



VINYL NEWS



Chair's Message

Vinyltec 2015 will be held October 13-15, 2015 in Akron Ohio and will be co-sponsored by the Akron Section of the Society of Plastics Engineers. The Technical Program Committee led by Kasper Van Veen has assembled an exciting theme for this conference, “Enabling Technologies for the Future in the PVC Industry”. The technical program is comprised of topics related to rigid and flexible vinyl. The conference will focus on:

- Opportunities & Challenges of PVC Recycling
- Market Applications of Vinyl
- Equipment Interaction
- International Applications & Markets
- The Impact of Environmental Considerations
- Economic Impacts on the Vinyl Industry

The conference will be preceded by a one day conference on “PVC Compounding Technology and Materials”. During this conference, information will be presented on the fundamental aspects of PVC compounding that includes fundamentals of PVC formulating, additives for flexible PVC, plasticizer selection and interaction, equipment interaction, and many more topics.

I would encourage you to register for this exciting event. It is an opportunity to learn about new technologies and markets for vinyl products and it is also a great opportunity to network with people in the industry. I hope to see you at Vinyltec 2015 in October!

Maryellen

President, SPE Vinyl Plastics Division

David Riley Remembered



On July 9th we lost a friend. Dave served in World War II as a Naval Deck Officer, then earned a PhD in Chemistry at Ohio State. He had been a research chemist for Goodyear, DuPont, Union Carbide, General Cable and Tenneco before founding Extrusion Engineers, which specialized in melt rheology, friction analysis and process equipment. He published frequently on topics ranging from extrusion, analytical methods, friction properties of thermoplastics, rheology of vinyl compounds, elongation flow behavior of melts to shear effects on molecular structure of polymers. This work led to very substantial cost reduction in extrusion, particularly in wire and cable manufacture, as well as to ASTM methods D3364 Melt Flow Analysis, D3591 Analysis of Formulated PVC, D5576 Structural Entities in Polyolefins and D5477 Polymer Layers or Inclusions by FTIR. A condensation of one of his later papers follows.

In addition to being a Fellow of the Society, Dave was recognized similarly by the American Institute of Chemists, American Association for the Advancement of Science, American Society for Testing and Materials, and the Institute of Electrical and Electronic Engineers.

What we will remember most is the help given unsparingly to younger colleagues and the shining smile. Let us smile once more for Dave.

SHEAR DEFECTS ON THE MOLECULAR STRUCTURES OF PVC AND OTHER POLYMERS NEAR NANOMETRIC SIZES

David W. Riley

Extrusion Engineers
Princeton, New Jersey

Introduction

The rheology of polymer flow is inherently and sensitively related to the molecular structure. The science would be simple if the polymers were stable—all we would have to do is relate the molecular weight, molecular weight distribution, and the melting characteristics directly to the flow and we would have most of our answers. Shearing effects have long been an unrecognized hindrance to proper processing. With the major work in the last fifty years being in the area of heat stabilization, shear changes have now become the major detriment to consistent properties in most polymers.

However, most polymers are not shear-stable and are changed, depending on the type of structure and the amount and intensity of shear during flow. The range of shear rates studied and addressed is over ten billion reciprocal seconds. The results of this study lead one to the conclusion that most of the problems in processing are due to a complete lack of understanding of these alterations in the structure (assuming consistent compounding). These alterations range from macromolecules through nanostructures to small, even volatile polymers. These structural differences will be discussed in detail, emphasizing the importance of nanometric sizes.

As if the effect of shear were not enough to alter the structure, the presence of oxygen dissolved in the polymer adds to the complexity; these additional reactions can cause complex branching and even incipient crosslinking. The end result can be unprocessable gel formation.

Almost every polymer is different in its capacity to change with shear. Poly(vinyl chloride) is one of the more sensitive, followed by polypropylene and polybutylene. The relative sensitivity of a wide range of polymers will be discussed.

Also the usefulness of various rheometers in detecting many of these changes will be discussed. The structural changes and rheological effects in the polymers will also be interpreted by molecular-structural functions observed using infrared spectroscopy and size exclusion chromatography, as well as other analytical functions.

