**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_**

**BACKGROUND INFORMATION**

* Use the wax paper to cover the balance and your workspace so that no trace materials on lab benches or balance pans contact any of the food materials. Make sure to tare the balance.
* Use the muffin cups as weigh boats to take the mass of substances safely.
* Make each solution in the beaker and then pour it into a dixie cup to allow each group member to taste the solution without spit-swapping. I have written your name on your cup to avoid mix ups!
* Take good care of your spoons! Don’t let them rest on lab tables; rinse, dry, and reuse them as necessary.

**PROCEDURE I – Try this!**

1. Obtain a 125 mL sample of the Kool-aid stock solution.
2. Use 25 mL to provide each member of your group with a small sample to taste (this is your control).
3. You should still have 100 mL left.
4. Now, let’s see what happens when we add the first ingredient, citric acid. Add approximately 1 gram to the container and dissolve. Taste it. **Here, you may consume as much as you like.**

**OBSERVATIONS I**

* Describe how your solution looks and tastes:
* This solution contained an excess of citric acid. What are some characteristics of acids?
* Dispose of the rest of your solution down the drain and rinse out your containers.

**PROCEDURE II**

1. Get a fresh, 100 mL sample of the Kool-aid stock solution.
2. Now add about 1 g of baking soda to the solution, dissolve, and taste.

**OBSERVATIONS II**

* Describe how your solution looks and tastes.
* This solution contained an excess of baking soda, which is a base. What are some characteristics of bases?
* Dispose of the rest of your solution down the drain and rinse out your containers.

**PROCEDURE AND OBSERVATIONS III**

1. What happens when you mix an acid and a base together?
2. Get another 100 mL of stock Kool-aid solution.
3. This time both the acid and base will be used. Ask your instructor to assign you **one** of the following recipes below to see if you can make a tasty beverage. **Circle** the one you will prepare:

1 gram citric acid + 1 gram baking soda (1:1) 1.5 grams citric acid + 0.5 grams baking soda (3:1)

 0.5 grams citric acid + 1.5 grams baking soda (1:3) 1 gram citric acid + 0.5 grams baking soda (2:1)

1. You will be getting information about the other three recipes from other groups. Construct a data table to record how all the recipes look and taste below.
2. Now make your solution based on your recipe and record your results in your data table. **Taste-test only a small amount; you will need to share with other groups.**
3. What differences did you notice when you added both acid and base to the Kool-aid? What do you think is causing this?
4. Do you taste one of the ingredients more than the others? What does this tell you about the relative amounts of the acid and base in your solution? Is this what you would predict from your recipe? Explain.
5. Find groups that made each of the other three recipes, taste their mixtures and record the results in your data table.
6. Did any of the combinations taste like perfect Kool-aid?
7. What should be added to each of the combinations to make it taste unlike the acid or base. Explain your choices.
8. Dispose of the rest of your solution down the drain and rinse out your containers.

**MAKING SENSE OF OUR RESULTS**

Sometimes experienced recipes help when making foods. For example, to properly make a S’more you need 2 graham crackers, 1 piece of chocolate, and 1 marshmallow.

1. If I had 3 pieces of chocolate, how many marshmallows and graham crackers would I need to make my S’mores? Explain how you knew this.
2. If I had 10 grams of chocolate would that mean I need 10 grams of marshmallow to make S’mores? Explain.
3. Here is the equation/recipe for the reaction between citric acid and baking soda:

H3C6H5O7 + NaHCO3 *→* Na3C6H5O7 + H2O + CO2

Balance the equation.

1. The ratio of the coefficients in the balanced equation matches one of the ratios that was made during Procedure 3, but it probably didn’t taste very good (check your observations). If the ratio matches, why didn’t it work?
2. Is there a unit we could use besides mass (grams) that would allow us to compare our experimental results to the balanced chemical equation? What is it?
3. If you used 0.90 g of H3C6H5O7, how many grams NaHCO3 should you add to make the reaction work best and react completely? Show your work and explain.

Before continuing, raise your hand and get approval from the instructor:\_\_\_\_

1. Get a fresh 100mL of Kool-aid stock solution and add your calculated quantities.
2. Describe how your solution looks and tastes:
3. How does the amount of fizz produced from this mixture compare to others that you have made? Why might this be?
4. Dispose of the rest of your solution down the drain and rinse out your containers. All paper/plastic products can be thrown away.

**FOLLOW-UP QUESTIONS**

1. There was an accident in the lab and someone spilled a full, 150g bottle of phosphoric acid (H3PO4). How many grams of sodium hydroxide am I going to need to neutralize the acid and make the spill safe for disposal? The UNBALANCED reaction equation is below.

H3PO4 + NaOH 🡪 Na3PO4 + H2O

1. A chemical reaction producing CO2 gas as a product, used in the making of bread, beer, and wine, is alcohol fermentation catalyzed by yeast or some forms of bacteria. In this reaction yeast breaks down sugar into ethanol and carbon dioxide as follows.

C6H12O6 + catalyst 🡪 2CH3CH2OH(l) + 2CO2(g)

If I want to produce 10.00g of CO2, what mass of sugar would I have to start with?