

EXPERIMENT #1: $\text{NH}_4\text{NO}_3 + \text{water} \rightarrow \text{NH}_4^+ + \text{NO}_3^-$

You will need: Ammonium nitrate, tap water, ziplock bag (sandwich size), graduated cylinder

* *Wear chemical resistant goggles!*

- a) Weigh out 10 grams of ammonium nitrate directly into the Ziplock plastic bag.
- b) Using a graduated cylinder, measure out 20 mL of water.
- c) Quickly, pour the water into the bag of ammonium nitrate, and seal the bag (try to remove excess air before sealing the bag.)
- d) Gently squeeze the bag to mix the solid and water.
- e) Feel the bag. Observe what is happening in the bag. After observing, rinse the contents down the drain while the water is running. Do not leave the sealed bag on the table—the bags leak. Throw away plastic.

1. Is this a physical or chemical change? _____
2. What evidence do you have that it is? What occurred in the bag that lets you know that new **products** (ending substances) have been formed? _____

3. What were the **reactants** (starting substances) of this experiment? _____

4. What were the **products** (ending substances) of this experiment? _____
5. Did molecules in this experiment get “divorced” (bonds were broken) or “remarried” (new bonds were created)? _____

EXPERIMENT # 2

- a) add 1/2 teaspoon of kool-aid powder to a glass or plastic beaker (50 to 500mL)
- b) using a graduated cylinder, add 30 mL of water
- c) mix gently

6. What is the Kool-aid doing in the water?

Solutions are liquid mixtures. Solutions have 2 parts. **Solute** means the solid chunks you start with. **Solvent** means the liquid.

7. In this experiment what is the solvent? _____
8. In this experiment what is the solute? _____
9. In this experiment what is the solution? _____

d) THOUGHT EXPERIMENT: Let the kool-aid solution evaporate for 2 weeks.

10. What is left in the beaker? _____
11. Where did the water go? _____
12. Was this experiment a chemical or a physical change? _____
13. How do you know? _____
14. Is this experiment reversible or irreversible? _____

EXPERIMENT # 3

- a) Get a ½ teaspoon of baking soda and place into a glass or plastic beaker (50 to 500mL)
- b) Add about 20 mL of vinegar (measure in a graduated cylinder)

15. Observe and record what happens. (one word answers are not acceptable)

16. Is this a physical or a chemical change? _____

17. What evidence do you have? _____

EXPERIMENT # 4 $\text{CaCl}_2 + \text{H}_2\text{O} \rightarrow \text{CaO} + 2\text{HCl}$

You will need: calcium chloride, tap water, ziplock bag (sandwich size), graduated cylinder

* *Wear chemical resistant goggles!*

- a) Weigh out 10 grams of calcium chloride directly into the plastic bag.
- b) Using a graduated cylinder, measure out 20 mL of water.
- c) Quickly, pour the water into the bag of calcium chloride, and seal the bag (try to remove excess air before sealing the bag.)
- d) Gently squeeze the bag to mix the solid and water.
- e) Feel the bag. Observe what is happening in the bag. After observing, rinse the contents down the drain while the water is running. Do not leave the sealed bag on the table—the bags leak. Throw away plastic.

18. Is this a physical or chemical change? _____

19. What evidence do you have that it is? What occurred in the bag that lets you know that new products (ending substances) have been formed? _____

20. What were the **reactants** of this experiment? _____

21. What were the **products** of this experiment? _____

22. What is the formula for calcium chloride? _____

23. Look carefully at the starting molecules and ending molecules. How have they changed? Did any atoms get “divorced” or “remarried”? Explain (2pts)

Endothermic reactions need heat, so the products end up cold. **Exothermic** reactions release heat, so the products end up warmer.

24. Which experiment was exothermic? _____

25. Which experiment was endothermic? _____