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# Enzyme Biocatalysis Outreach

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15-30 minute demonstration about enzymes for elementary students (grades K-6). Enzymes are the tiny machines that help the body function and are used to produce industrial products. Two examples used are the “chomper” (protease) and the “firefly” enzyme (firefly luciferase).

## Resources Required

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1. Estimated Time: 5 minutes.
2. List of Materials and Estimated Cost.
  - Paper plates: \$2.00
  - Scissors: \$5.00
  - Yellow Crayons: \$3.00
  - Tape: \$1.00
  - Pipe cleaners: \$1.00
  - Enzyme Poster (Optional, available per below)

## Preparation Instructions

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### 1) Obtain the Necessary Materials

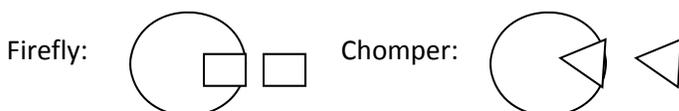
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A grocery store should have all of the necessary materials. In addition, the classrooms that will be visited possibly have tape, scissors, and crayons that can be used.

### 2) Setup for the Demonstration

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For each child that will be a part of the demonstration prepare two enzymes: one “chomper” and one “firefly.” Do this by cutting a square out of the side of the plate and a triangle out of another plate. Each child will get both plates and the cut-out pieces from them.



A simple poster is attached which helps illustrate the important points of the demonstration.



### 3) Determine Appropriate Length

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On the following page are the demonstration instructions. It can all be presented at once, or just one of the three sections can be completed.

Section 1 = Enzyme introductions and explanation (Instructions 1-3)

Section 2 = Enzyme creation and activity hands-on exercise (Instructions 4-5)

Section 3 = Enzyme activity song and dance (Instruction 6)

### 4) Online Resources

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Enzyme Poster - <http://chemicalengineering.byu.edu/people/brad-c-bundy>

Firefly Luciferase - <http://en.wikipedia.org/wiki/Luciferase>

## Demonstration Instructions

1. Hang the poster where it is easy to see and use.
2. Using the poster teach what an enzyme is and what it does. For Example:  
Hey Kids, my name is \_\_\_\_\_. I came all the way over here to talk with you about enzymes. Can you all say enzymes? Did you know that enzymes are super tiny machines that are all around us and in your bodies? Can everyone stand up? If you were to push all of the enzymes all the way down to the bottom of your body, they would fill up most of your legs. Then you have this much of your body water (60%) and most of the rest is fat (12%). Enzymes do all sorts of cool things. They are the little machines that make your body move. Can you move your arms and legs, enzymes are at working making you move.
3. Again using the poster, explain what a firefly enzyme looks like and does. Continue with explaining a “chomper” enzyme.
4. Explain to the kids that they will be creating enzymes with plates and pipe cleaners to act as the “lines and squiggles.” The lines and squiggles represent the alpha helix and beta sheets but you don’t have to use those big words. As part of the next activity explain to the kids that they will be taking the pipe cleaners and making lines and squiggles which they will then tape on to the plates to make enzymes. Once they have done this they will have their enzyme machines do their jobs by 1) color the square the matches the missing paper plate cut out and then color it yellow like the firefly enzyme so the firefly can glow. Next “chomper” will chomp the matching triangle by cutting it in half with scissors.
5. Hand out the materials and help the kids create their enzymes (tape on squiggles and lines with the pipe cleaners you gave them) and have the enzymes act on the squares and triangles.
6. Finally have students do the enzyme dance (to the tune of “If you’re happy and you know it”) If you are an enzyme and you know it do the chomp... chomp, chomp  
If you are an enzyme and you know it do the chomp... chomp, chomp  
If you are an enzyme and you know it then find a molecule and eat it, If you're an enzyme and you know it do the chomp... chomp, chomp. (While singing chomp have students do an alligator chomping dance with arms)

