**The Magic of Chemistry – Lab Activity - Bag of Change Score:\_\_\_\_\_\_\_\_\_\_\_**

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|  | **Not Meeting Expectations <40** | **Emerging 40 45 55** | **Developing 60 65 70** | **Proficient 75 80 85** | **Extending 90 95 100** |
| **Comp 2– I can conduct a scientific experiment obtaining appropriate qualitative and quantitative observations and present this data in an organized manner using tables, charts and/or graphs.  Results/Observations -**  Accurate/Complete/descriptive | * Most data incorrect * Missing many required observations | * Data lacks precision/accuracy * Several required observations missing | * Satisfactory representation of the data * Minor omissions in observations. Descriptions need more clarity | * Most data is accurately represented * Observations complete with some details | * Excellent and accurate representation of the data * Detailed, descriptive and complete observations |
| **Comp 3 – I can process, analyze, and evaluate results to write a conclusion and critique results/experiment design.**  **Analysis of Lab -** Complete/accurate responses to questions  Recognize and describe changes occurring as chemicals are combined. | * Several questions not attempted and most responses incomplete. * Descriptions of changes unclear. | * Responses are provided for most questions but often answers are incomplete * Recognized and described few changes. | * Responses are provided for all questions but answers sometimes incomplete/ unclear * Recognized and described some changes that occurred. | * Most questions are responded to accurately and completely answered * Recognized and described most changes that occurred. | * Questions are answered accurately, clearly and in complete sentences. * Recognized and described all changes that occurred. |
| **Evaluating -**  Critique Lab procedure & performance of lab | * Made no attempt to evaluate performance of the lab or to suggest improvements to the procedure | * A weak attempt to evaluate performance of the lab or to suggest an improvement to lab procedure | * Briefly stated one valid way to improve lab procedure or how lab could have been performed better | * Explained one valid way to improve lab procedure and how the lab could have been performed better | * Clearly described several valid ways to improve the lab procedure and outlined how the lab could have been performed better |

**Purpose:**

* To follow safe laboratory procedures
* To make detailed observations
* To observe changes when three substances are combined
* To critique the lab procedure and your performance of lab.

**Materials:   
*Safety:*** Wear safety goggles, take care not to spill blue liquid on clothing or get any chemicals near eyes or mouth. Keep the thermometer on paper towel or in bin between uses so that it does not roll off desk and break.

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| 2.5 g Chemical A – in 50 mL beaker  5 g Chemical B – in 50 mL beaker  Chemical C: Bromothymol blue solution –  50 mL of Warm Tap Water in an 80 mL beaker 1 -dropper  Safety Goggles | 1 Ziploc bag  1 thermometer  1 - 10 mL graduated cylinder 1 – 25 mL graduated cylinder  Paper towel for spills/to clean thermometer |

**Procedure / Observations:**

1. Put on your ***safety goggles***, remove loose clothing, and tie back hair if necessary. Ensure workspace is ready before beginning lab. **Read entire procedure before proceeding. Follow safety rules and lab guidelines!**
2. Pick up one bin containing materials plus two paper towels. One towel to be used to clean thermometer between uses. The other to clean up accidental spills.
3. **Observations**: Describe and record the properties of chemicals A, B and C. Observations should include the ***colour***, ***physical*** ***state,*** and ***appearance*** (granular, salt like, powder like, flacky, translucent, opaque, murky, clumpy, clear etc). Write initial observations in table 1.
4. **Put 50 mL of warm tap water into the 80 mL beaker**.
5. Measure 2 mL of chemical C using the 10 mL graduated cylinder and dropper. Pour measured chemical C into the 80 mL beaker containing the warm tap water. Swirl to mix. Measure the temperature.   
   Record observations in table 2 in the results.
6. Measure 20 mL of the chemical C mixed with tap water using the 25 mL graduated cylinder. Pour this into the 50 mL beaker containing chemical A. Gently swirl contents in beaker A for 1 minute to dissolve chemical.
7. Use the thermometer to measure the temperature of the solution in beaker A. Record temperature and observations in table 3. Describe all changes you witnessed after 20 mL of water mixed with chemical C were added to chemical A.
8. Clean the thermometer tip and place in bin or on paper towel until needed again.
9. Measure 20 mL of the chemical C mixed with tap water using the 25 mL graduated cylinder. Pour this into the 50 mL beaker containing chemical B. Gently swirl contents in beaker B for 1 minute to dissolve chemical.
10. Use the thermometer to measure the temperature of beaker B. Record temperature and observations in table 3. Describe all changes you witnessed after 20 mL of water and chemical C are added to chemical B.
11. Open the Ziploc bag and carefully pour contents of beaker A followed by the contents of beaker B into the Ziploc bag. Undissolved solid chemical might remain behind in beaker A. Don’t worry about this.
12. Immediately seal the bag, observe, and record all changes in table 4. Be specific.
13. After one minute, open the Ziplock and measure the temperature of the liquid solution. Be sure to completely immerse tip of thermometer in liquid. Record the final temperature in table 4.
14. You have completed the bag of change experiment.

