Name:_____Date:_____Class:_____

Student Worksheet

Catalytic Conversions: Independent Inquiry

Safety

Do not eat the alginate mixture. Avoid splashing hydrogen peroxide into the eyes or onto other areas of the body. Any spills of calcium chloride on the skin should be immediately flushed with water.

Materials

- 30 ml alginate-glass MnO_2 mixture
- 100 ml 3% H_2O_2
- 250–300 ml container
- 5% $CaCl_2$ solution
- one hole stopper with glass tubing
- Tygon® tubing
- graduated cylinder
- plastic shoe box
- small plastic container
- stirring rod
- plastic syringe or pipette
- balance, weighing paper
- clamps
- ring stand
- caliper
- balance, weighing paper
- fermentation bubbler

Question: How does size and shape of a catalyst affect the reaction rate?

Procedure

Select the structures saved from the previous lab that you want to test, rinse them in tap water and blot dry.

Challenge #1

Experiment with *different size* structures in hydrogen peroxide. Find a relationship of reaction rate (the bubbling) and different characteristics of the alginate structures. How many relationships can you find?

Challenge #2

Experiment with the *same size* structures with *different concentrations* of hydrogen peroxide. How many relationships can you find?

Challenge #3

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How will your group measure the reaction rate of 4 g of structures in 100 ml hydrogen peroxide? You may request materials that are not on the materials list.

As you complete this challenge, write down your group's experimental method in enough detail so another group could redo the experiment.

Include your measurements in a data table, and graph the trend.

Analyze the Results

1. Show how you calculated the percentage of alginate structures that were the same size. Show all of your work on a separate page.
2. What factors were controlled in this reaction?_____

Draw Conclusions

1. How successful was your group in making alginate structures that were the same size? Justify your success through the percentage of structures that were the same size and shape.
2. What factors affected your ability to be consistent?
3. Nanoparticles are structures that cannot be seen without a powerful microscope. They are much, much smaller than the structures you made today. What problems may researchers run into when trying to create a batch of nanoparticles that are all the same size and shape?

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