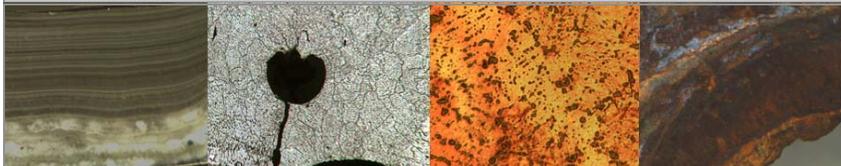


# NU S & B L S



**New Hampshire  
MATERIALS  
LABORATORY, INC.**  
*Your Problem Solving Partner*

**POLYMER IN TODAY'S WORLD AND THE MEDICAL DEVICE INDUSTRY**

**SEPT 2011 / SUPPLEMENT ISSUE**

## Welcome to New Hampshire Materials Laboratory

Here at NHML, we provide testing for various industries and manufacturers including the medical device industry and polymer manufacturers.

This supplement not only includes some interesting facts about plastics but also includes a couple of case histories from our chemistry lab. Our Senior Chemist, Jeff Masse is not only our polymer expert but also has the ability to help our medical device customers with a solution to their problem.

In our next Nuts & Bolts due out this fall, we will be taking a closer look at our chemistry lab capabilities and how we can be a great source for the medical device industry. An industry growing by leaps and bounds.

Tim Kenney  
Laboratory Director

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## How Well Do You Know Your Plastics



How well do you know your plastics?

## The Recycling of Plastics

Plastics a.k.a. polymers or resins are everywhere in today's modern world including inside our recycling bins. Have you ever wondered what happens during the recycling process or what happens to those plastics after they've been recycled? Read on for some interesting facts and information about the recycling of plastics.



Type 7 Plastics

Recycled plastics are just that: recycled plastics. For example, a yogurt container can not be recycled back into a yogurt container. Many regions use the single stream recycling method. All recyclables (paper, plastic, glass) are collected at the same time. Once at the recycling facility, everything is sorted by category. Continued page 2 →

Plastics are everywhere. Baby Bottles, CD & DVD cases, Styro-foam cups, bread bags, and your plastic grocery bags are just few products in the long list of items made with plastic. We see them and use them but how well do we know our plastics? Do you know why a #7 plastic can't be recycled or why #6 has potential health hazards? Read on for more interesting facts and information about today's plastics. Continued page 2 →

The plastics are then sorted by type, as some types such as # 7 are not able to be recycled.

After the sorting has been completed, the plastics that are ok to be recycled are ground into chips or flakes. It then goes through a bath process to clean away impurities left behind from the plastics previous use. Once dried, it is melted and formed into resin pellets (also known in the manufacturing world as nurdles). These pellets are often used by manufacturers in the production of other various products such as artificial fleece, carpeting, and engineered wood to name a few as well as other resin products.

Recycling is a good thing. It reduces the demand for other resources but not the demand for virgin plastic. Products made with virgin plastic can not be manufactured from anything but virgin plastic.



The most commonly recycled plastics are Polyethylene Terephthalate (PET) and High-density Polyethylene (HDPE). Polyethylene Terephthalate, also known by consumers as PET or type #1 plastic, is used by manufacturers because of its strength, thermo-stability, and transparency. The items range from bottles of water, soda or juice, and even toys to name a few. High-density Polyethylene, also known by consumers as HDPE or type # 2 plastic, is a thermoplastic made with petroleum. It is moldable type of resin thus the reason used in many consumer products such as detergent bottles, cutting boards, and more.

## Polymer Pellets And The Effect of Ultraviolet Light Stabilizers

UV stabilizers (a.k.a. Ultraviolet Light Stabilizers) are frequently used in polymers. Why? By using a UV stabilizer in the formation of a polymer it helps combat photodegradation caused by light, heat, and oxygen. These stabilizers help prevent loss of strength, stiffness, or flexibility as well as the discoloration of the polymer. They essentially extend the shelf life of the polymer.

HAL (a.k.a. Hindered Amine Light Stabilizers) is a type of stabilizer used to prevent light degradation of the polymers.

Increased stability of polymers achieved by the use of these stabilizers can even exceed that of the pigment.

A client of ours used polyamide pellets containing a UV inhibitor to produce a molded part. Patches of thin white residue were eventually seen on the surface of the molded parts and were thought to possibly be the UV inhibitor which was "bleeding: to the surface. Continued on page 3 →

PVC (polyvinyl chloride) type #3 plastic is widely used in construction because of its durability. It is also found in other consumer products such as food wrap. Typically, PVC is not recycled due to lower cost of virgin resin.

Type #4 plastic, also known as Low Density Polyethylene is used to make such items as bread bags, grocery bags, and plastic wrap. It is considered safe but is not currently recycled.

Both the final molded parts and the pellets with the UV stabilizer were sent to our lab for analysis.

An FTIR spectrum was taken of the thin white residue on the molded parts. It appeared to be that of a HAL (hindered amine light stabilizer). The pellets were then examined under a microscope, and a similar white film was noticed on the surface of the pellets. An FTIR spectrum revealed that the white film on the pellets matched the white residue on the molded parts. Both were HAL (the hindered amine light stabilizer) used in the manufacturing of the pellets.

It appears that the UV stabilizer was poorly blended with the original polymer pellets, or else it had bled to the surface of the pellets themselves and did the same when molded into parts. Either stabilizer for that particular polymer, was at the heart of the problem.

Our chemistry lab sees polymer pellets and other sorts of molded plastics during the course of a year. The chemist is asked to identify or verify the polymer material or to identify a contaminate which appeared on the plastic. Here at NHML we consider ourselves "Your Problem Solving Partner". Our Senior Chemist and polymers expert, Jeff Masse is one of our team members and is ready to help.

Type # 5 plastic also known PP (Polypropylene), is used to manufacture everyday household products such as yogurt cups, ketchup bottles, pharmaceutical bottles, and electronic packaging. It is considered safe and is slowly being picked up for curbside recycling.

The last two types of plastics, Polystyrene (a.k.a. Styrofoam) identified as type #6, and type #7 (other) are not able to be recycled. Styrofoam is made mainly into disposable containers, packing, plate and cups. Evidence shows this type of plastic leaches potentially harmful chemicals, especially when heated.

### Medical Device Company Testing Needs

Here at New Hampshire Materials Laboratory we assist all types of manufacturers including the medical device industry.

An unknown residue, fleck, or stain can cause a medical device QA manager to cringe. This is where our laboratory comes into service.



Graft Blade

A prime example is back in 2010, we had a medical device manufacturer from the mid-west contact us regarding a contamination that was found on a graft blade.

Our Senior chemist removed the blade in order to perform an FTIR (Fourier Transform Infrared Spectroscopy) on a stain and to find the source of the contamination. The FITR gave Jeff a flat baseline and indicated that the stain was not caused by any presence of organic material.

Next an EDS (Energy Dispersive Spectroscopy) was done on a non-contaminated portion (clean area) of the blade and the stained area. The spectra revealed that higher levels of Oxygen were found in the stained area of the blade. Our Senior Chemist, Jeff concluded that the stains were caused by surface oxidation/corrosion.

Polycarbonates are thermoplastic polymers that do not have a unique plastic identification code and are identified as #7 plastics. These types of plastics are used in iPods, CD & DVD cases, as well as medical devices. The reason these plastics can not be recycled is they are a mixture of plastics and typically have additives of sorts added during the molding process. These plastics are also known to have BPA which is considered toxic.