Rockets, Reactions and Ratios Worksheet

Data Table A1: Test Trials

Testing Data – up to four trials						
Trial	Mass of Baking Soda (Sodium Bicarbonate)	Mass of Rocket	Ratio (Rocket Mass divided by Baking Soda Mass)	Time (How long it took before the canister popped)	Did it Clear a Meter? (Y/N)	Observations
1						
2						
3						
4						

Additional Observations and Notes:

Data Table A2: Final Competition

Final Measurements to be Tested in the Class Competition	Trial 1	Trial 2
Baking soda mass	g	g
Mass of rocket	g	g
Ratio (rocket mass divided by the baking soda mass)		
Estimated time from capping to explosion from trials	s	s

Rockets, Reactions and Ratios Worksheet, cont.

Data Table B1: Group's Launch Data

Final Measurements	Trial 1	Trial 2
Baking soda mass	g	g
Mass of rocket	g	g
Ratio (rocket mass divided by the baking soda mass)		
Approximate time from capping to explosion	s	s
Clear meter? Y/N		

Data Table B2: Raw Data from Class Testing

Group Name	Trial 1 or Trial 2	Rocket Mass (g)	Baking Soda Mass (g)	Ratio of Rocket Mass to Baking Soda	Time (s)	Clear meter? Y/N	Description of Rocket

Post-Lab Analysis and Calculations

1. What was the winning group's ratio? Are there other features of the winning rocket that may have contributed to their success?

2. Using observations from lab and your answers in Table 1, from the *Prelab Questions*, what compounds are possible products of acetic acid and sodium bicarbonate? Why? What evidence supports your claims?

3. The reaction of acetic acid and sodium bicarbonate involves a double replacement that is immediately followed by the decomposition of an acid. Using your previous work, write the following chemical equations. Include states of matter (s for solids, aq for aqueous, l for liquids, etc).

    a. Double Replacement: _____

    b. Decomposition: _____

    c. Overall:_____

4. Vinegar is a solution of approximately 5% acetic acid in water. This is a volume percent (v/v) which means there are 5 mL of acetic acid per 100 mL of vinegar. The density of acetic acid is 1.05 g/mL. Use stoichiometry to determine how many grams of acetic acid are in 15.0 mL of vinegar.

5. What are the molar masses of the two reactants, acetic acid and sodium bicarbonate? Show all work.

6. Using stoichiometry, determine the amount of baking soda, in grams, needed to react with the grams of acetic acid in 15.0 mL of vinegar. Show all work.

7. Was the amount of baking soda your group used in the competition limiting, excess, or the exact amount?

    a. If the baking soda was limiting, how much more was needed to use up all of the acetic acid? Show your work.

    b. If the baking soda was excess, how many grams were in excess? Show your work.

8. Some groups were able to be successful, even though baking soda was limiting. Why would this occur?