In this laboratory session you will be engaging in a variety of activities designed to teach a concept to students. Each station will be marked by a number and will provide all of the materials and equipment you will need to complete the activity. This experience is to introduce some hands-on ways to teach your students and have fun at the same time. Enjoy!!

Content for the ideas will be provided or are found in the KSAM book and you will be held responsible for these concepts on the exam.

1. Color Cyclones
2. Atomic Dimensions
3. Non-Polar Disk Game
4. Liquid Skin
5. Which is Which????
6. Little Bits
7. Warm-ups and Cool-downs

TURN IN THIS ENTIRE PACKET AS YOUR LAB REPORT
1. When food coloring was added to the test tube containing water, did the food coloring mix with the water? Describe.

2. When food coloring was added to the oil, did the food coloring mix with the oil? Describe.

3. Describe what happened when food coloring was added to the shallow dish of Half & Half. Based on your answers to questions 1 - 2, what can you conclude about the oil content of the half & half?

4. Record your observations after adding the food coloring to
   Dish 1:
   Dish 2:
   Dish 3:

5. Describe what happens when liquid detergent is added to the dishes.

6. What effect must liquid detergent have on the oil and water in milk?

7. Rank the dishes from least fat content to most fat content (1, 2, 3) or (2, 1, 3) etc.

8. In the boxes identify which milk sample is represented by each dish: skim, 2%, whole, half & half, or other.

Each of the following circles represents one of your labeled dishes of milk: A, B, and C.

1. Color each dish (as best you can) to record your observations of what happened to the food coloring after the liquid detergent was added.

2. On the blank lines to the right of the dishes, record your observations in written form.

3. In the box to the lower right of each dish, indicate which type of milk (half & half, whole milk, 2% milk, skim milk, or other) you think that sample was.
Atomic Dimensions

Student Procedure and Data Sheet

1. Below you will find the beginnings of an Atomic Dimension Ruler (AD Ruler). The dot represents the size of the nucleus of an atom. Remember that the nucleus is the center of an atom.

2. There are 10 dots between the first 2 lines. How many nuclei does this represent?

3. There are 5 equal spaces on your AD Ruler, how many dots do you have on the AD Ruler? How many nuclei does this represent?

4. Use the cut-out version of the ruler you find at the station for the rest of the activity.

THE AD Ruler

5. Place your AD Ruler on a piece of register tape, marking the beginning and the end of the ruler. Remember that this represents 50 nuclei.

6. Pick up the AD Ruler and lay it down again right next to your second line. Mark the other end of the ruler as you did before. You now have the length of 2 of your AD Rulers. How many nuclei does this represent?

7. Fold the register tape over at the line that represents the length of 2 of your AD Rulers. Use this length to fold over the tape until you have a length to represent 1000 nuclei. Cut the tape at that point. Explain how you did this below.

8. Explain how you might have your students produce a scale model representing the atom. (Assume you will have the students in a long hallway.) Produce a sketch to indicate how the model will look when it is completed. Use the back of this sheet if necessary.
THE NONPOLAR DISK GAME
DATA SHEET

 NAME _______________________

Record the following information in the table below:
1. Record the number of disks having their black sides up and their white sides down.
2. Record the number of disks having their white sides up and their black sides down.
3. Use the following formula to calculate the percentage of disks oriented with their black sides up and their white sides down out of the 10 total disks.

\[
\text{\% of disks with black side up} = \frac{\text{\# of disks with black side up}}{10} \times 100
\]

4. Total the numbers for # black sides up and record in the correct space at the bottom of column 2.
5. Total the numbers for # white sides up and record in the correct space at the bottom of column 3.
6. Since the total number of disks recorded in column 2 represents the number of disks having their black sides up out of 100 disks (10 trials of 10 disks), this also represents the total percent or disks oriented with their black sides up. Record this number in the correct space at the bottom of column 4.

<table>
<thead>
<tr>
<th>TRIAL 1</th>
<th>TRIAL 2</th>
<th>TRIAL 3</th>
<th>TRIAL 4</th>
<th>TRIAL 5</th>
<th>TRIAL 6</th>
<th>TRIAL 7</th>
<th>TRIAL 8</th>
<th>TRIAL 9</th>
<th>TRIAL 10</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td># OF DISKS WITH BLACK SIDE UP</td>
<td># OF DISKS WITH WHITE SIDE UP</td>
<td>% OF DISKS WITH BLACK SIDE UP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Describe the attraction of the pencil lead to the water and to the oil.
_________________________________________________________________

2. Is water a polar or nonpolar material? _________________

3. Based on your data, what conclusion can you draw about the polarity of the pencil lead?
_________________________________________________________________

4. Suggest other substances that are like baby oil or mineral oil in their polarity.
_________________________________________________________________

5. Using your knowledge of polarity, what is one reason that water beads on a newly-waxed car?
_________________________________________________________________
Liquid Skin
Data Sheet

Procedure:
1. Take a penny and place it ‘heads up’ on a paper towel.
2. Predict on the data sheet the number of drops you believe you can add before the water runs off of the penny.
3. Take the dropper with water in it and add (while counting) as many drops as you can to the penny before the paper towel underneath gets wet. Record the # drops you added. The water drops act this way because of what is called surface tension. Surface tension causes molecules to stick together.
4. Dry off the penny and place it in its original position – heads up again.
5. Repeat steps 2-4, using alcohol, instead of water and record your results. If we add soap to the water, it will break up the molecules of water. What is your prediction about the surface tension of soapy water? Record on the data sheet.
6. Repeat the process with soapy water and record your data.
7. Finally dry, then turn the penny over to the ‘tails’ side. Add drops of water as you did in step 3. Record your data.

