow your student the opportunity to use the science vocabulary for this part of the unit and to have another chance to present his or her understanding of a solution. Together, you and your student will then choose another solution and discuss the important parts of the solution.

Information: **Solute –** The substance that is dissolved.
Solvent – The substance that dissolves the solute.

Materials: Pen/pencil, this worksheet.

Procedure:

1. Present your solution and your findings to your family partner. While your family partner is listening, he or she should answer the following questions or ask them of you when you are finished:

A. What does the solution do? _____

_____

B. What is the solute? _____

C. What is the solvent? _____

D. How does the solute dissolve in the solvent? _____

_____

_____

E. What happens to the boiling point of the solvent? _____

F. What happens to the freezing point of the solvent? _____

2. Together chose another solution and discuss how to complete the sentences (the student should fill these in).

A. The solution we chose is _____.

B. The solution does _____.

C. The solute is _____.

D. The solvent is _____.

E. The solute probably dissolves in the solvent by _____

_____

_____.

F. The boiling point of our solvent _____. The freezing point of our solvent _____.

Conclusion: Together, answer these questions:

How does something dissolving affect the solvent?

_____

_____

_____

_____

How do solutions affect our lives?

_____

_____

_____

_____

Home-to-School Communication:

Dear Family Partner,

Please give me your reactions to your student's work on this activity. Write YES or NO for each statement.

_____ 1. My student understood the homework and was able to complete it.

_____ 2. My student and I enjoyed the activity.

_____ 3. This assignment helped me know what my student is learning in science.

Any other comments: _____

Family Partner Signature: _____

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 2

Turn in this checklist stapled to a copy of what you have done today.

- ❑ The Solution
  - ❑ What does the solution do?
  - ❑ What could the solution be used for?
  - ❑ What is the solvent?
  - ❑ What is the solute?
  - ❑ How does the solute dissolve?
  - ❑ What things do manufacturers have to do to keep the solute dissolved?
  - ❑ Do consumers have to shake the product to keep it mixed?
- ❑ It's properties
  - ❑ Does the freezing point of the solvent change?
  - ❑ Does the boiling point of the solvent change?
  - ❑ Are there any cool or interesting properties of the solution?
  - ❑ Could you get more solute to dissolve?
  - ❑ Does temperature affect your solution?
- ❑ How are you going to show how your solute dissolves?
- ❑ How are you going to present your solution to the class?

Turn-in a completed research checklist and stapled copy of research.

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 2

Turn in this checklist stapled to a copy of what you have done today.

- ❑ The Solution
  - ❑ What does the solution do?
  - ❑ What could the solution be used for?
  - ❑ What is the solvent?
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- ❑ How are you going to show how your solute dissolves?
- ❑ How are you going to present your solution to the class?

Turn-in a completed research checklist and stapled copy of research.

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 3

Turn in this checklist stapled to a copy of what you have done today.

Your Model:

- ❑ What happens when your solute dissolves?
  - ❑ What happens first, second, third?
  - ❑ What is the nature of the solute? (ionic, polar covalent, non-polar covalent)
  - ❑ What is the nature of the solvent? (ionic, polar covalent, non-polar covalent)
  - ❑ How do individual molecules of solute and solvent interact?
  - ❑ How will I show the dissolving process effectively?
  - ❑ Do manufacturers do anything to make the solute dissolve? Or keep it dissolved?
  - ❑ Have you shown every step, or have you skipped one or two?
- ❑ Should I use the compouter or something else more appropriate?
  - ❑ Do I have a way to make the model?
  - ❑ What will I attempt to show my audience about the solution?

Turn-in a completed research checklist and stapled copy of research.

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 3

Turn in this checklist stapled to a copy of what you have done today.

Your Model:

- ❑ What happens when your solute dissolves?
  - ❑ What happens first, second, third?
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  - ❑ What is the nature of the solvent? (ionic, polar covalent, non-polar covalent)
  - ❑ How do individual molecules of solute and solvent interact?
  - ❑ How will I show the dissolving process effectively?
  - ❑ Do manufacturers do anything to make the solute dissolve? Or keep it dissolved?
  - ❑ Have you shown every step, or have you skipped one or two?
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  - ❑ Do I have a way to make the model?
  - ❑ What will I attempt to show my audience about the solution?

Turn-in a completed research checklist and stapled copy of research.

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 4

Turn in this checklist stapled to a copy of what you have done today.

Presentation:

- ❑ Planning
  - ❑ Who is saying what?
  - ❑ The five mintues is equal on both sides?
  - ❑ Do you have a unique/creative presentation style?
- ❑ Presenation
  - ❑ You've made all of the visuals or you have a plan to finish them tonight
  - ❑ What happens if one of you is gone the following day?
  - ❑ You run through it and take no more than five minutes

Project:

- ❑ Turn-in Project
  - ❑ All of your research is put together
  - ❑ You know what you are turning in
  - ❑ Both of you have a copy in case one of you is absent.

Turn-in a completed research checklist and stapled copy of what you have accomplished today.

Names: _____ & _____

Period: _____ Date: _____

Research Checklist Day 4

Turn in this checklist stapled to a copy of what you have done today.

Presentation:

- ❑ Planning
  - ❑ Who is saying what?
  - ❑ The five mintues is equal on both sides?
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- ❑ Turn-in Project
  - ❑ All of your research is put together
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Turn-in a completed research checklist and stapled copy of what you have accomplished today.

