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

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|  | **Not Meeting Expectations <40** | **Beginning 40 45 48** | **Developing 52 63 70** | **Competent 74 80 84** | **Mastery 88 95 100** |
| **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 | * Most data is accurately represented * Observations complete with some details | * Excellent and accurate representation of the data * Detailed, descriptive and complete observations |
| **Analysis** Complete/accurate  **Understanding:**  1. Chemical vs physical change & evidence  2. Qualitative vs Quantitative  Appropriate descriptive observations | * Several questions not attempted and most responses incomplete * Responses do not demonstrate understanding of key concepts * No observations from the lab were used in the analysis | * Responses are provided for most questions but often answers are incomplete * Weak understanding of key concepts in lab * Few observations from the lab were used to explain answers | * Responses are provided for all questions but answers sometimes incomplete/ unclear * Some errors in understanding key concepts in lab * Observations from the lab were used to explain answers inconsistently | * Most questions are responded to accurately and completely answered * Understanding of most concepts in lab demonstrated * Observations from the lab were used to explain answers as required | * Questions are answered accurately, thoroughly and in complete sentences. * Full understanding of key concepts in lab demonstrated * Appropriate/ detailed observations from the lab were used to explain answers as required |
| **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 | * Clearly 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 distinguish between chemical and physical changes witnessed in lab;
* 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.

Chemical A,

Chemical B

Chemical C: Bromothymol blue solution - **acid (yellow)/base (blue) indicator**  
1 Ziploc bag

1 50 mL beaker

Water

**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. **Observations**: Describe and record the properties of chemicals A, B and C. Observations should include the ***colour***, ***physical*** ***state,*** and ***texture*** (granular, salt like, powder, flacky etc).

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| **Chemical A**  Colour:  State:  Texture: | **Chemical B**  Colour:  State:  Texture: | **Chemical C: Bromthymol Blue**  Colour:  State: |

1. Pour the contents of Beaker A and B into your Ziploc bag keeping the chemicals ***separated***. Seal the bag.
2. Open the Ziploc bag and carefully pour 10 drops of bromothymol blue onto each of the two chemicals in the Ziploc bag. Immediately seal the bag.
3. ***Record observation in provided table that follows.***
4. Add 15 mL of water and then gently squeeze the bag in various places to ***mix all three chemicals*** (being careful NOT to tear the bag). ***Record and further temperature changes and all other changes that occur in the Observations box that follows***. CAUTION! Unseal the bag if it becomes too inflated.
5. ***List all observations in the space provided below!***

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| **OBSERVATIONS:**  *Chem A mixed with \_\_\_\_\_ of Chem C:*  Temperature: Warm or Cold (circle one)  Colour of dissolved solution: | *After mixing Chem A, B, C:*  Describe exactly what you see, feel and hear once all three chemicals are mixed?  What evidence is there that a gas is produced? |
| *Chem B mixed with \_\_\_\_\_ of Chem C :*  Temperature: Warm or Cold (circle one)  Colour of dissolve solution: |

1. When you are finished, open the Ziploc bag and place it upright in the garbage bin. Place the graduated cylinder into the white tub of graduated cylinders. ***Return*** the dry beakers to the white bins they came from. Wipe your work area clean if necessary with a damp paper towel.
2. Wash your hands. Return your safety goggles.
3. Complete chemical and physical changes checklist (check off only things you observed during lab!)

**Chemical and Physical Changes Decision Checklist**

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| --- | --- |
| ***Chemical Change***  A new substance is created – MUST BE CHEMICAL  The change is not reversible  There is a change in colour  Gas bubbles are present  Heat, light or smoke are released  There is a change in odour  A participate forms (solid) | ***Physical Change***  No new substance was created – MUST BE PHYSICAL  The change can be reversed  The substances underwent a change of state (eg. solid, liquid, gas) **due to heating or cooling**  The change is ONLY in appearance or form of the material  There is ONLY a change in physical properties like texture, shape, or size |

**Analysis (Refer to notes/electronic devise/and lab observations/checklist to complete) :**

1. List at least three things you did to ensure safety in your work area:



1. Both define and then give an example of a ***qualitative observation you made during the lab***?
2. Both define and then give an example of a ***quantitative observation made during the lab***?
3. Were your observations in this lab mainly qualitative or quantitative? Explain using observations made during the lab and the above definitions.
4. Define ***chemical change***? In general, what changes are evidence of a chemical change?
5. Define ***physical change***? In general, what changes are evidence of a physical change?
6. List one observation **YOU recorded** during the lab that is evidence that a ***chemical*** change occurred as a result of mixing the three chemicals. **Explain why** you think this is evidence for a chemical change?
7. Choose 1 observation YOU made of ***physical*** changes that occurred as a result of mixing the chemicals. Explain why you think it is a physical change based on the definitions above and the observations you made.
8. 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?
9. 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?
10. Ask 1 good question about either something you observed in the lab or anything in general to do with the concepts of chemical and physical change.
11. Why does the bag inflate? What causes bubbles to form?