"Polymer Shrinking Madness! Exploring Shrinking Properties and Chemical Makeup through Mass Spectrometry"

You and your lab partner work for The Reynolds Toy Company and have been assigned the task of producing two plastic trinkets using polystyrene and polyethylene. Both samples must be heat cured and measure 25cm^2, +/-10%. You must also produce circles, trapezoids, or triangles. The polymer buying public does not want any squares or rectangles! One shape must be made of polystyrene and the other must be made of polyethylene. You must produce two different shapes.

Permanent markers are available for decoration. You may also use a hole punch if you wish to make a keychain. The hole for the keychain can be disregarded in the area calculation. The drying oven is set to 325 F. Please place parchment paper under your plastics when shrinking them. Use forceps to remove your samples after shrinking is complete.

In your lab report:

a) Record all measurements that you took that helped determine how you produced the two 25cm^2 geometric shapes. Include all calculations.

b) Include a cost analysis report and determine how much it costs to produce each shape (price of classroom samples is included below).

c) Look at the "mystery" mass spectrum. Is this the mass spectrum for polystyrene or polyethylene? Determine the chemical structure of each repeating unit and diagram them in your lab books. Which sample would have a mass spectrum that looks like the one provided? Explain how you know this in your lab report.

d) Look up some basic information on PDMS (used as the example before the lab), polystyrene, and polyethylene. What are they used for? What is the structure of each polymer's repeating unit? Are these materials recyclable?

When you are done, turn in your lab report and your polystyrene and polyethylene shapes. I will spend the weekend with my NASA calibrated laser ruler and determine if you have accomplished your goal.

You will be graded according to the following rubric: 45pts total

1. Polystyrene and polyethylene samples: (5pts)

   Both shapes are 25cm^2 +/-10% _____ 5pts

   One shape is 25cm^2 +/- 10% _____3pts

   Neither shape is 25cm^2 +/- 10%, but both turned in _____2pts

One shape not turned in ____1pt

Neither shape turned in ____0pts

2. Lab Safety: (5pts)

All procedures followed ___5pts

Instructor observed one safety violation ____3pts

Student conduct endangered themselves or others (lab terminated) ___0pts

3. Lab Reports: (35 pts)

All sections of lab report are included and complete (like a usual lab report) ___20pt

Cost Analysis is included and accurate ___ 5pts

Identification of correct mass spectrum with explanation ___ 5pts

Identify uses, structures and recycle info for PDMS, polystyrene, and polyethylene ____5pts

Cost analysis information:

50 sheets of 8.5inx11in polystyrene=$68.78

50 disposable salad containers (polyethylene)=$25.87 *The entire container cannot be used to produce the geometric shapes and you will need to determine the usable area of your container to conduct your cost analysis for polyethylene.