Reaction Rate and Temperature of Vinegar Lab

Prelab Questions

1) Write the equation for the reaction between magnesium and acetic acid.

2) Why must you cut and clean all the magnesium pieces to be exactly the same?

3) How much acetic acid is actually in vinegar?

4) Why must the volumes of vinegar be the same in each reaction?

5) Are reaction time and reaction rate the same thing? Explain.

Procedure

1) Place an equal volume of vinegar in each of six test tubes.

2) Cut and sand a 12 cm piece of magnesium ribbon until it is clean and shiny.

3) Cut the magnesium ribbon into six equal pieces of 2 cm each.

4) Place one test tube in a water bath in which you have placed some ice cubes to make the water about 10° below room temperature.

5) After 2 min, when the temperature of the vinegar should be the same as that of the water bath, drop in a piece of the magnesium ribbon. Record the time it takes for the ribbon to react completely with the acid in the vinegar. Proceed with the other trials while this reacts.

6) Repeat with a test tube of vinegar that is at room temperature.

7) Meanwhile, begin heating water in another water bath, Place the remaining four test tubes of vinegar into the water bath. Monitor the temperature of the bath.

8) When the bath is 10°C above room temperature, remove one of the tubes, record the temperature, and drop in a piece of magnesium ribbon. Record the time it takes to react completely.

9) Keep an eye on the temperature of the water bath so that you can remove a test tube each time the temperature goes up another 10 °C and run another reaction.

10) Repeat until you have six values total. The lowest value should be at 10 °C BELOW room temperature, and the highest value should be at 40 °C ABOVE room temperature.

11) Make a graph to show the relationship between temperature increases of 10 °C and reaction time. Time should be on the y-axis and temperature on the x-axis.

Post Lab Questions

Write a formal lab report with the graph included.

1) Why is it so important to leave the test tube in the ice bath for the whole reaction but not the ones at higher temperatures?

2) Why do the reactions at higher temperature happen faster then the ones at the lower temperatures? Explain at the molecular level.

3) Does doubling the temperature double the reaction rate?

4) Is there a linear relationship between reaction time and temperature?

5) Pick one possible source of error in this lab and thoroughly discuss how the results of the lab would be different if it occurred.