Oobleck

Conceptual knowledge:
An **observation** is made directly with one of your senses: sight, hearing, smell, touch, taste, and so forth. In chemistry lab, we don’t taste things and we only smell things by wafting and we only touch things with great care. So, most of our observations come from sight or smell. Once in a while our observations come from hearing.

An **inference** is indirect - it's a conclusion that is derived directly from an observation. For example, I might **observe** that a solution in my test tube bubbled when I added another chemical. I then might **infer** that a chemical reaction occurred that caused the bubbling to occur.

**Materials needed:**
- 25.00 g white powder
- 18.0 mL green liquid
- Zip lock sandwich bag

**Equipment needed:**
- Digital balance
- Weigh boat (plastic cup)
- Graduated cylinder
- Plastic spoon

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Observations you should write:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure out and pour the correct amount of green liquid into the sandwich bag.</td>
<td>What does the liquid look like? Did you detect any odor? When you poured it, did it look thick or thin?</td>
</tr>
<tr>
<td>Next, <strong>slowly</strong> add the white powder—a very little at a time—to the green liquid.</td>
<td>What does the powder look like: chunks, crystals like salt or sugar, fine like powdered sugar, or like something else? Did you detect any odor?</td>
</tr>
<tr>
<td>Knead (squeeze) the contents in the bag—gently but firmly—to mix the substances together thoroughly making sure all of the white powder is wet.</td>
<td>What does the material feel and look like when you started? How did it change? What does the material feel and look like when you finished?</td>
</tr>
<tr>
<td>Hold up the sandwich bag with its contents in such a way as to allow the contents to flow and watch.</td>
<td>Describe how it flows? Does it flow like syrup or water or something else? Does it look sticky?</td>
</tr>
<tr>
<td>Feel the material in the sandwich bag.</td>
<td>What does it feel like? Does it feel one way when you lightly touch it and another way when you squeeze it quickly?</td>
</tr>
</tbody>
</table>

You may discuss what you are seeing and what you think that it means but on your worksheet, write your OWN PERSONAL observations in class. Your inference(s), and a conclusion(s) are homework.

Take your Oobleck home with you to complete this assignment and have the worksheet ready to turn in when class starts tomorrow. Be careful about leaving the sandwich bag in your book bag or purse. If the bag get's punctured, Oobleck is hard to clean up!
Observations – Activity #2
In the exercise below write only in pen. Your teacher will tell you what to do. If you still need help distinguishing between observations, inferences, and conclusions study the definitions on the back of this handout.

Summary of Observations from your lab notebook: All observations should be written (recorded) in black or blue pen in your lab notebook. Observations must be written in very detailed form for every stage of the work from starting materials to product. Measurements are observations and all measurements must include all significant digits and units of measurement. In the space below, summarize the observations that you made. Use all the space available. Be as complete as the space below allows.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Inferences: Reasonable conclusions based on observations.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Conclusion (solid or liquid and why): A final summary of how you have attempted to accomplish your goal and what results or answers have you come to after thinking about your experiment. In this particular case, you should address the following question, “Was the material you formed a solid, a liquid, or something else?” It is not enough to simply answer that question. You must a) summarize your lab results, b) answer the question, c) explain the differences that exist between solids and liquids, and d) reach a conclusion about whether your product is a solid or liquid (or something else), and e) justify your answer (which means to offer an argument for why you conclusion is the correct one).

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
Below are some formal definitions and examples of observations, inferences, and an example of a conclusion. These examples are NOT examples of the observations, inferences, or conclusion that you might draw in the activity on the reverse of this sheet, so you CANNOT simply copy these and expect to get a passing grade. These are from a completely different activity. If you take time to STUDY and THINK about the observations, inferences, examples and the conclusion example below, it WILL give you a better understanding of what these should be.

<table>
<thead>
<tr>
<th>Observations</th>
<th>Inferences</th>
<th>Conclusions</th>
</tr>
</thead>
</table>
| **Definition:** Receiving knowledge of things around you through the senses*, or the recording of data (including measurements) using scientific instruments. The term may also refer to any data (measurements or calculations from measurements) collected during this activity.  
*You have more than 5 senses. | **Definition:** Drawing reasonable conclusions based on observations; or by predicting the next logical step in a clear pattern. | **Definition:** A final summary of how you have attempted to accomplish your goal and what results or answers have you come to during your experiment. A conclusion brings together all the strands you've been working with, explains the applications or implications of the results, and brings your work to an appropriate ending. |

**Examples of observations:**
- The 1st chemical that we used was a dark red powder. We measured out 3.49 g of this powder.
- The dark red powder was dissolved in 24.8 mL of distilled water. It difficult to dissolve. It took ~15 minutes to dissolve the powder on the stirring apparatus.
- When the 2 solutions were mixed the solution/mixture turned white. After a few minutes it appeared that a white powder in the liquid had started to settle to the bottom. But all of the white did not settle to the bottom.
- After filtration and drying the product was weighed at 6.44 g. After subtracting the mass of the filter paper it was determined that the actual yield was 2.14 g.

**Examples of inferences:**
- When the 2 liquid solutions were mixed together a solid was produced so a chemical reaction occurred.
- Because some of the white in the mixture did not settle to the bottom that remaining white was a suspension (tiny particles of the stuff that settled to the bottom remained suspended in the liquid).
- Because some white material settled to the bottom that material was a chemical product of the reaction.
- Because the white product settled to the bottom that product was less soluble in the liquid than the 2 reactants (reactants are the starting chemicals).

**Examples of a conclusion:**
- Two dry chemicals were dissolved in distilled water in separate containers. Those 2 solutions were then mixed together and a white suspension resulted. After settling, a solid chemical product (white powder) was collected. The results demonstrate that a precipitation reaction and double replacement reaction occurred. This was a double replacement reaction because usually only double replacement reactions produce a product with description (a white powder indicate the formation of an insoluble salt).