



## 2011-2012 Outreach Options

### Field Trip Options

Our Beyond Benign Classroom holds a maximum of 25 students and our lab holds a maximum of 18 students. Typically field trips are offered for school groups from 9:00am-12:00pm. Generally there is an introduction to Green Chemistry, Lab Activity and a Tour of the Warner Babcock Institute for Green Chemistry (with an opportunity to see scientists in action and ask questions). We can arrange a space for your group to have lunch provided students bring their own many groups opt to stop on the bus ride back to school. We ask for a minimum donation of \$100 to cover lab supplies for the day.



### Middle/High School Option:

#### Blackberry Solar Cell

Students will construct a dye-sensitized solar cell using materials such as blackberries. During the process students learn about how the materials, product and process meet the cost, safety and performance criteria of green chemistry technology. After construction is complete, students measure the voltage output of their solar cells and discuss how the technology is continuing to emerge. (Renewable Energy)



### High School Options:



#### Essential Oil Extraction:

Students perform a greener method of essential oil extraction. Traditional extraction methods include solvent extraction and steam distillation, which can use hazardous solvents and high energy, respectively. Using dry ice and liquid carbon dioxide (CO<sub>2</sub>), students will extract essential oil from lemons and oranges. This experiment is a great way to show changes of a chemical and phase change diagrams. (Phase changes, phase change diagrams)



### **Recycling PLA:**

#### **Acids & Bases, pH, Life-cycle, Renewable resources**

Working in the Beyond Benign Lab students will conduct a base hydrolysis experiment to break down a PLA (polylactic acid) cup and then convert it into a cleaner. This experiment allows students to learn about end-of-life concepts within a product life-cycle. Students will learn about the importance of several interrelated green chemistry principles design-for-degradation, renewable resources and pollution prevention.