**Activity 4**

**Chemical Reactions at Home!**

In this activity, students will use baking soda and vinegar to study how chemical reactions occur. Many students may have used baking soda and vinegar, but have they tried to catch the bubbles?

**Materials:**

1 narrow neck bottle (approx. 500 mL), vinegar (1 L minimum), baking soda (1/2 cup minimum), 1 regular sized balloon, tape (duct or masking tape will do), string (50 cm), a ruler

**Procedure:**

1. Place ½ cup of vinegar into the bottle

2. Blow up and then deflate the balloon to stretch it out.

3. Carefully place ½ teaspoon of baking soda into the balloon – using a funnel if available.

4. Carefully stretch the opening of the balloon over the opening of the bottle. Make sure the baking soda stays inside the balloon during this step.

5. Seal the balloon to the bottle using tape.

6. Lift up the balloon to empty the baking soda into the bottle.

7. Once the reaction is complete (no more bubbles are forming), wrap string around the widest part of the balloon to measure its circumference. Record this number in Table 1. The measurements in Table 1 will be the standard measurement for comparison with all others.

8. Assuming that the shape of the balloon is a sphere, we can calculate the radius. Use the formula $r= \frac{C}{2π}$. Record this radius in Table 1.

9. We can calculate the volume of the balloon using the formula V = $\frac{4πr^{3}}{3}$

10. Remove the tape from around the bottle and empty everything out to prepare for the second trial.

11. To fill in Table 2 and 3, double one of the reactants and predict how the volume of the balloon will change.

* In Table 2, double the amount of baking soda used, then repeat the steps.
* In Table 3, double the amount of vinegar used, then repeat the steps.

12. Complete the conclusion questions to analyze the results.

**Data:**

Table 1

|  |  |  |
| --- | --- | --- |
| Circumference | Radius | Volume |
|  |  |  |

Table 2

|  |  |  |  |
| --- | --- | --- | --- |
| ***Prediction*** (How will the volume change? Will it increase? decrease? double? half?) | Circumference (cm) | Radius (cm) | Volume (cm3) |
|  |  |  |  |

Table 3

|  |  |  |  |
| --- | --- | --- | --- |
| ***Prediction*** (How will the volume change? Will it increase? decrease? double? half?) | Circumference (cm) | Radius (cm) | Volume (cm3) |
|  |  |  |  |

**Conclusions (answer on a separate piece of paper)**

1. Were any of your predictions correct? If not, why do you think the results were different than you thought?

2. Which reactant do you think has the greatest effect on the volume of gas produced? What evidence makes you think so?

3. Predict what would happen to the volume of gas produced if you doubled both of the reactants at the same time. If you have time and enough materials, check if you are right!