Experimental

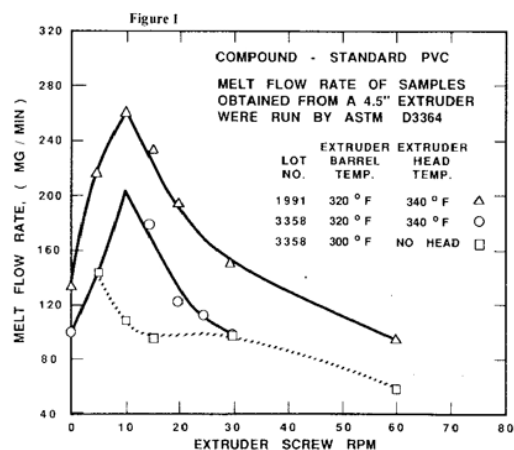
Processing Example: Instability Studies using Extruders. In Figure 1, the instability of melt flow is given as a function of RPM of an 1112 mm (4 1/2") extruder vs. Melt Flow Rate. Three lots of flexible PVC were run through the extruder at normal processing temperatures (170°C) at different screw speeds. The material was sampled coming out of the crosshead for two cases. A third set of samples was taken directly off the tip of the screw. The differences demonstrate what happens for both the effect of the crosshead vs. the screw alone. The barrel settings ranged from 150 to 160°C, trying to take heat out of the compound. The head was set at 170°C.

Results & Discussion

The ranking of shear instability for many polymers has been evaluated, and we conclude that apparent shear stability ranks in the following order:

Most shear stable	Low density Polyethylene Linear low density PE High density PE Polybutylene
Almost the least stable	Polypropylene (mostly decreasing mol. wt.)
Least stable	Poly(vinyl chloride)

The shear effects proceed through a mechanism of fragmentation to a series of re-alignments into a progressively more complex series of structures in PVC. These complex structures are defined as incipient crosslinking. This complex polymeric system has been observed widely in the processing world. However, the results are greatly modified depending on the level of sensitivity to alteration by mechano-chemical chain reactions.



References

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- ASTM D 3364, "Test Method for Determining the Melt Flow Rate for PVC With Molecular Structural Implications." The name is the process of being changed to Melt Flow Rate for Polymers With Molecular Structural Implications and the Scope broadened to cover all thermoplastic polymers.
- ASTM D 1238 "Test method for Measuring the Flow Rate of Plastics using an Extrusion Plastometer."

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Registration Fees

Pre-Conference Compounding Workshop & Full Conference		
	Register before Sept. 25th	After Sept. 25th
SPE Member	\$700.00	\$775.00
Nonmember	\$809.00	\$884.00

Full Conference Wednesday October 14th and Thursday 15th		
	Register before Sept. 25th	After Sept. 25th
SPE Member	\$500.00	\$575.00
Nonmember	\$609.00	\$684.00

Pre-Conference Compounding Workshop ONLY Tuesday October 13th		
	Register before Sept. 25th	After Sept. 25th
SPE Member	\$250.00	\$325.00
Nonmember	\$359.00	\$434.00

Emeritus/Student

\$225 for Pre-Conference Workshop & Full Conference

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Speaker/Moderator

No charge on day of presentation

\$150 for remainder of Conference

Please note that if you are using Internet Explorer, you will experience timing out issues. Please use Firefox, Google Chrome or Safari (Mac only). For help registering, please call Scott Marko at +1 203-740-5442.

Lunch will be provided for everyone at the Pre-Conference Compounding Workshop

*Nonmembers registration fee includes one year membership dues.



Enabling Technologies for the Future of the PVC Industry

Workshop—October 13, 2015

8:30 am - 10:00 am	<i>PVC Manufacturing</i> Bob Paradis, Formosa
10:00 am - 10:30 am	<i>Overview of PVS Compounding</i> Jim Summers, P3 Consultants
12:00 pm - 1:30 pm	Lunch
1:30 pm - 2:15 pm	<i>Stabilizers</i> John Scott, Valerus
2:15 pm - 3:00 pm	<i>Lubricants</i> Stan Walzyk, BYK
3:00 pm - 3:30 pm	Break
3:30 pm - 4:15 pm	<i>Plasticizers</i> Emily McBride, Applications Lab Supervisor, Emerald Dick Koslowski, Emerald
4:15 pm - 5:15 pm	<i>Panel Q&A</i> Jim Summers, P3 Consultants John Scott, Valerus Dick Koslowski, Emerald Emily McBride, Applications Lab Supervisor, Emerald Bob Paradis, Formosa Stan Walzyk, BYK



