

Name _____ Period ____ Date _____
 Reaction of Acetic Acid (Vinegar) with Baking Soda Chemistry

Purpose: To determine the theoretical yield of carbon dioxide from the chemical reaction which occurs when acetic acid is added to baking soda, and to compare this value to the experimental value.



Procedure:

1. Obtain a 24 well plate. Have each person in your group take the mass of this plate.
2. Fill well C-4 approximately half full of baking soda.
3. Have each person in your group take the mass of the plate + baking soda.
4. Obtain two micropipets filled with acetic acid. Place them in well B-3 and D-4
5. Have each person in your lab group take the mass of the plate + baking soda + acetic acid two times
6. Add drops of acetic acid from the micropipets in well B-3 and D-4 to the baking soda in well C-4 until all signs of reaction have ceased.
7. Note in the observation section below what you observe happening as you add acetic acid to baking soda.
8. Replace the pipets in well B-3 and D-4, and have each person in your group take the mass of the plate + acetic acid + reaction mixture.
9. Rinse the plate with cold water and turn it upside down on a paper towel.

Data: Balance # _____
 Student Name _____

	1		2	
	1a	1b	2a	2b
mass of 24 well plate				
mass of 24 well plate + baking soda				
mass of 24 well plate + baking soda + acetic acid				
mass of 24 well plate + acetic acid + reaction mixture				

Observations:

Calculations:

A. Average masses and absolute uncertainties:

24 well plate

_____ ± _____
 w. plate + b soda + acid
 _____ ± _____

24 well plate + baking soda

_____ ± _____
 w. plate + acid + reaction mixture
 _____ ± _____

	Mass of baking soda	Moles of baking soda
Equation		
Substitution		
Answer		

Information: Gas evolved from this reaction is carbon dioxide.

	Mass of carbon dioxide lost during reaction	Moles of carbon dioxide lost during reaction
Equation		
Substitution		
Answer		

Mole ratio = $\frac{\text{mole CO}_2 \text{ lost}}{\text{mole NaHCO}_3 \text{ reacted}}$ = _____

Calculate the Percent Error

$$\text{percent error} = \frac{(\text{experimental value} - \text{theoretical value})}{\text{theoretical value}} \times 100$$

Error Analysis

	Average Mass	Absolute Uncertainty	Maximum Mass	Minimum Mass
24 Well Plate				
Well Plate + Baking Soda				
Well plate + Baking Soda Acetic Acid				
Well plate + Acetic Acid Rxn Mixture				

Calculate the maximum and minimum values for the theoretical and actual yields of carbon dioxide

	Maximum Value	Minimum Value
Mass of baking Soda		
Moles of baking soda		
Moles of carbon dioxide		
Theoretical Mass of carbon dioxide		
Experimental Mass of carbon dioxide.		

G. Determine the maximum percent error of carbon dioxide production. Show the equation and substitution.

Calculate the minimum percent error. Show work.

H. Would the following experimental conditions cause an Always Larger (AL), Sometimes Larger (SL), Always Smaller (AS) or No Effect (NE) on the experimental value of carbon dioxide mass?

_____ Some of the reaction mixture overflows off the 24 well plate.

_____ You fail to record the "24 well plate, baking soda and acetic acid mass" to the nearest 0.01 g.

_____ You forgot to return the pipettes to the well plate for the final mass.

_____ Your balance was never zeroed during the experiment.