SUPPLEMENTARY MATERIALS for the manuscript
MS # 2005-0442
“Towards the greening of our minds: a new special topics course offered at Washington College”
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LIST OF TOPICS COVERED IN THE MINI-PROPOSALS

• Nitrates: Not Just for Nitrogen Any More. A strain of *E. coli* in which the synthetic pathway for L-aspartate is genetically enhanced uses nitrate in wastewater to synthesize L-aspartate in bioreactors. The L-aspartate is collected to make polyaspartic acid, a biodegradable polymer, the sale of which pays for the modest operating costs and the capital investment. Genetically engineered algae or subaquatic plants trapped in fine mesh baskets under marker buoys and other floats could help to remove the high levels of nitrate already present in the Chesapeake Bay.

• The Use of Biodegradable Polymers in Cigarette Filters. The replacement of the cellulose acetate filter with a biodegradable form of cellulose acetate based on corn starch can help the environment be cleaner and safer for people and aquatic organisms alike. This synthetic material readily breaks down into carbon dioxide and water with the aid of microorganisms in approximately 1 year.

• The Use of Biodegradable Polymers in condoms. The replacement of polyurethane with polyhydroxyalkanoates (PHA’s) with similar chemical and physical properties as polyurethane for condom materials creates a desirable condom that is more environmentally benign.

• Making disposable diapers greener. Baby diapers are typically made of polyethylene outer layers. Making this polymer not only depletes the petroleum resources but the polyethylene-based diaper is non biodegradable. The polyethylene outer layer of the diaper will be replaced by Ingeo™ fiber. This fiber is created using the NatureWorks™ PLA (polylactic
acid) process developed by Cargill Dow LLC. This fiber is derived entirely from annually renewable resources such as plant starch from corn.

- The Grass is Always Greener. The use of switchgrass pellets can be used as a fuel source for agricultural machinery. The grass may also be fermented via enzymes to be a source of ethanol for use in conventional combustion engines. It is the hope that production and use of switchgrass can be a sustainable process for the agriculture industry allowing for independence from outside energy sources.
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FIRST ASSIGNMENT: WRITING ABOUT THE ANNUAL PRESIDENTIAL GREEN CHEMISTRY AWARDS

“The whole way of science is nothing more than a refinement of everyday thinking.” –Albert Einstein

Goals:

- Learn about the Presidential Green Chemistry Awards and increase awareness about state-of-the art technological innovations in chemistry
- Use the scientific way of thinking to compile a written paper about an application of the green chemistry principles
- Think OUT-OF-THE-BOX.

About the Presidential Green Chemistry Awards:

The Presidential Green Chemistry Challenge Awards Program started in 1996. It invites nominations and recognizes individuals, groups, and organizations for their outstanding innovations in the use of cleaner, cheaper and smarter chemistry for diverse technological applications annually.

Five categories of awards are honored by a panel selected by the American Chemical Society. The five categories are the following:

- Academia
- Small business
- The use of alternative synthetic pathways for green chemistry
- The use of alternative reaction conditions for green chemistry
- The design of safer or less toxic chemicals.

Public and national recognition follows the award ceremony at the beginning of the Annual Green Chemistry and Engineering Conference in Washington, DC every year.

Format of the article:

The students work individually on this assignment. The students are urged to consult the professor for guidance. Each student will pick an award topic in the provided list and compile an article summarizing the accomplishments of the award recipient(s).

The article should be typed and should not be longer than 4 pages (excluding the cover page and the bibliography) using Font 12 and double spacing. If the length of the article exceeds 4 pages, the student will be penalized. The pages should be numbered. The total number of points will be 25 points.
Cover page (1 point): name of the student, title of the article, name(s) of the award winner(s) and year.

The following pages should include:

1. **Introduction (3 points)**
   Include the category of the award and describe briefly the focus of the award (2-3 sentences)

2. **Experimental section (8 points)**
   State what the previous strategy used in the experiment or process uses (if there was one) and what the new one is about. Refer to which principle of Green Chemistry is applied.
   This is a statement. There is no explanation and discussion of the science involved in this section.

3. **Results and Discussion (8 points)**
   Describe the results of the new strategy. Compare the experimental processes and the results of the previous and the new strategies and discuss about the advantages and inconveniences of both.
   Do not forget to mention the impact on health, environment, economics and answer the following question: How does this new design work towards a sustainable Earth?