Enabling Technologies for the Future of the PVC Industry

Conference Agenda—October 14, 2015

8:15 am - 8:30 am	<i>Welcome, Introductory Comments</i> Kasper Van Veen, Vice President of Research and Product Development, Vintex
8:30 am - 9:30 am	<i>Vinyl Market Presentation</i> David Peters, Shawnee
9:30 am - 10:00 am	<i>Plasticizer Market Overview</i> Sandy Payne, BASF
10:00 am - 10:30 am	Break
10:30 am - 11:00 am	<i>Gelation and Fusion of PVC Resin</i> Dave Owen, Technical Service Specialist, BASF
11:30 am - 12:00 pm	<i>HMW Dibenzates</i> Emily McBride, Applications Lab Supervisor, Emerald
12:00 pm - 1:30 pm	<i>The Truth on Global Warming (Lunch Speaker)</i> Jim Summers, P3 Consultants
1:30 pm - 2:15 pm	<i>The Current State of Unconventional Hydrocarbon Development in the Northern Appalachians</i> Dr. Southgate, Ohio State
2:15 pm - 2:45 pm	<i>Development of Low Volatility Bio-Based Plasticizers</i> John Schneider, Lawter
3:15 pm - 3:45 pm	Break
3:45 pm - 4:15 pm	<i>Roofing</i> John Greko, Carlisle
4:15 pm - 4:45 pm	<i>Innovation in Extrusion</i> Grant Flaherty, Batterfeld
4:45 pm - 5:15 pm	<i>Dies—PVC Die Design</i> Derek Ford, Tech Manager, Cloeren
5:15 pm - 5:45 pm	<i>Recyclable and Renewable Plasticizer</i> Woo Sung Bae, Resinate Materials
5:45 pm - 6:15 pm	<i>Opportunities of PVC in the Credit Card Market</i> Tim Wetherrill, Klockner Pentaplast



Enabling Technologies for the Future of the PVC Industry

Conference Agenda—October 15, 2015

8:00 am - 8:30 am	<i>Criteria and Concerns in the Selection of Resources Utilized in a Compounding Facility; A Compounder's Perspective</i> Bud Botset, Color Master Dan Oakley, Color Master
8:30 am - 9:30 am	<i>SCI-Arc Houses</i> Rich Krock, Technical Director, Vinyl Institute
9:30 am - 10:00 am	<i>Analytical Tools to Predict Mechanical Performance</i> Jason Lyons, R&D Manager of Acrylic Additives, Arkema
10:00 am - 10:30 am	Break
10:30 am - 11:00 am	<i>Heat Stabilizers</i> Luiz Cruz, North American Business Manager, AM Stabilizers
11:30 am - 12:00 pm	<i>Heat Stability in PVC Compounding and Extrusion</i> Dan Molefem University of Pretoria
12:00 pm - 12:30 pm	<i>Flexible Vinyl Division, Containment and Prop 65</i> Kevin Ott, Vinyl Institute
12:30 pm - 1:30 pm	Vinyl Plastics Division Meeting
1:30 pm - 2:00 pm	<i>PVC Property Modification Using Styrenics Based Modifier Systems</i> Mohammed Abboud, Styrosolution
2:00 pm - 2:30 pm	<i>Effect of Iron Content in Ground Calcium Carbonate on Accelerated Weathering Properties of Rigid PVC Compounds</i> Lane Shaw, JM Huber
2:30 pm - 3:00 pm	<i>Plasticizer Induced Stress Cracking of Rigid PVC and Polycarbonate</i> Paul Kroushl, Teknor Apex
3:00 pm - 3:30 pm	Break
3:30 pm - 4:00 pm	<i>SPE Communication and Technology Capabilities</i> Kathy Schatch, SPE Governance Liaison
4:00 pm - 4:30 pm	<i>Weatherability of Cast PVC Films</i> Mark Alessandro, Avery Dennison
4:30 pm - 5:00 pm	<i>Presentation from Lab Around Akron</i> Jim Isner, PDI
5:00 pm - 5:30 pm	<i>Raw Materials Perspective</i> Paul Klitch, Avery Dennison

Councilor's Report

At the time that this newsletter will publish the Vinyl Division will be getting ready for the 2015 Vinyltec in mid-October in Ohio and the Council will be meeting in Pittsburg just before the Vinyltec in Pittsburg. The Vinyltec this year will be in Ohio and the program is fully packed with great presentations. I would certainly encourage you to attend. It will be near Akron Ohio.

As this is prior to the Council meeting there really is not much to report on at this time. However I have been asked to join the Operational Planning Committee. This group is somewhat free ranging (but not like the chickens you can buy). Actually it is a group focusing on planning change (at least partially) is the best way I can explain. Dr. Brian Grady is the current chair of this group.

One of the team's members is on the Next Generation Advisory Board. Of course one of our tasks is to set a recognition program for younger professions. There are two awards that are being considered. One is an award similar to the Honored Service Member award and the other is similar to the Fellow award. It is not to say that someone 35 years old or younger could not be awarded either of the standing awards (HSM or Fellow) mentioned above could not be awarded to a young profession in the plastics industry but as we all know this would not be the norm in the SPE. So to recognize a younger member the concept a different criterion from current requirements for these types of awards would be set. One for the Service award and the Technical award would be another. The committee is in the process of designing these awards at this time. This is not to diminish the current HSM or Fellow (the author is both) but to actually enhance them. And of course allow a young member to understand the value for their self and for the place of employment.

