

## Forensic Chemistry

Somebody eating at a popular restaurant suddenly fell ill. A suspicious white powder was found on the victim. As chief crime scene investigator, your job is to identify the white powder that was collected on the victim. It may be the same substance as one of the 5 different powders that are stored at the location. This substance may be the cause of the illness or it may simply be a harmless, edible cooking ingredient. You decide to compare the physical and chemical properties of the unidentified powder to the properties of the 5 known powders. Once the mystery powder is identified, you will be able to solve the crime!

### **THIS IS A FORMAL LAB – IT WILL BE MARKED. (Communication)**

You will need to rewrite these subsections EXCEPT 'materials & method'. For that simply write, "see attached sheet" and make sure you attach this sheet at the end of your lab.

Refer to 'lab report checklist' and the full handout on how to write a formal lab. Both can be found on the 'Other Useful Notes' section of my website. [www.hudeckijrsci.weebly.com](http://www.hudeckijrsci.weebly.com)

#### Purpose:

Copy the purpose listed on page 190 on text.



#### Hypothesis:

Not applicable for this lab.

#### Materials & Method:

- |                      |                            |
|----------------------|----------------------------|
| - Safety goggles     | - distilled water          |
| - Table salt         | - toothpicks               |
| - Baking soda        | - scoopula                 |
| - Chalk              | - magnifying glass         |
| - Sodium nitrate     | - spot plate               |
| - Sodium thiosulfate | - Dilute hydrochloric acid |

1. For each of 5 substances, record the WHMIS warnings. (there are 8 possible ones). Show teacher.
2. Put a small amount (a scoop with the scoopula) in a **labeled** piece of filter paper.
3. Look at each sample using your eyes and the magnifying glass. You should be able to fill in the observation chart with the 1<sup>st</sup> four properties.  
Clarity = how 'see through' it is. ie: very clear, somewhat clear and not clear at all.
4. Using the hand lens and a toothpick, count out roughly 20 crystals of which ever solid appears to be salt. Measure out roughly equal amount of each of the other solids. Place each sample in a different well of the spot plate. Put them in order # 1 → 5 going left to right. (you may wish to make a paper 'map' as well so you don't get confused).
5. Add water to each sample. Observe what happens to the solids and record in table. Do you need to mix with toothpick to get them to dissolve? (**somewhat soluble**) ...or do they dissolve on their own (**very soluble**)...or do they not dissolve (**insoluble**). HINT: use a different toothpick for each sample. Do not cross-contaminate.
6. If you have more wells, keep going. If not, rinse, dry and start again.
7. Repeat steps 4 & 5 using hydrochloric acid instead of water. Look at solubility and look carefully in

- case there are additional observations that can be made. Record your observations in the table.
8. Get a sample of the mystery powder. Make the same set of observations for the mystery powder. Add one more row to your observation table and record your observations.

Observations:

Include a neat version of your observation chart. Accuracy in your observations is important. **(Inquiry)**

Conclusion:

Use the evidence (observations) collected to identify the mystery. Write your conclusion in a full sentence.

Analysis:

1. You mixed all powders with water and a weak acid. Did you observe any chemical reactions? For each example, state the clue that helped you decide it was a chemical change. **(K & U)**
2. Which properties (physical or chemical) were most useful in identifying the mystery powder? Make sure to explain your answer. **(K & U)**
3. How confident do you feel about your identification of the sample. Explain your answer. **(Application)**
4. What other physical properties could have helped to identify the mystery powder? Why were these properties not tested in the lab? **(Application)**
5. You find a puddle of a clear, colourless liquid on your driveway. It is either water, potassium iodide (KI) or spilled battery acid from your car. How can you safely test the liquid to determine its identity. Explain how you can interpret your observations. Use what you have learned from this lab and from class. **(Application)**

Criteria	Level 1	Level 2	Level 3	Level 4
<b>Communication</b> - work in formal lab style.	Attempts to follow formal lab format. Frequent errors.	Follows proper lab format with some errors	Mostly follows proper lab format	follows proper lab format with no errors.
<b>Note: mark will be lowered by a full level if rubric not handed in.</b>				
<b>Inquiry</b> - able to observe and record accurately	Attempts to record observations . Frequent errors.	Completes observation chart with some/minor errors.	Completes observation chart with no errors. Brief.	Completes observation chart with no errors. Very detailed.
<b>K &amp; U</b> - understands physical/chemical properties.	Attempts to identify phys/chem properties. Errors.	Identifies phys/chem properties with minor errors	Identifies phys/chem properties without errors	Identifies phys/chem properties without errors - detailed
<b>Application</b> - Can apply new knowledge	Difficulty applying new knowledge. Significant errors.	Applies new knowledge with some errors.	Applies new knowledge with minor error/omissions	Applies new knowledge logically - detailed