4. **Conclusions and Future Work (3 points)**
   Summarize the content of your article and propose a lead to future experiments or different applications using the same hypotheses.

5. **Bibliography (2 points)**
   Particular attention will be paid to the nature of the references. References CAN NOT be all web references.

**PAST AWARD RECIPIENTS and LIST OF GREEN CHEMISTRY RESOURCES:**
See handouts and the following websites:

http://www.acs.org (search Green chemistry institute and awards)

http://www.epa.gov

http://www.cnn.com

http://www.greenbiz.com
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SECOND ASSIGNMENT: PRESENTING AND DISCUSSING THE ANNUAL PRESIDENTIAL GREEN CHEMISTRY AWARDS

“Saying what we think gives us a wider conversational range than saying what we know.”
Cullen Hightower

Goals:
Using your bibliographic information and current knowledge about the annual presidential green chemistry award of your choice, explain in a clear manner the goal of the award and the benefits gained with this new greener design. The presentation should show your understanding of the green chemistry principle(s) applied in this new strategy, your ability to compare traditional and “greener” approaches, as well as your aptitude to lead a discussion on a topic of your interest.

Format:
This is an individual project consisting of 15 minutes of presentation followed by 10 minutes of questions and discussion.

You will be evaluated by both your classmates and the professor. The evaluation will be based on:

2) Preparation of the speaker
3) Dynamism and motivation for the subject
4) Organization of the presentation
5) Quality of slides
6) Quality and clarity of expression
7) Pace of presentation
8) Answering questions
9) Ability to lead a discussion
10) Overall rating

Planning the presentation:
When planning your presentation, you should think about these different points:

- Title and objective of the presentation (Your presentation should be focused)
- Audience (Everybody has a different background in the class and everybody thinks differently)
- Organization: your presentation should be planned and contain:
  - An introduction
  - An outline
  - A body
Some basic power point guidelines:

1. **The helpful rule of thumb** is to use a maximum of six bullet points per slide and six words per point.

2. **Balance.** The bullet points should not be centered but left-justified. The graphics should be placed off-center to leave more room for text.

3. **Keep text easy to read and to understand.** Too much text should be avoided. The audience will be more receptive to spoken words.

4. **Select colors and contrast with care.** Be creative but experiment with color combinations and make sure they work well on a screen.

5. **Select a single background.** Use one of the master slides provided by Microsoft PowerPoint.

6. **Font size is important.** Use only a few familiar fonts. If you want to emphasize some important words, use bold letters instead of all capitals.

**Use the "floor test" for readability** Print out a slide containing text, then place the page on the floor. If you can read the slide from a standing position, then your audience can likely read it from their seats. If no, then the font size needs to be increased.

7. **Minimize or avoid animated texts, sounds, and fancy transitions.** These can be effective in certain situations, but often distract your audience from the main points you are making.

8. **Avoid switching many times between programs (such as calling up a Web page).** This takes extra time and can make it difficult for your audience to remain focused on your presentation.

9. **Do you want people to take notes during your presentation?** Leave them sufficient time to do so.

10. **Timing.** Use two slides per minute as a maximum.
11. **Visual images can be great**, but they need to be selected carefully and be appropriate to the point(s) you want to make. Watch size, too--images too small are not helpful.

“Creating an effective power point presentation” by Thomas Saylor
“Judicious PowerPoint,” by David Brown in *Syllabus* 14, 8 (March 2001), 27.
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SECOND ASSIGNMENT: PRESENTING AND DISCUSSING THE ANNUAL PRESIDENTIAL GREEN CHEMISTRY AWARDS

Name of the speaker:

Green Chemistry award presented:

TOTAL on 30 points. Each category is worth 3 points. Circle the number of points corresponding to your evaluation for each category.

1- Preparation of the speaker
   1  2  3

2- Organization of the presentation
   1  2  3

3- Pace of presentation
   1  2  3

4- Quality of slides
   1  2  3

5- Quality and clarity of expression
   1  2  3

6- Dynamism and motivation for the subject
   1  2  3

7- Ability to answer questions
   1  2  3

8- Ability to lead a discussion
   1  2  3

9- Contribution to learning
   1  2  3

10- Overall rating
    1  2  3

   General comments:
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THIRD ASSIGNMENT: GREEN CHEMISTRY MINI-PROPOSAL TEAM PRESENTATION

“Research is the art of seeing what others see, but thinking what others don’t think.”
-Ralph Waldo-

Goal(s):

The main goal of the mini-proposal is to provide the students with the opportunity to apply their knowledge in a project where an environmentally-benign design or process is lacking. The concept of this mini-proposal requires the students to apply their ANALYSIS and CREATIVE THINKING skills to problems of importance to industry and society.

