**Chemical vs Physical Change Research Assignment Name(s):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**You and your partner will research chemical and physical changes to better understand these concepts, cooperatively complete the listed questions and then classify a number of examples of changes as either physical, chemical or both. You can choose to complete this assignment independently as well.**

**Learning Goals:** 1) To understand the difference between a chemical change and a physical change and be able to explain precisely which observations are evidence to support the type of change. 2) To explain the difference between reactants and products in a chemical reaction and which substances produce the changes observed (such as bubbling or solid formation). 3) To recognize why a chemical change is either endothermic or exothermic.

***Research online and use your textbook to complete the following questions:***

1. **a) Chemical vs physical changes: How does one distinguish a physical change from a chemical change? /2**

**b) What evidence do you look for a chemical change? State at least three things to look for. /3**

**c) What evidence do you look for if it is a physical change? State at two three things to look for. /2**

1. **When a chemical change occurs what does it mean that chemical bonds break and new substances are formed?** Explain using the chemical reaction shown below from the **“freezer beaker”** demo performed in class. *A chemical reaction shows the chemical composition of all the substances before and after a chemical change.* ***/1***

**Reactants yields Products**

**Ba(OH)2 ·8H2O(s) + 2 NH4Cl(s) 🡪 BaCl2(s) + 10 H2O(l) + 2 NH3 (g)**

1. Name the compounds in the chemical reaction on the previous page. State the physical state of each compound in the chemical reaction. (i.e. (s) solid; (g) gas; (l) liquid; (aq) aqueous- solid dissolved into solution. You may need to look up some of the chemical names online!
2. Give the name of each r**eactant**: **Ba(OH)2 ·8H2O = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1  
     
    NH4Cl = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1**
3. **What were the states of each of these substances before they were mixed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1**

**What did each reactant look like before being mixed together? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/1**

1. What are the names of the three **products**?  **BaCl2 =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ H2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
    NH3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /3**
2. **What observation did you make during the demo that shows that a gas was produced? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Which product in the chemical equation is a gas?**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /2**

1. **Which substances are responsible for the creamy white liquid form of the mixture after the reaction has taken place?**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1
2. **Was this chemical reaction exothermic or endothermic?** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1  
     
   **What specific observations made during the demo are evidence for this?**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1  
     
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **a) What is the difference between an endothermic chemical reaction and an exothermic chemical reaction? How do you know if a chemical change is endothermic or exothermic?** /2

**b) Give one example of each that you find on the internet not already mentioned here or in class activities.** /2

|  |  |
| --- | --- |
| Example of Exothermic Reaction | Example of Endothermic Reaction |
|  |  |

1. **a) What new substances were produced during the elephant toothpaste demo (refer to notes taken during demo)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ /1  
   b) What did you observe in this reaction that shows that the changes seen were chemical? /1**

**For the following situations is the change physical/chemical or both? Use the internet to help explain. /8 Marks**

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
|  | **Observation** | **Type of Change  (circle one)** | **Explain Using Evidence or State a Reason for your choice based on your understanding of physical vs chemical changes.** |
| 1. | sugar dissolves in a hot cup of tea | physical chemical both |  |
| 2. | Raw eggs are cooked on the stove | physical chemical both |  |
| 3. | water drops form on the bathroom mirror during a shower | physical chemical both |  |
| 4. | a piece of chalk breaks when dropped | physical chemical both |  |
| 5. | a piece of toast is burned | physical chemical both |  |
| 6. | an iron hinge rusts over several years | physical chemical both |  |
| 7. | an ice cube melts after it is taken out of the freezer | physical chemical both |  |
| 8. | a candle disappears as it is burned while wax pools below the candle | physical chemical both |  |