<table>
<thead>
<tr>
<th>LIQUID</th>
<th># DROPS PREDICTED</th>
<th>#DROPS ADDED TO PENNY A</th>
<th>RANKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubbing alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soapy water</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIQUID</th>
<th># DROPS PREDICTED</th>
<th>#DROPS ADDED TO TAIL SIDE</th>
<th>#DROPS ADDED TO HEAD SIDE (from above)</th>
<th>DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

QUESTIONS:

1. Which liquid had the highest surface tension? _____________ Rank the liquids in the third column of the table with 1 being the highest and 3 the lowest surface tension.

2. Compare the drops of water added to the heads side to the number added to the tails side of Penny A. Suggest a reason for this difference.

3. Suppose you make a solution of salt water. Would it have higher, lower or the same surface tension as water? _______________ Explain your answer below.
WHICH IS WHICH?????

Data Sheet

Name __________________________

I. Record your observations below: If a thermometer is not available, record relative temperatures as much colder, cooler, same, warmer, or hot.

<table>
<thead>
<tr>
<th>OBSERVATIONS</th>
<th>TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLID PHASE</td>
<td>LIQUID PHASE</td>
</tr>
<tr>
<td>Aluminum foil</td>
<td></td>
</tr>
<tr>
<td>Aluminum foil + CuSO₄</td>
<td></td>
</tr>
<tr>
<td>Aluminum foil, CuSO₄ + NaCl (initially)</td>
<td></td>
</tr>
<tr>
<td>Aluminum foil, CuSO₄ + NaCl (finally)</td>
<td></td>
</tr>
</tbody>
</table>

II. Use your observations below to answer the questions:
1. Have any chemical reactions taken place? ________________________ If so, list the indicators of reactions that you have observed.

2. Have any physical changes taken place? ________________________ If so, describe those changes.

3. As the reaction proceeds, what happens to the color of the liquid? What does this indicate?

4. The aluminum foil is no longer aluminum metal... but there is a new metal being deposited. Describe the color of this deposit. What do you think it is?
1. Fill two cups about ¾ full of water.

2. Place one Alka Seltzer tablet on a sheet of paper. Crush the tablet with the pestle provided.

3. Assign members of your group the following tasks: 2 Dropper/observers - these will drop the tablets into the cups of water at the same time, then begin observing and watch the reaction occurring in an assigned cup; then say 'stop' when the Alka Seltzer disappears. 2 Timers – these will time the assigned reaction and compute the elapsed time for the reaction.

4. At exactly the same time, drop the whole tablet into one cup and the crushed tablet into the other cup.

5. Observe and time each cup. Record data and answer the questions below.
   1. Record beneath each cup the time required for all of the Alka Seltzer to disappear.
   2. Circle the cup in which the chemical reaction proceeded most rapidly. What evidence do you have besides the time expended? ________________
   3. Draw the bubbles you observed coming from the effervescent material in each cup.

4. What is the independent variable in this experiment? ________________
5. What is the dependent variable in this experiment? ________________
6. Write an hypothesis reflecting the relationship between the independent variable and the dependent variable in the form 'As x increases/decreases, y increases/decreases.'
Warm-ups and Cool-downs

Data Sheet

1. Complete the table, considering that the water is the ‘surrounding environment.’

<table>
<thead>
<tr>
<th>Reactants</th>
<th>Temp change by feel</th>
<th>Initial Temp</th>
<th>Final Temp</th>
<th>Temp Change</th>
<th>Did water temperature increase or decrease?</th>
<th>Endothermic or Exothermic?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate + H₂O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium chloride + H₂O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alka-seltzer + H₂O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. In an endothermic chemical reaction involving heat transfer, the temperature of the surrounding environment ________________

3. In an exothermic chemical reaction involving heat transfer, the temperature of the surrounding environment ________________

4. In the reaction involving calcium chloride and water, the heat flows from the calcium chloride to the water, therefore the energy receiver was the ________________

5. In the reaction involving Alka-seltzer and water, what was the energy giver? ________________

6. When an alcohol rub is given to a person with a fever, heat is transferred from the person to the _________________. This therefore lowers the person’s temperature. What is the energy giver, the alcohol or the person? ________________

7. When you touch an ice cube, is your finger an energy receiver or an energy giver?

8. What were the contents of the baggie and the vial in the story about climbing Long’s Peak?