

Limiting Reagent

Recommended for Chapter(s): 3

Demo #010

Materials NOT in box

1. Safety goggles.

Procedure

1. (Prep) Put 100 mL of vinegar into each of the 250 mL Erlenmeyer flasks.
2. (Prep) Blow up the 4 balloons that are going to be used and then let the air out of them. (This helps loosen the balloons to make it easier to blow up during the reaction.)
3. (Prep) Place the following amounts of baking soda into 4 different balloons using the powder funnel and attach the balloons to the appropriate flask without letting the baking powder spill into the vinegar.
 - a. $\frac{1}{4}$ teaspoon Balloon for flask 1
 - b. $\frac{3}{4}$ teaspoon Balloon for flask 2
 - c. $1\frac{1}{2}$ teaspoon Balloon for flask 3
 - d. 3 teaspoon Balloon for flask 4
4. Dump the baking soda into flask 1.
5. Ask student what is going to happen when you pour the baking soda from the next balloon into the flask?
6. Pour the baking soda into flask 2. You may need to support balloon until the reaction completes.
7. Have student compare the balloon sizes to tell how much CO_2 was formed during the reaction.
8. Repeat this process for the other two flasks.

Safety

1. Wear safety goggles.

Clean Up

1. Return the materials to the cart in the demonstration library room.

Stockroom Notes

1. Throw away balloons.
2. Dump solutions down the drain.
3. Wash and dry out the flasks. Make sure that these flasks are kept for this demonstration because they are numbered.
4. If needed refill any materials that have been used up.
5. Return items to demonstration tub.
6. Return tub to the demonstration library.
 - a. Return the goggles to the goggle box.

Discussion

This demo can be used to illustrate the concept of limiting reagents. When vinegar (CH_3COOH) and baking soda (NaHCO_3) react the following reaction occurs.



In the first 2 flasks the limiting reagent is the baking soda. Therefore, as you add more baking soda the balloon gets bigger. The third flask contains approximately the right amounts of vinegar and baking soda for both reagents to be used up in the reaction. In the fourth flask the limiting reagent is now the vinegar and the balloon remains the same size as the balloon on the third flask.

Materials in box

1. 4 250 ml Erlenmeyer flask
2. 250 ml Graduated cylinder
3. 3 Measuring spoons
4. Powder funnel
5. Vinegar
6. Baking soda
7. Balloons (9 in)