The Andur Report

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In this Issue

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Anderson Development Company

Dr. Steve Seneker Retires

October 29th, 2021 was a bittersweet day for those of us at ADC and especially in the Urethane R&D group. It was Dr. Steve Seneker's last day at ADC. Steve spent the last 21 years of his 35 year career in the polyurethane industry at Anderson Development, and lead the R&D group to numerous successes along the way.

Steve was not only an excellent, highly respected chemist, but he was also a great mentor and friend. Steve was a person of great integrity who was always ready to roll his sleeves up and join in on the work at hand.

Among some of the accomplishments of the R&D group under Steve was the development of a low free TDI product line, high performance AndurElite products, expansion of existing product lines, and many other product improvements.

We wish him the best in his retirement!

New Product: Curene 88

Curene 88 is a new curative that is a blend of phenyldiethanolamine and triisopropanolamine. It is a solid at room temperature and has an equivalent weight of 88. The typical use of Curene 88 would be to lower the hardness and resilience of an elastomer without sacrificing too much of the physical properties. Many times Curene 88 is blended with Curene 442 (MBOCA) to only vary the hardness slightly. Using 100% Curene 88 lowers the hardness by 30-40 units on the Shore A scale. If interested in a sample or for more information, contact R&D, customer service, or your sales representative.

Curene 88 Highlights:

Equivalent Weight = 88

Melting Point = 60-70°C

Viscosity @ 70°C = 65cP

Color = Light Amber

Moisture = < 500ppm

Bio-based PO3G Elastomers—A Green Alternative to PTMEG

In August and October, we presented at the PMA and CPI conferences on research we conducted on PO3G polyols. Below is an excerpt from the paper.

PO3G is a bio-based polyol that has a similar structure to PTMEG. When comparing PO3G-based elastomers to PTMEG, most properties were found to be comparable in this study as previous studies have shown. In general, the lower crystallinity and flexibility of the PO3G backbone provides prepolymers with better liquidity and lower viscosity and creates elastomers with higher elongation and improved tear strength. The compression set of PTMEG-based systems was slightly better than PO3G, however, the PO3G results were in the range of a good performing elastomer. Resilience was almost identical for the two backbones. The abrasion resistance was slightly improved for PTMEG, except for the softest systems tested, in which the PO3G was slightly better. The PO3G samples yielded similar DMA results with analogous storage modulus curves and tan delta curves characterized by a higher, narrower peak, indicating a quicker glass transition of the soft segment. The temperature of glass transition was only slightly lower for the PTMEG-based elastomers, but very comparable. When looking at sub-ambient stress-strain tests, the PO3G stayed more flexible at -30°C than PTMEG making PO3G a good candidate for cold temperature applications.

Of all the properties evaluated, the flex fatigue showed the most disparity between PO3G-based and PTMEG-based elastomers. The PO3G outlasted PTMEG by a factor of 4 to 8.5 times depending on the sample. The PO3G samples ran for thousands of cycles, while PTMEG only lasted for hundreds. As mentioned before, the monol content in the PO3G is a likely contributor of the higher tear, elongation, and flex fatigue resistance. Other properties such as tensile strength, compression set, and resilience were all adequate for a high-performance urethane elastomer. This makes the greatly increased flex fatigue a great attribute of the PO3G versus PTMEG. To prove the theory that the monol is the cause of the increase in flex fatigue resistance, an experiment could be done taking PTMEG, adding some monol content, and then measuring properties on the resulting elastomer. Future studies could also look at higher hardness (90-95A) PO3G-based elastomers to see if they have a similar increase in flex fatigue, since the amount of monol is much less for 1000 MW and lower PO3G polyols.

When blending the PO3G and PTMEG to make hybrid prepolymers, results were both expected and unexpected. Tensile and elongation properties showed the expected behavior. The tensile strength decreased while the elongation increased as PO3G was incorporated. Dynamic mechanical analysis was also straightforward. The non-synergistic, non-linear results that were observed with tear strength and abrasion resistance, however, were very unexpected for two compatible polyether backbones. At levels of 20% and 50% PO3G, both tear and abrasion were negatively impacted. As stated above, it is possible that the blend of 3 and 4 methylene polyethers in the soft segment reduced the ability to stress crystallize. The intention of the blends was for the case that processors might want to incorporate only a portion of "green" content into their parts, which could be for multiple reasons, including cost, customer resistance to change, etc. However, based on the results of these studies, it would be better to use all PO3G and go 100% "green".

If you have any questions or interest in this technology, please contact Robert Czeiszperger in R&D.

Polyurethane raw materials situation update

Anyone paying attention to any type of news these days can easily see that supplies of anything from groceries to building materials to furniture is quite a complex mess right now. This is no different in the chemical industry and specifically the urethane related raw materials. Rest assured, ADC is doing our best to keep our current customers supplied with the products you need. Many raw materials are on allocation right now, have very long lead times, or just aren't available. If a product you need is not available, a comparable substitution may be available. Contact R&D or your sales rep. with substitution questions.

New Chemist

In September, Bryant Moore joined the Urethane R&D group as an R&D chemist. Bryant is a recent graduate from Adrian College with a Bachelor's degree in Chemistry. Welcome to the team Bryant!

30A Brochure: Multiple systems to achieve ~30A

ANDERSON DEVELOPMENT COMPANY — **30A SPECIALTY SYSTEMS** — TDI AND MDI — TECHNICAL DATA

Polyurethane System	TDI - Ester		TDI - Polybutadiene	TDI - PPG Ether	TDI - PTMEG Ether	MDI - PTMEG Ether
Prepolymer	**Andur® 7 APLM**	**Andur® 8 APLF**	**Andur® XP-375**	**AndurGel OO 50**	**Andur® 80 APLF**	**Andur® M 75 AP**
Curative (ratio by weight %)	Curene® 93	Curene® 49	Curene® 107	1.28:1 A:B	Curene® 100 XPF	Curene® PTMG 1000/ TEA* (96/4)
Recommended Plasticizer	Andurflex 9-88SG	Andurflex 9-88SG	Paraflex® HT-10		Andurflex 9-88SG	Andurflex DOA**
% Plasticizer †	25%	35%	122%		20%	30%
Processing Characteristics						
Stoichiometry	1.1	1.05	0.95	~0.95	1.05	0.97
Recommended Catalyst	Andurcat 33LV or Dabco® T-12				Andurcat 33LV	
REFER TO INDIVIDUAL PREPOLYMER DATASHEETS FOR CASTING GUIDELINES. TEMPERATURE ADJUSTMENTS MAY BE AVAILABLE OR NECESSARY WHEN ADDING PLASTICIZERS.						
Elastomer Properties						
Shore Hardness	33A	31A	30-35A	27A (78 OO)	30A	29A
Tensile, psi	2300	2250	660	220	900	800
100% Modulus, psi	100	115	155	90	95	100
300% Modulus, psi	180	250	255		160	165
Elongation, %	740	500	600	350	690	615
Die C Tear (D624), pli	85	80	45	30	65	70
Split Tear (D1938), pli: AVG.	19	7	6	3	12	14
D395 Comp. Set, % (22 hrs @ 70°C)	3	3	30 (5 @ 25C)	0	9	14
D2632 Rebound, %	57	45	60	55	55	66
Attributes / Comments	Good solvent resistance; ultra low compresssion set	Good solvent resistance; ultra low compresssion set	Extremely excellent water/acid/base/bleach resistance	Room temperature cure; easy to process; low compression set	Good water/acid/base resistance; low compression set	Wet & dry food contact approved; good water/acid/base resistance; low compression set; high rebound

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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.

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