The Andur Report

September 2012

Anderson Development Company

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Technical Paper given at PMA/CUMA

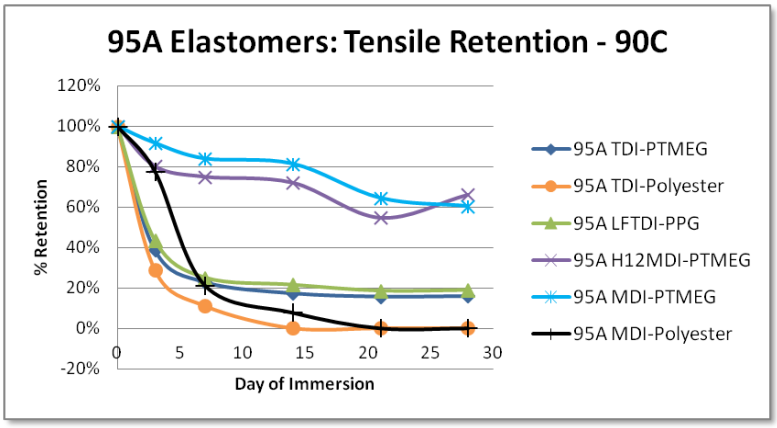
In April at the annual PMA meeting and in June at the annual CUMA meeting, ADC presented a technical paper titled "Polyurethane Elastomer Hydrolytic Stability". The paper was a study of various polyurethane systems (multiple backbones and isocyanates) immersed in water at 50°C and 90°C for various periods of time, up to 5 months. The hardness, tensile and split tear of the material were tracked during this time.

The results of the testing showed that temperature of the immersion liquid (water) plays a big role in how fast the material degrades. For example, a polyester material retained greater than 50% of its tensile and tear strength for 2-3 months at 50°C while at 90°C, properties degrade to less then 20% retention after only one week (see the graphs below).

In terms of isocyanate, an aliphatic-PTMEG was the most stable, but an MDI-PTMEG was shown to be very close to the aliphatic in hydrolytic stability. A TDI-based polyether material was a distant third.

Further testing at lower temperatures (room temperature) may be in the works to look especially at how the polyester backbone responds.

For a copy of the paper, contact any of the R&D Staff to the left.



New Products

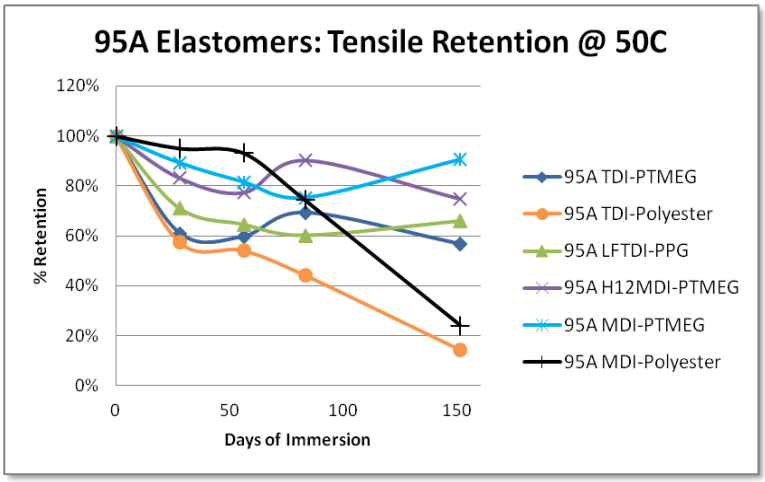
Some recent products we've commercialized:

Andur 81 DP:

This prepolymer cured to an 80-85D with MBOCA and has a 2.5 minute potlife, which is long for such a high hardness material.

Andur 94 APLF:

Cast with MBOCA, this material gives a 95A and is a low free TDI PTMEG-based prepolymer. It has a slightly longer potlife than 95 APLF.



OSHA Adopts GHS Standard

On March 20, 2012, OSHA approved final revisions to the Haz. Comm Standard. The purpose of these changes is to bring the U.S. into alignment with the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS). GHS provides a more standardized approach to hazard communication,
and helps to minimize problems associated with conflicting national
and international requirements.

