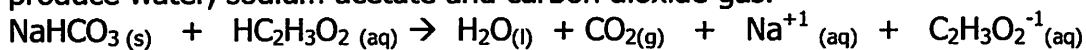


Making of an Air Bag Lab

NAME: _____ DATE: _____ PERIOD: _____

Background:

Baking soda (sodium bicarbonate) will react with the acetic acid in vinegar to produce water, sodium acetate and carbon dioxide gas.



An air bag can be produced by generating carbon dioxide gas in a zip-loc bag using the reactants listed in the above equation. The amount of carbon dioxide needed to fill the bag will be dependent upon the volume of the bag. The grams of baking soda and the milliliters of vinegar required to produce the carbon dioxide can be calculated using stoichiometry.

Procedure & Calculations:

Find the volume of a zip-lock bag by completely filling the bag with water then carefully transferring all of the water into a large graduated cylinder.

Volume of zip-lock bag in milliliters: _____

Volume in zip-lock bag in liters: _____

Calculate the moles of carbon dioxide gas needed to completely fill the zip-lock bag by using the Ideal Gas Law.

The pressure will be the barometric pressure. Change the barometric pressure to atmospheres by using the conversion of 29.92 in Hg = 1 atm.

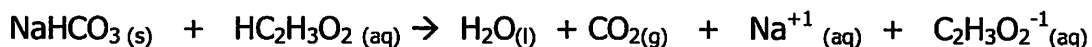
Work to change pressure:

The temperature of the gas will be the temperature of the vinegar. Take the temperature using a thermometer.

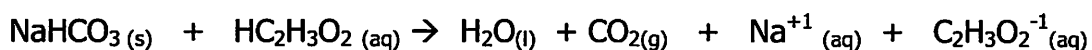
PV = nRT

Remember: R = 0.0821 L-atm/mol-K

Using the balanced equation and the moles of carbon dioxide needed, calculate the grams of baking soda needed.



Using the balanced equation and the moles of carbon dioxide needed, calculate the grams of acetic acid needed.



Using the grams of acetic acid needed, calculate the milliliters of vinegar required to give that number of grams of acetic acid. Vinegar is 5% acetic acid, meaning every 100 milliliters of vinegar equals 5 grams of acetic acid.

Teacher Sign Off: _____

Make the Air Bag:

Open the zip-lock bag and place the grams of baking soda into one corner of the bag. Place the middle of the bag between your thumb and index finger. Pinch the bag in the middle so that both corners of the bag are below the point where you are pinching the bag. Have a partner pour the milliliters of vinegar into the other corner of the bag. Squeeze the air out of the bag and then seal the bag. Remove hand and allow the vinegar and baking soda to mix. Gently shake the bag.

Rate your air bag by circling okay, good or poor. Use the follow scale below:

Full, ready to bust, over inflated --- okay

Full, but can be squeezed a little, not over inflated – good

Under inflated, can be squeezed a lot! – poor

Conclusion:

Why would it be important for a car airbag not to be over inflated or under inflated?