ESSAI

Volume 8 Article 33

4-1-2011

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(Chemistry 1105)

Nowadays, one can hardly turn on the television or open a newspaper without bombardment from ads boasting a product or company's "greenness." The term has been splashed across headlines and billboards everywhere: "Go Green," "Think Green," and "Green is the New Pink." So what does being green really mean?

In 2007, Dell Computers set up set up an "eco-innovation" booth at an Oracle OpenWorld conference—the world's largest annual information technology event—and asked passersby, "What does being green mean to you?" Here are some of the answers they received:

"Green means being able to go outdoors and have clean fresh air and water…being able to look at nature in its pure forms…Turn off your lights, carpool, use public transportation."

"My kids are already talking about what we can do to make the world a better place, to make rivers cleaner, air cleaner, things we can do at home…recycling and that kind of stuff…"

"We are going green by growing our own corn on our farm and using the cobs to heat our house. We got tired of depending on propane, so we decided to switch to a renewable resource. Last year we used no propane at all."

Though the public will generally give self-constructed answers about what being green means to them, the field of chemistry classifies "greenness" by a product or chemical's adherence to a series of structured requirements. "Green chemistry" is a term that refers to "the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances."[i] It operates by twelve principles that focus on using chemical products that are sustainable, renewable, and biodegradable. These guidelines seek to "minimize risk by minimizing hazard,"[ii] which essentially means the avoidance of using or constructing substances that are toxic, or potentially toxic, to the environment and its inhabitants. In this way, green chemistry controls toxic waste buildup in the environment, as well as by properly disposing of harmful chemicals and attempting to create products that reduce preexisting toxicity.

Currently, one of the most prominent processes in need of a green chemistry makeover is the production of polyethylene terephthalate, or PET. PET, a commercial polyester polymer, is quite useful and commonly used because of its strength, stability, and adaptability; however, it is damaging to the environment as its production "uses large amounts of petroleum, a valuable and non-renewable resource…Of the more than 4 billion pounds produced in 1998, only 745 million pounds were recycled. The remaining 81%, some 325.5 billion pounds, were either landfilled or incinerated."[iii] Thankfully, in recent years, scientists have been working on several green chemistry approaches to creating more environmentally friendly plastics.

Polylactic acid, or Polylactide (PLA), has recently received increased attention for its potential as a bioplastic alternative to petroleum-derived commodity plastics. Unlike PET, PLA "is a renewable plant based material, produced from the fermentation of starch from crops, (most commonly cornstarch or sugarcane in the United States), into lactic acid that is then polymerized."[iv] PLA can be spun into fibers or fibrous material, which improves durability and dyeability and makes it less susceptible to hydrolysis and untimely biodegradation.[v] Spinning PET into fibers before use is a huge contributor to its renowned versatility, tensile strength, and heat resistance—this same process gives PLA favorable properties similar to those of PET.

Both the production and finished product of PLA plastics are considered to meet the

standards of green chemistry. The U.S. Environmental Protection Agency continually posts winners of the Presidential Green Chemistry challenge on their website; the NatureWorks™ PLA Process is featured as a 2002 winner, because it "makes biobased, compostable, and recyclable polylactic acid (PLA) polymers using 20–50 percent less fossil fuel resources than comparable petroleum-based polymers. The synthesis of PLA polymers eliminates organic solvents and other hazardous materials, completely recycles product and byproduct streams, and efficiently uses catalysts to reduce energy consumption and improve yield."[vi] The same source states that PLA "can compete head-to-head with traditional fibers and plastic packaging materials on a cost and performance basis." Packaging materials, plastic dishes and cutlery, carpeting, foil, biodegradable medical implants, tins, bottles, and even clothing have all been made successfully from either PLA or a PLA blend.

The price of PLA products "compared to regular plastic products is becoming more competitive as the interest in biodegradable product rises. The disparity in prices is about 15+%."[vii] The market for these products has been growing exponentially, so once high prices are consistently lowering. A drawback of PLA, in addition to the presently higher price, is poor abrasion resistance that "may limit or even preclude the use of PLA fibers in some high-performance apparel applications, in ropes, or in other uses where abrasion resistance is required."[viii] The lower melting point (about 175°C) signifies a limitation of PLA's "applicability in high-temperature environments, but it is at least high enough not to preclude ironing and drying in apparel applications." There has also been speculation about the biodegradability of PLA products; their producers have glossed over the fact that PLA requires both high humidity and high temperature to hydrolyze, and garbage dumps and compost heat do not fulfill these extreme conditions. If PLA continues to gain popularity, the U.S. would probably have to build many factories where the recycled products could be broken down by controlled conditions. Another potential drawback is that PLA is generally derived from corn starch, and with corn prices skyrocketing due to increased ethanol demand, PLA prices may not decrease for many years; however, there is the option of attempting to use sugarcane instead. All in all, the world would probably be willing to transition, albeit slowly, to PLA products once further research is conducted and the economy has stabilized somewhat.

As the masses clamor to purchase "greener" commodities, many companies have realized that there is a substantial amount of money to be made by promoting their products or services as "green," even if there is no environmental benefit. This is called "green washing" and it is defined as the "misleading act of companies, industries, governments, organizations and individuals trying to promote unjustified environmentally friendly practices, products and services through branding, mislabeling, packaging or public relations."[ix] This practice is commonly used in gas and oil companies, including Shell, Exxon Mobil, and BP. Royal Dutch Shell, for example, used advertisements implying that oil refineries sprout flowers instead of spewing pollutants. An excerpt of the now banned ad stated "We use our waste CO2 to grow flowers," which referred to Shell's donation of a small fraction of their CO2 waste to greenhouses that typically burn natural gas to provide beneficial growing conditions. The ad also stated "Don't Throw Anything Away. There is No Away." These statements were grounds for removal of Shell's ads by the Advertising Standards Authority, explicating that "most readers were likely to interpret the claim 'We use our waste CO2 to grow flowers,' especially in the context of…the headline claim 'Don't throw anything away, there is no away,' to mean that Shell used…at least the majority of their waste CO2 to grow flowers, whereas the actual amount was a very small proportion, when compared to the global activities of Shell."[x] Other cases of green washing include simply placing green on a product label, or pictures of nature. Many products claim to be "all-natural," though there is little regulation as to the verity of these claims, and an all-natural product doesn't necessarily mean it's environmentally friendly.

However slow the process of reversing or even stalling the damage done to our environment, the ever-increasing awareness of the importance of going green is a step in the right direction.

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