**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** |
| **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 | * 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  3. 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 distinguish between qualitative and quantitative observations
* 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.

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| 2.5 mL Chemical A – in 50 mL beaker  2.5 mL Chemical B – in 50 mL beaker  Chemical C: Bromothymol blue solution - **acid (yellow)/ base (blue) indicator** Room Temperature Tap Water in 250 mL Beaker | 1 Ziploc bag  1 thermometer  1 - 10 mL graduated cylinder  2- stir sticks (rinse between uses) |

**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 beakers containing chemical A and B. Chemical C is an acid/base indicator located in your bin already.
3. **Observations**: Describe and record the properties of chemicals A, B and C. Observations should include the ***colour***, ***physical*** ***state,*** and ***texture if applicable*** (granular, salt like, powder, flacky etc). Put observations in table 1.
4. Collect 200 mL of room temperature tap water in 250 mL beaker. Measure temperature of water in beaker.
5. Measure 10 mL of tap water from 250 mL beaker using graduated cylinder. Pour water into chemical in beaker A. Stir contents for 1 minute. Record temperature in table 2. Be sure to tilt the beaker so that tip of thermometer is fully immersed below water surface. Record observations table 2.
6. Put 1 mL of chemical C into beaker and stir solution for 20 seconds. Record further observations in table 2.
7. Take temperature once again and record. Rinse stir stick and thermometer.
8. Repeat steps 5 to 7 chemical in beaker B.
9. Open the Ziploc bag and carefully pour contents of beaker A followed by beaker B into the Ziploc bag. Some solid chemical may remain behind in each beaker. Don’t worry about this.
10. Immediately seal the bag, observe, and record all changes in table 3. Be specific.
11. After a two minutes, open the bag and take the temperature of the liquid solution in the bag. Be sure to completely immerse tip of thermometer in liquid. Record the temperature in table 3.
12. You have completed the bag of change experiment.
13. Open the Ziploc bag and place it upright in the garbage bin. Place your materials back in your white bin. Rinse the chemical beakers with water and empty the 250 mL beaker into sink and return to the white bins to where they came from. Wipe your work area clean with a damp paper towel.
14. Wash your hands. Return your safety goggles.
15. Complete lab write up!

**Results:**

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| ***Initial temperature of tap water: °C***  ***(250 mL beaker)*** |

***Table 1: Initial Chemical Observations***

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

**Table 2: Observations of Chemical A and Chemical B mixed with Water**

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| --- | --- |
| **OBSERVATIONS:**  *Chem A mixed with 10 mL of Water for 1 min*  Temperature:  ***°C***  *Describe any changes resulting from mixing water and chemical A.*  Colour after addition of ten drops of Chemical C and mixing:  Final Temperature:  ***°C*** | *Chem B mixed with 10 mL of Water for 1 min*  Temperature:  ***°C***  *Describe any changes resulting from mixing water and chemical B.*  Colour after addition of ten drops of Chemical C and mixing:  Final Temperature:  ***°C*** |

**Table 3: Observations in Ziploc Bag – The bag of Change**

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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 2 minutes*:  ***°C***  What evidence was there that a gas was produced? |

**Chemical and Physical Changes Decision Checklist**

Check off only things you observed during lab! Star or highlight steps where all three chemicals where combined.

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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 external 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  **A solid dissolves in a liquid** but has only changed in form **(i.e. salt in water)** |

**Analysis (Refer to results/internet/your class notes and physical vs chemical changes checklist to complete :**

1. List at least three things **you actually did** to ensure safety in your work area or during the lab:



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 you made during the lab***?
3. Were your observations in this lab mainly qualitative, quantitative or both? Explain using actual observations made during the lab and the above definitions.
4. Define ***chemical change***? What change(s) did you observe that are evidence of a chemical change?   
   **Explain why** you think these changes are evidence for a chemical change?
5. Define ***physical change***? What change(s) did you observe that were evidence of a physical change?   
   **Explain why** you think these changes are evidence for a physical change?
6. List 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. How do you know the substance is something new that was not present before the three chemicals were mixed?
7. 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?
8. 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?