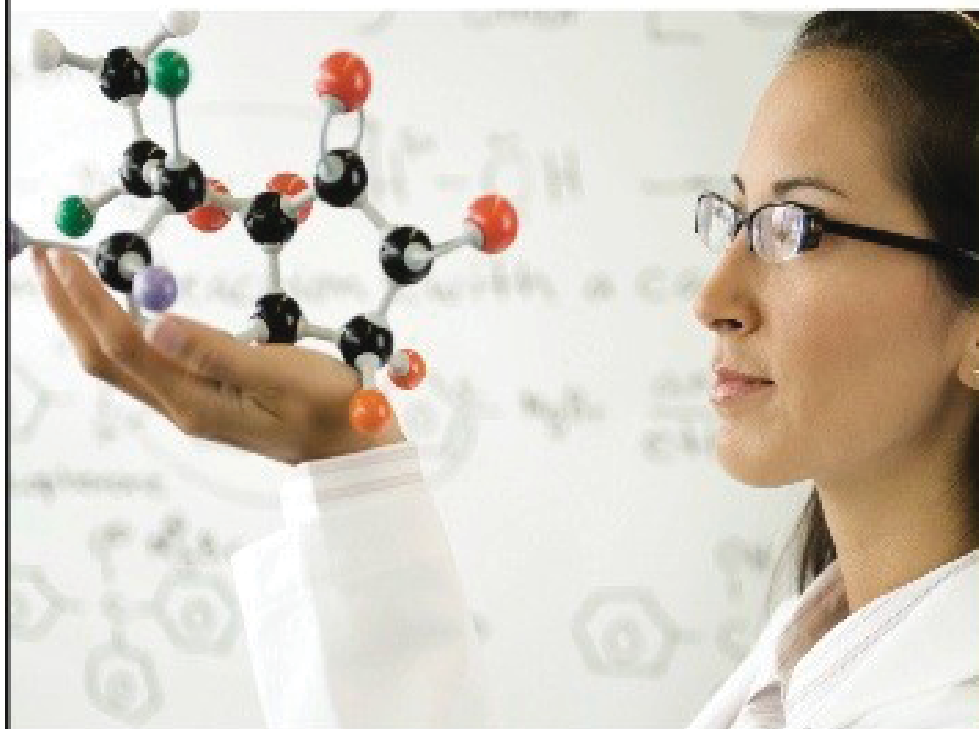
All of us in the SPE should consider mentoring to get others to understand the value of SPE. I really know it was important in the development of my career and we would like to pass it on just as others have helped us.

I have not seen an agenda for the Council meeting yet. So it really is not wise to speculate. But as always I welcome comments and questions about Council. I am your voice in the SPE governance. Please use it.

Best Regards,

Bill Arendt
Research Fellow
Honored Fellow of the Society
Vinyl Plastics Division Councilor

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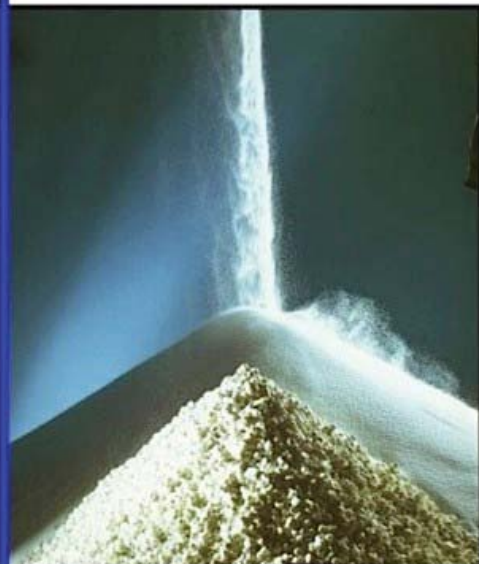


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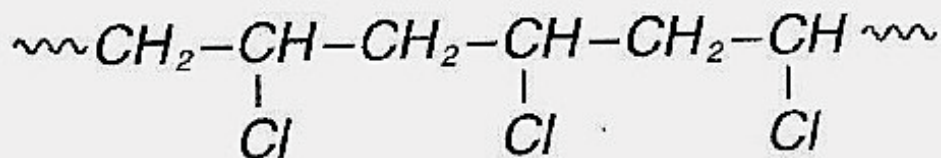
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