Major Changes

• Hazard classification: The definitions of hazard have been changed to provide specific criteria for classification of health and physical hazards, as well as classification of mixtures.
• Labels**:** Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, hazard statement, and precautionary statement for each hazard class and category.
• MSDS's are now to be called Safety Data Sheets (SDSs): The new format requires 16 specific sections, ensuring consistency in presentation of important information.
Information and training**:** GHS recognizes the importance of training to an effective hazard communication approach. The revised HCS requires that workers be trained by December 1, 2013 on the new label elements and safety data sheet format and retrained within two years of the publication of the final rule.
As indicated in its proposed rule making, OSHA has adopted all physical and health hazard endpoints found in Revision 3 of the Purple Book with the following exceptions:
• Acute Toxicity (category 5 for oral, dermal and inhalation exposures)
• Skin Corrosion/Irritation (category 3)
• Aspiration Hazard (category 2)
• Hazardous to the Environment (all endpoints)
These exclusions are consistent with the prior scope of coverage found in 29 CFR 1910.1200 originally effective November 25, 1985.
Additional endpoints that are now included are:
• Combustible dusts
• Pyrophoric gases
• Simple asphyxiants
Hazards not specifically addressed by the United Nation's Globally Harmonized System of Classification and Labelling (GHS) are now termed 'hazards not otherwise classified (HNOC)' by OSHA.
Health hazard criteria can be found in Appendix A while physical
hazard criteria can be found in Appendix B.

Implementation Schedule

The final HCS rule is scheduled to be fully implemented by 2016. Employers have until December 1, 2013 to train employees on the new label elements and SDS format.

Affected Citations

Other standards such as the Flammable and Combustible Liquids Standard (29 CFR 1910.106), the Process Safety Management Standard (29 CFR 1910.119) and selected substance specific health standards (29 CFR 1910.1001-1052) have been revised to
conform to the new criteria as well as revised for associated hazard communication elements. Here's an incomplete listing of affected citations (dropped ones not thought relevant to members):

Part 1910 – Occupational Safety And Health Standards

Subpart A
• 29 CFR 1910.6 Incorporation by reference
• Subpart H
• 29 CFR 1910.106 Flammable liquids
• 29 CFR 1910.107 Spray finishing using flammable and combustible materials
• 29 CFR 1910.119 Process safety management of highly hazardous chemicals
• 29 CFR 1910.120 Hazardous waste operations and emergency response
• 29 CFR 1910.123 Dipping and coating operations: coverage and definitions
• 29 CFR 1910.124 General requirements for dipping and coating operations
• 29 CFR 1910.125 Additional requirements for dipping and coating operations that use flammable or combustible liquids
Subpart Q

29 CFR 1910.252 General requirements

Subpart Z
• 29 CFR 1910.1003 13 carcinogens
• 29 CFR 1910.1028 Benzene
• 29 CFR 1910.1050 Methylenedianiline
• 29 CFR 1910.1052 Methylene chloride
• 29 CFR 1910.1200 Hazard communication
• 29 CFR 1910.1450 Occupational exposure to hazardous chemicals in the laboratories
Redline strikeout of the HCS Final Regulatory text 2012 can be found at: http://www.osha.gov/dsg/hazcom/redline.html.
The Side-by-Side Comparison of OSHA's Existing Hazard Communication Standard (HCS 1994) vs. the Revised Hazard Communication Standard (HCS 2012) which can be found at: http://www.osha.gov/dsg/hazcom/side-byside.html

Taken from PMA's Polytopics, Quarter 2, 2012.

Employers have until December 1, 2013 to train employees on the new label elements and SDS format.

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Mission Statement

Anderson Development will be a global supplier of innovative specialty chemical products, striving for continual improvement in all of our operations. It is our goal to be personal, efficient, and responsive to our customers and employees. We will provide a team-oriented atmosphere while allowing for individual diversity among our employees.

We're on the web!
www.andersondevelopment.com

New Instruments

Some new instruments we have in our lab now include a TGA (thermogravimetric analyzer, a TMA (thermomechanical analyzer, a rotary abrader, and an environmental chamber for our physical testing machine. A description of each is below.

TGA: Samples are heated to high temps and weight loss is recorded. This can be useful for identifying additives in a material such as a plasticizer and filler concentration.

TMA: The TMA measures changes in dimension with temperature, so it is useful for determining the coefficient of thermal expansion (COTE) which is how we can calculate the shrinkage of a material.

Rotary Abrader: The rotary drum abrader can measure the abrasion resistance of materials as compared with a standard rubber material (ASTM D5963)

Environmental Chamber: This chamber will allow us to run tensile, tear, and compression tests at temperatures other than ambient. The chamber can cool down to -40C and heat to past the melting point of any urethane.