

Gas Lab name: \_\_\_\_\_

40/1200

Chemists often need to determine exact amounts of reactants and products to produce efficient and cost effective reactions. Proper amounts of chemicals, for instance, need to be placed into a car air-bag to insure that it inflates to the proper size and pressure so that it works, rather than pops" when you hit it, or possibly does not inflate enough and you end up hitting the steering wheel.

We will be using baking soda & vinegar, which really are sodium hydrogen carbonate and acetic acid solution. When combined they will react and form sodium acetate in aqueous solution, along with some water and carbon dioxide. Your job it to measure the proper amount of baking soda to produce enough carbon dioxide gas to inflate a zip-lock bag without popping it. We'll need to use Stoichiometry to do this. Then we'll add 60 mL of the vinegar which enough to finish the reaction.

PROCEDURE	
A	write the word equation for this chemical reaction.
B	write the balanced chemical equation with phases for this reaction
C	Using stoichiometry, determine mine how many moles of carbon dioxide will take to fill a zip lock bag that is 0.94 L. Take into consideration the air temperature (in Kelvin).
D	STOP. have teacher check A, B, and C. Teacher checks off before you move ahead
E	Get your goggles on now. Obtain a zip-lock bag and a twist tie. Place into one corner of the bag the baking soda you need and tie it off so that it will stay in that corner until you are ready for it.
F	Measure out 60 mL of vinegar and put this into the other corner of the zip-lock bag. Make sure that the two reactants DO NOT TOUCH until you are ready for them later on.
G	Carefully squeeze out as much air as possible from the plastic bag, zip the bag closed

**STOP.**

Wait until you are told to mix the chemicals. We will do one team at a time in front of the room, on the "PODIUM BEHIND THE SAFETY GLASS". If you have time now, proceed to the word problems on the other side. Use loose leaf paper, be neat. Paper is cheap! Knowledge is valuable.

## Gas Lab page 2 Questions for lab report - PAPER IS CHEAP!

1. State Avogadro's Hypothesis clearly. A diagram to help your definition would be wonderful, please draw something here.
2. A real gas would behave most like an ideal gas under what 3 conditions?
3. Some reasons that the behavior of real gases deviate from expected ideal gas behavior are.
4. A sample of argon has a volume of 2.05 L at 323 K and exactly 3.00 atm. If you change is condition to STP, what is its new volume? (show formula, set up, units, math, and correct significant figures in answer).

You have four gases with the conditions listed here.  
Answer questions 5-11 below using this chart.

	helium	hydrogen	carbon dioxide	methane
volumes	5.00 L	2.00 L	2.00 L	1.00 L
temps	273 K	0°C	273 K	293 K
pressures	50.5 kPa	101.3 kPa	760 mm Hg	1.15 atm

5. Which of these four gases is at STP?
6. Which of these four gases has the highest pressure?
7. How many particles in the hydrogen sample?
8. How many particles in the carbon dioxide sample?
9. Which of these gases have equal temperatures AND equal pressures?
10. Which of these four gases has the lowest pressure?
11. Which of these four gases has the kinetic energy (and explain how you know)?

Into your questions, fit four "L" shapes for graphs on one side of one piece of loose leaf paper with room for labels.

Title them with the titles given in #12, - #16 below.

Label the axes as indicated.

Draw the BEST FIT LINE to indicate that relationship, as it applies to gases.

Finally, tell if each of the graphs shows direct, inverse, reverse, or indirect proportionality.

- 12. temperature as a function of volume
- 14. volume as a function of pressure
- 15. pressure as a function of temperature
- 16. volume as a function of temperature

Use T, V, and P for axis labels. Draw straight or curved lines.

Requirements for Gas Lab	what goes on each page	points
Cover Page	Title and Introduction Paragraph	$1 + 2 = 3$
page 2	word, balanced equations, and Stoichiometry	$1 + 1 + 2 = 4$
as many pages as it takes to be neat and clear	11 lab questions and four graphs	$11 + 4 = 15$
last page	a complete conclusion	3
due by:		total points: 25
attach this lab handout on the back please.		