Content:

The team of students will identify a reaction or design which is NOT environmentally benign or does not employ any of the green chemistry principles. Then they will develop a mini-proposal which describes the use of an alternative and greener design using a more environmentally friendly synthetic pathway, feedstock, solvent, catalyst, or source of energy.

The mini-proposal can either focus on the

- Use of a greener design or synthetic pathway (use of microbial catalysts, use of enzymes, use of renewable source of energy…)
- Use of a more environmentally benign solvent (a known organic reaction may require organic solvents and you may think of using an alternative and greener solvent or no solvent at all)
- Use of a greener starting material (use of renewable resources)

Where do we start?

After the identification of a TRADITIONAL reaction or pathway commonly used, your thinking pathway should start by asking yourself the following questions:

- How is this reaction performed? What type of starting material does it use? What type of solvent? What is the energy input? Does it use a catalyst? Is it reusable? Are the products biodegradable?
- What can I change to make this process greener? (see tools and principles of green chemistry)
• What will be the impact(s) of the greener product or process on the environment (air, water, local and global), health, and safety? (comparison with existing design and viability of the project)

• Will this project be cost-efficient? What do I need to change in the production line? How will this affect the existing industrial structure? How do I launch this greener product on the market?

Format:

This is a TEAM project consisting of 20 minutes of presentation using Microsoft Power Point followed by 5 minutes or more of questions and discussion. The 20 minutes should be spent equally between the two innovators.

An abstract describing the goals and tools of the mini-proposal will be posted on blackboard at least 3 days before the presentation. The abstract should contain:
  • A title and names of the innovators
  • The date of the presentation
  • A summary of the goals and tools used in the mini-proposal
  • A picture, scheme, or figure relevant to the proposed project.

Grading:

You will be evaluated by both your classmates and the professor. Part of your evaluation will be individual and part of it will be a team evaluation.

The individual evaluation will be based on:
  • Preparation of the presenter
  • Organization of the presentation
  • Pace of presentation and respect of allotted time
  • Quality of slides
  • Quality and clarity of expression
  • Dynamism and motivation for the project
  • Ability to answer questions and lead a discussion
  • Use of analytical and critical thinking
  • Contribution to learning

The team evaluation will be based on:
  • Quality and clarity of the goals expressed in the abstract
  • Originality of the mini-proposal
  • Feasibility of the proposed project
  • Achievement(s) as a team
  • Overall rating
Planning the presentation:

When planning your presentation, you should think about these different points:

- **Title and objective of the presentation** (Keep your presentation **focused**!)
- **Audience** (Everybody has a different background in the class and everybody thinks differently!)
- **Organization**: your presentation should be **planned** and contain:
  - An introduction
  - An outline
  - A body
    - Presentation of the traditional pathway or design
    - Advantages and drawbacks
    - Presentation of the goals of your greener alternative project
    - How can we achieve these goals? Tools of greener alternative project
    - Principles of green chemistry used in this new approach
    - Impacts (health, environment, economics)
    - Sustainability
    - Advantages and obstacles
  - A conclusion
  - Bibliography
- **Time**: respect the allotted time!
- **Visual aids**: see rules for Power Point presentation (second assignment)
- An efficient Power Point presentation should be **practiced at least once especially when working in a team**!
Title of the mini-proposal:

Name of speaker 1:
- Preparation of the presenter
- Organization of the presentation
- Pace of presentation and respect of allotted time
- Quality of slides
- Quality and clarity of expression
- Dynamism and motivation for the project
- Ability to answer questions and lead a discussion
- Use of analytical and critical thinking
- Contribution to learning

COMMENTS:

Name of speaker 2:
- Preparation of the presenter
- Organization of the presentation
- Pace of presentation and respect of allotted time
- Quality of slides
- Quality and clarity of expression
- Dynamism and motivation for the project
- Ability to answer questions and lead a discussion
- Use of analytical and critical thinking
- Contribution to learning

COMMENTS:
Team evaluation:

- Quality and clarity of the goals expressed in the abstract 1 2 3
- Originality of the mini-proposal 1 2 3
- Feasibility of the proposed project 1 2 3
- Achievement(s) as a team 1 2 3
- Overall rating 1 2 3

COMMENTS: