Reeko's Mad Scientist Lab

Supplies: **Milk**
Vinegar

Making homemade plastic

Yep, we're surrounded by plastic. Sit right there and look around the room and see if you can spot something made of plastic. See, I told you so. The keys on your keyboard are made of plastic. The mouse you've got your hand resting on is made of plastic. Even parts of the monitor you're looking at right now is made of plastic (yikes... Reeko, I don't know how you know all these things but stop it - it's giving me the creeps).

These plastics can be either *natural plastics* which are made of materials such as wax or natural rubber, or they can be *synthetic plastics* which are made from polyethylene or nylon. Most plastic is made of petroleum oil. The type of plastic we're fixing to make is of the natural type.

1. **Have an adult slowly warm 1/2 cup of heavy cream (or milk).**
2. **When it begins simmering, stir in a few spoonfuls of vinegar (lemon juice will also work).**
3. **Continue adding spoonfuls of vinegar and stirring until it begins to gel.**
4. **Now let the it cool.**
5. **Next, wash the rubbery stuff with water to clean it off. You'll have little plastic 'curds'.**

Voila! You have plastic! If you want to really have some fun with it, take it to Dad and tell him you've been sitting out in the garage watching this stuff drip off from under the car for about an hour now. Note: if he begins gathering up tools, it might be a

good time to level with him...

The acid in the vinegar reacts with the casein in the milk making the plastic. In practice, this type of plastic would be much too expensive for household use. Oil-based plastics are much cheaper since the raw materials needed are much easier to come by. But alas, even oil is a resource that will someday run out. Scientists know this and are hard at work searching for new ways to make plastic. Maybe you could be the one to find the answer...

***Parent's Note*. Plastics are characterized by high strength-to-density ratios, excellent thermal and electrical insulation properties, and good resistance to acids, alkalis , and solvents. The giant molecules of which they consist may be linear, branched, or cross-linked, depending on the plastic. Linear and branched molecules are *thermoplastic* (soften when heated), whereas cross-linked molecules are *thermosetting* (harden when heated).**

The development of plastics began about 1860, after Phelan and Collander, a United States firm manufacturing billiard and pool balls, offered a prize of $10,000 for a satisfactory substitute for natural ivory. One of those who tried to win this prize was U.S. inventor John Wesley Hyatt. Hyatt developed a method of pressure-working pyroxylin, a cellulose nitrate of low nitration that had been plasticized with camphor and a minimum of alcohol solvent. Although Hyatt did not win the prize, his product, patented under the trademark Celluloid, was used in the manufacture of objects ranging from dental plates to men's collars. Despite its flammability and liability to deterioration when exposed to light, Celluloid achieved a notable commercial success.

Other plastics were introduced gradually over the next few decades. Among them were the first totally synthetic plastics: the family of phenol-formaldehyde resins developed by the Belgian-

American chemist Leo Hendrik Baekeland about 1906 and sold under the trademark Bakelite. Other plastics introduced during this period include modified natural polymers such as rayon, made from cellulose products.

Sources:

Encarta 98
Museum of Life and Science, Durham, North Carolina