Names: _____ & _____

Categories	Exceeds Expectations (100-85%)	Meets Expectations (84-75%)	Does Not Meet Expectations (74-50%)
Research (25 points)	❖ Uses a variety of sources (more than 3 total) ❖ Function, Identification of solvent and solute, and how solute dissolves are clearly stated ❖ Proper use of vocabulary terms ❖ Properly referenced to the source material	❖ Uses at least 3 sources ❖ Function, Identification of solvent and solute, and how solute dissolves are clearly stated ❖ Proper use of vocabulary terms ❖ Properly referenced to the source material	❖ Uses less than 3 sources ❖ Function, Identification of solvent and solute, and how solute dissolves are not clearly stated ❖ Incorrect use of Vocabulary terms ❖ Source material not properly cited
Logical Discussion of Dissolution Model (10 points)	❖ Very logical from one step to the next ❖ Adequate information provided to support why this type of dissolving would occur	❖ Clear logical progression from one event to the next; A few leaps in logic, from one step to the next ❖ Evidence is present, but not always well thought out and properly supported	❖ No clear tie from one event to the next ❖ No evidence to support reasoning ❖ Events stated that are not true or not possible (i.e. the way all compounds dissolve)
Properties (10 points)	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly. ❖ Discusses interesting properties and how those have changed due to the solution.	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly. ❖ Adds some interesting properties of the solution, but not much discussion of how they have changed.	❖ Discusses the affects of the solute dissolving to boiling and freezing points correctly.
Model (30 points)	❖ The model shows the appropriate steps and adequately shows the process of dissolving. ❖ All of the information is correct, labeled, and easily understood.	❖ The model shows the appropriate steps and adequately shows the process of dissolving. ❖ All of the information is correct and easily understood.	❖ The model shows two little of the steps and does not adequately show the process of dissolving. ❖ All of the information is correct, but difficult to understand.
Creativity of Presentation (10 points)	❖ Very organized and prepared presentation ❖ Time is shared equally by all members ❖ Both visually and audibly appealing ❖ Shows much effort was spent preparing for the oral presentation ❖ Interesting	❖ Well thought out presentation ❖ Time is equally shared by all members ❖ PowerPoint, Visuals, and voice inflection are properly used ❖ Some effort was spent preparing. ❖ Somewhat interesting	❖ Haphazard presentation ❖ Time is not equally shared ❖ Visually and audibly unpleasant due to poor planning ❖ Shows little effort in preparing proposal ❖ Not interesting
Interactive Homework (10 points)	❖ Returned before the deadline with parent signature	❖ Returned on the deadline with parent signature	❖ Returned after the deadline with parent signature
Group Participation (15 points) [awarded by group members]	❖ Shared workload equally ❖ Was Helpful ❖ Would work with each other again	❖ Most of the work was shared equally ❖ Was somewhat helpful ❖ Would work with each other again	❖ The work was not shared equally ❖ You were not very helpful ❖ The group members would probably not work together again.

Grade: _____ for _____ Grade: _____ for _____

Stage 3: Learning Activities

(Steps taken to get students to answer Stage 1 questions and complete performance task)

Day 1

- Introduce the Unit
  - EQ's
  - Discuss what we will be doing
  - Discuss the Advanced organizer seen earlier in the year.
- Start Notes: Solutions

Day 2

- Bearly Alive:
  - In this less, students focus on the concentration of solutions. Gummy bears are placed in solutions containing different concentrations of sugar and salt overnight. The bears become bloated or shrink in size depending on the solution they are placed in. Students are introduced to basic solution vocabulary. They discuss the diffusion of water in and out of the gummy bears and relate it to the concentrations of the different sugar and salt solutions.

Day 3

- Mixing it Up!
  - Students investigate solubility. They mix a gas (CO_2), three liquids (methanol, isopropyl alcohol, and oil), and a solid (copper sulfate) with water. Students observe that a homogeneous solution forms for all of the sixtures except for oil and water. In addition, for three of the mixtures a second distinct phase remains. Using their observations, students consider what dissolving means and describe homogeneous solutions from a molecular perspective. The lesson ends with a discussion of how toxins dissolve in our bloodstream and are carried throughout our body

Day 4

- Finding Solutions
  - Students will be guided to use two different methods to create solutions – by weighing the solute, and by dilution of an existing solution. The changes in concentration will be tracked visually by using a solute that already contains a dye – Kool-Aid® drink mix.

Day 5

- Solution Calculations and Concentration
  - Holey Moley
    - Students will practice calculations to determine the molarity of a solution prepared by dissolving a known quantity of a solute in a specified amount of solvent. They then consider how to determine the concentration of a solution upon dilution.

Day 6

- Is it toxic?
  - Students are presented with 3 solutions, which are labeled simply as solutions #1, #2, and #3. Each contains a salt dissolved in water (KCl, NaBr, or NaOH). The concentration of each is 1.0 mole salt per liter. Students are challeneged to use what they know about molar mass to identify which of the 3 solutes is in each of the 3 solutions. The goal is to predict which is safe to drink.

Day 7
- Students will take additional notes about types of solutions and colligative properties.
- Teacher will show and discuss the Electrolyte-Non-electrolyte Lab as a demonstration.
- Solubility Curves?

Day 8
- Introduce the unit project

Day 9, 10, & 11
- Project Days 2-4 Research and Model Design.

Day 12-13
- Project Presentations

Day 14
- Test Review

Day 15
- Solutions Test

Monday	Tuesday	Wednesday	Thursday	Friday
24 Introduce Unit and Discuss Overarching Set-Up of Where solutions are and what we are talking about Start Sol'n Notes	25 Bearly Alive	26 Mixing It up!	27 Finding Solutions	28 Solution Calculations and Concentration Holey Moley?
31 Is It Toxic?	1 Notes on Types: Solutions, Colloids, Suspensions, Supersaturated Solutions And Colligative Properties	2 *Introduce the Project* Project Day 1	3 Project Day2	4 Project Day 3
7 Project Day 4	8 Presentations 1	9 Presentations 2	10 Review	11 Test Solutions