QuickLAB

Wear oven mitts when handling heated items.

Limiting Reactants in a Recipe

Materials

- 1/2 cup sugar
- 1/2 cup brown sugar
- 1 1/3 stick margarine (at room temperature)
- 1 egg
- 1/2 tsp. salt
- 1 tsp. vanilla
- 1/2 tsp. baking soda
- 1 1/2 cup flour
- 1 1/3 cup chocolate chips
- mixing bowl
- mixing spoon
- measuring spoons and cups
- cookie sheet
- oven preheated to 350°F

Procedure

1. In the mixing bowl, combine the sugars and margarine together until smooth. (An electric mixer will make this process go much faster.)
2. Add the egg, salt, and vanilla. Mix well.
3. Stir in the baking soda, flour, and chocolate chips. Chill the dough for an hour in the refrigerator for best results.
4. Divide the dough into 24 small balls about 3 cm in diameter. Place the balls on an ungreased cookie sheet.
5. Bake at 350°F for about 10 minutes, or until the cookies are light brown.

Yield: 24 cookies

Discussion

1. Suppose you are given the following amounts of ingredients:
   1 dozen eggs
   24 tsp. of vanilla
   1 lb. (82 tsp.) of salt
   1 lb. (84 tsp.) of baking soda
   3 cups of chocolate chips
   5 lb. (11 cups) of sugar
   2 lb. (4 cups) of brown sugar
   1 lb. (4 sticks) of margarine

   a. For each ingredient, calculate how many cookies could be prepared if all of that ingredient were consumed. (For example, the recipe shows that using 1 egg—with the right amounts of the other ingredients—yields 24 cookies. How many cookies can you make if the recipe is increased proportionately for 12 eggs?)

   b. To determine the limiting reactant for the new ingredients list, identify which ingredient will result in the fewest number of cookies.

   c. What is the maximum number of cookies that can be produced from the new amounts of ingredients?