**Clean up**

1. Open the Ziploc bag and carefully pour its contents into the sink and rinse down drain. Place the empty Ziploc in the garbage bin. Then rinse all glass wear with water. Place all rinsed glass wear back in your bin and return your bin and materials to the back bench. Wipe your work area clean with a damp paper towel. Place all used paper towels in the compost.
2. Wash your hands. Return your safety goggles.
3. Complete lab write-up together and submit!

**Results:**

***Table 1: Initial Chemical Observations- Describe physical properties of each chemical!***

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| --- | --- | --- |
| **Chemical A**  Colour:  **State**:  Appearance of Substance | **Chemical B**  Colour:  **State**:  Appearance of Substance | **Chemical C: Bromthymol Blue**  Colour:  **State**:  Appearance of substance (clarity): |

|  |
| --- |
| ***Describe the appearance of water after chemical C is added:***  ***Initial temperature of tap water combined with chemical C: °C***  ***(250 mL beaker)*** |

**Table 2: Observations of warm water and chemical C in 80 mL beaker**

**Table 3:** **Observations of Chemical A and Chemical B mixed with Water/chemical C**

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| --- | --- |
| **OBSERVATIONS:**  *Chem A mixed with water/chemical C*  *Describe any changes*  Final Temperature:  ***°C*** | *Chem B mixed with water/chemical C*  *Describe any changes*  Final Temperature:  ***°C*** |

**Table 4: Observations in Ziploc Bag – The bag of Change – Beaker A and Beaker B Combined**

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| --- |
| *After mixing Chemicals A, B, C together in Ziploc Bag*  Describe exactly what you see, feel and hear once all three chemicals are mixed and bag is sealed?  Record *final Temperature of mixture after 1 minute*:  ***°C***  What evidence was there that a gas was produced after all chemicals were combined? |

**Analysis/Conclusions/Critique:**

1. List at least two things **you actually did** to ensure safety during the lab other than wear safety googles.



1. a) What changes did you see in the appearance and temperature when chemical C + water was mixed with chemical A?

b) How could you change the lab procedure to ensure that most of chemical A dissolved into the water instead of just some?

1. a) What changes did you see in appearance and temperature when chemical C + water was mixed with chemical B?

b) Did chemical B dissolve more easily into solution then chemical A? \_\_\_\_\_\_\_

1. Describe one qualitative and one quantitative observation you made during this lab?

Qualitative Example:

Quantitative Example:

1. State **one** observation **YOU recorded** during the lab that proves undeniably that a new substance was produced as a result of mixing the three chemicals together in the Ziploc bag. How do you know the substance is something new that was not present before the three chemicals were mixed?
2. Critique your performance of the lab. What steps or actions could you have performed better? What could you have done differently so your observations and results were better?
3. If you could rewrite this lab so the lab procedure would be easier to follow, what improvements would you make? How would you change the procedure and materials used to make this a better lab? Be specific.