Product/Polymer Profile Assignment (20% of final grade)

This assignment will give you an opportunity to research and synthesize information about a specific polymer used in a commercial product. The assignment is to prepare a written profile that includes basic information about your product and polymer along with its impact on society. The profile will include a series of assessments addressing the polymer’s composition and use in the product as well as the polymer’s life cycle and opportunities to use green chemistry to design a more sustainable alternative. Project components will be due throughout the term (see the assignment sheet for specific due dates) and the final product/polymer profile essay will be due at 11:00 pm on Monday, June 6, 2011. All assignments will be turned in using Blackboard and must be turned in as a portable document format (PDF). Each assignment must include a list of sources used (e.g., bibliography).

Note: You can use EasyBib.com to help you cite your sources. From the UO Library webpage (http://libweb.oregon.edu/general/resources/trial-databases.html) “EasyBib is a citation tool for creating bibliographies in MLA, APA, or Chicago/Turban formats. Students can easily search for a citation or enter the bibliographic data of a particular source. EasyBib then formats the citation, alphabetizes a works cited list, and creates a list that can be copied and pasted into a word processing application.”

Assignment #1 – General Information Sheet – Due April 30, 2011 (20 points)
Choose a commercial product that contains one of the polymers from the lists below. Collect the information highlighted by the list of questions and create a general information sheet that summarizes this information.

**Petroleum or Fossil Fuel feedstock**
- Polyethylene terephthalate (PET)
- High or Low density polyethylene (HDPE/LDPE)
- Polypropylene (PP)
- Polycarbonate (PC)
- Polyvinyl chloride (PVC)
- Polystyrene (GPPS)

**Bio-based feedstock**
- Polylactic acid (PLA)
- Polyhydroxyalkanoate (PHA)
- Polyethylene terephthalate (PET)

**General Product Information**
- Describe your product and how it is used (what is it’s function?).
- Describe any societal concerns with the production, use or disposal of your product. How do you know that these are legitimate?
- Draw a simple life cycle for your product. Are there any impact hot spots and where are they located in the life cycle?
- Describe the scale of the product impact – how many products are made/used in the US each year?
- Is your product recyclable?
- List the materials used to make your product.
- Identify the polymer that will be the focus of your profile.
Polymer Information

- What is the name of your polymer?
- What is the structure of your polymer?
- What is the chemical formula for your polymer?
- What is the name of your monomer?
- What is the structure of your monomer?
- What is the chemical formula for your monomer?
- How is your polymer made? Is it a "step" or "chain" polymer?
- What are the properties of your polymer — why/how is it used in your product (function)?
- Are there hazards associated with your polymer?
- How much polymer is in your product? What % of the total weight of your product is due to the polymer (% by weight)?

Assignment #2 – Outline and Bibliography – Due May 7, 2011 (10 points)
What kinds of information do you need for your project and where are you going to find the information (e.g., sources)? Turn in a list of questions that you need to answer for your project and include a list of possible sources. Your list will need to have a minimum of ten sources.

Assignment #3 – Life Cycle Assessment – Due May 14, 2011 (20 points)
- Describe the life cycle and draw a life cycle diagram for your polymer.
- How much polymer is made each year (can be in the US or world wide)?
- What % of the total amount of polymer made each year is used in your product?
- Is your polymer recyclable?
- How long does your polymer last or how long does it take to degrade?
- Is your polymer biodegradable?

Assignment #4 – Impact Assessment – Due May 28, 2011 (20 points)
- What are the hazards associated with your polymer?
- Describe the impacts of your polymer throughout the life cycle of the polymer (e.g., raw materials, manufacture, use and disposal).
- What is the significance of these impacts? Are the impacts large or small, significant or insignificant, compared to what?
- Where are the impact hot spots?

Assignment #5 – Final Profile - Essay – Due June 6, 201 (30 points)
The company that makes the product you selected has hired you as a consultant to evaluate the need for designing a more sustainable product. Specifically the company wants you to use your research (assignments #1-4) to evaluate the use of the polymer in their product. The assignment is to summarize the key concerns raised by your research and discuss the need and availability of alternatives for the polymer. The CEO is preparing to present this information to company shareholders so that they can decide if they want to invest in finding an alternative polymer for their product. The CEO has asked you to include your evaluation and recommendations for a more sustainable alternative using the 12 principles of green chemistry. In order to convince shareholders to invest in a new solution, the CEO also needs you to summarize the benefits of finding an alternative polymer (e.g., decreased impacts on human health and the environment, cost savings, etc.). In other words, what’s in it for the company or why should they invest in an alternative polymer?

Essay Details: 2 pages (max), typed, single-spaced.
**Grading Rubric for Product/Polymer Profile General Information Sheet – Due Saturday, April 30, 2011 for CH 113**

**Assignment #1:** Choose a commercial product that contains one of the polymers from the assignment list and create a general information sheet that summarizes the information listed in the assignment.

<table>
<thead>
<tr>
<th>Task</th>
<th>Beginning (1-4 pts.)</th>
<th>Developing (5-9 pts.)</th>
<th>Accomplished (10-15 pts.)</th>
<th>Exemplary (16-20 pts.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify and describe the commercial product.</td>
<td>Product information covers less than half of the items listed in the assignment. Information is not referenced.</td>
<td>Product information covers 75% of the items listed in the assignment. Information is referenced incompletely.</td>
<td>Product information covers all items listed in the assignment. The information clearly identifies sustainability issues associated with product manufacture and use. Information is referenced.</td>
<td>Product information covers all items listed in the assignment. The information clearly identifies sustainability issues associated with product manufacture and use. Information is referenced using a standard format.</td>
</tr>
<tr>
<td>2. Identify and describe the polymer.</td>
<td>Polymer information covers less than half of the items listed in the assignment. Information is not referenced.</td>
<td>Polymer information covers 75% of the items listed in the assignment. Information is referenced incompletely.</td>
<td>Polymer information covers all items listed in the assignment. The information clearly identifies the hazards associated with polymer manufacture and use. Information is referenced.</td>
<td>Polymer information covers all items listed in the assignment. The information clearly identifies the hazards associated with polymer manufacture and use. Information is referenced using a standard format.</td>
</tr>
<tr>
<td>3. Provide information about the scale of product and polymer use.</td>
<td>Provides minimal information about the scale of product/polymer use or the relationship to hazards. Information is not referenced.</td>
<td>Provides some information about the scale of product/polymer use and the relationship to hazards. Information is referenced.</td>
<td>Provides minimal information about the scale of product/polymer use and the relationship to hazards. Information is referenced using a standard format.</td>
<td>Provides clear, referenced, information about the scale of product/polymer use and the relationship to hazards. Information is referenced using a standard format.</td>
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