International Training Course (TechnoBiz)

PVC Processing

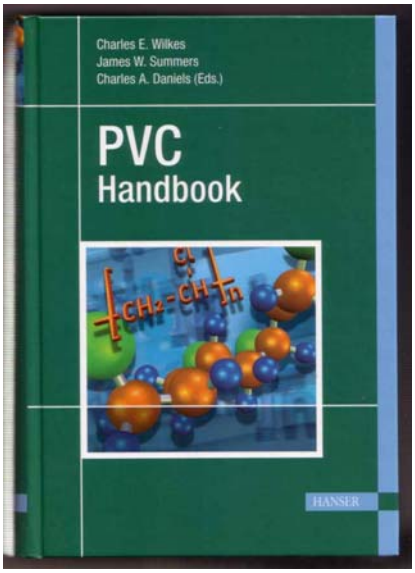
3-4 November 2008, Century Park Hotel, Bangkok

6-7 November 2008, Grand Seasons Hotel, Kuala Lumpur

This 2-day technical training course on PVC Processing is designed for engineers, production managers, and quality control managers and R& D people related to PVC. The course instructor is world-renowned PVC expert Dr. James Summers.

FREE
"PVC Handbook" !!
(For every 2 delegates from the same organization)

Program Outline



PVC Polymer Preparation

Poly(vinyl chloride) (PVC) has a chemistry and a physical structure that makes it broadly unique in the polymer world. PVC (often referred to as vinyl) is polymerized commercially by the free-radical polymerization of vinyl chloride. PVC is one of the few polymers that are insoluble in their monomer, thus causing precipitation early in polymerization conversion to form particles. This offers the rare opportunity to influence and control morphology during polymerization by using surfactants at the polymer, monomer, and water interfaces, by agitation, and by the additives' charging process. Control of the PVC polymerization and measurement of PVC characteristics that affect PVC processing and properties are discussed.

PVC Melt Processing

Highly syndiotactic PVC forms a crystalline structure that is virtually unmeltable. Therefore, small runs of syndiotacticity and small fringed-micelle crystallites found in commercial PVC's can make it impossible to completely melt PVC during processing, therefore, it flows as bundles of about 10 million molecules (primary particle flow units at 1 μm diameter). This behavior is also very rare in the polymer world where most polymers flow as completely melted molecules. This leads to some unique advantages for PVC. The processing is discussed in detail and advantages and disadvantages are pointed out. This understanding is quite valuable in formulating and trouble-shooting PVC processes for compounding rigid and thermoplastic elastomers, for extrusion, and for injection molding. The control of PVC's properties is discussed in terms of processing. Processing of dispersion compounds is also discussed and mechanisms described. Powder compound preparation and guidelines are discussed. The achievement of good dispersion (breaking particles to smaller sizes) is discussed in terms of machine design and formulation. Additives such as color concentrates must be designed properly.

Formulating for Specific Properties

Vinyl compounds often contain nearly 50% chlorine. In a fire, vinyl provides only about half the fuel compared to other polymers. Halogens in flame-retardants, including chlorine in PVC, additionally provide condensed phase and gas phase combustion resistance by a radical-trapping, flame-poisoning mechanism.

This flammability uniqueness is compared to other polymers. Compounding and adding plasticizers makes PVC a thermoplastic elastomer (TPE). PVC's TPE property capability will be compared to other polymers. Stabilizers are used to enable PVC to be processed at high temperatures, up to 280°C in injection molding. Mechanisms are described for various organo-metallic compounds as well as for stabilizers having no metals.

Choosing Additives for PVC

Poly(vinyl chloride) is moderately polar, as judged by its solubility parameter. Thus when polymers are sorted according to solubility parameter, PVC is centrally located in this table, making it fairly easily to compatibilize with other polymers and therefore amenable to compounding. For example, PVC, located between polystyrene and polyacrylonitrile, is compatible with styrene/acrylonitrile copolymers such as in ABS. Also PVC has a strong attraction to esters. This attraction is particularly notable for PVC with acrylic processing aids and for PVC with ester-containing plasticizers. Thus PVC is known for its ability to be compounded because so many materials can be blended with it. The processing aid properties and mechanism are described. Impact resistance of PVC is achieved with energy absorption by PVC. Rubbery particles and nano-filler particles cause PVC to absorb this impact energy, which also depends on processing conditions. Mechanisms are described as well as the characteristics of various impact modifiers. Lubrication is one where the understanding requires us to look as these additives as surfactants. Lubrication mechanisms are described in detail. The promise of nano-composites is discussed, as well as more traditional fillers for stiffness and low cost. Bio-fillers are also discussed.

The Special Properties of PVC

The time-temperature properties of PVC's glass transition temperature (Tg) are discussed. Additives to raise Tg are described. Long-term properties are considered for PVC and compared to other polymers such as olefins. PVC compounds have been widely used in exterior applications since the 1950s. These applications include house siding, accessories, vinyl window and door frames, fencing, decking and outdoor furniture, pond liners, garden hose, greenhouse film, and electrical boxes. PVC can be compounded to have good weathering characteristics required. These include color retention, physical property retention, and dimensional stability. To insure acceptable performance in actual long- term use of PVC in exterior applications, good understanding of PVC degradation mechanisms and the effect of compound additives and processing on retention of the properties are necessary. These are discussed in terms of mechanisms where PVC is compared to other polymers and products.

Environmental and Safety Issues

The vinyl industry can also be proud of how safety is a priority, not only in products, but also within the working environment of the industry itself. It is an example to the world of responsible product stewardship. When, in the 1970s, the industry observed a rare liver cancer, it was quickly reported to government agencies. Leading PVC producers quickly solved the vinyl chloride monomer exposure problem and shared the technology with the whole industry to eliminate this health issue. This and other issues of PVC and additive safety are discussed so that you can be assured of responsible product stewardship. Issues to be discussed are monomer, stabilizers, hydrogen chloride, plasticizers, and combustion.

Program Instructor – Dr. James Summers

Dr. James Summers graduated from Rose-Hulman Institute of Technology in Chemical Engineering and then graduated from Case Western Reserve University in Chemistry and Macromolecular Science & Engineering. This led to a 45 year career as a scientist and engineer with BFGoodrich, The Geon Company, PolyOne, and P3Consultants.

His specialty is PVC technology and he presents his work with fundamental understanding for mechanisms, chemistry, and polymer science. He serves the Society of Plastics Engineers, Vinyl Division as Director and serves on the Technical Program Committee. He serves as Associate Editor of the Journal of Vinyl and Additive Technology and serves on the Editorial Board for the Journal of Applied Polymer Science. He has published well over 120 technical papers and patents and 4 books.

Registration Fee

Registration Fee : 750 US$ / delegate

The course fee includes documentation and lunch & refreshments.

Group Registration: If 3 or more than 3 delegates from the same organization register, 10% discount will be offered on the course registration fee. If 6 delegates register from the same organization, 7th person participation is FREE. For every 2 participants from the same organization, one "PVC Handbook" will be given along with course documentation.

Course Language: ENGLISH

Program Agenda:

Day 1		Day 2	
08.00 - 09.00	Registration		
09.00 - 09.10	Welcome Remarks	09.00 - 10.30	Lectures
09.10 - 10.30	Lectures	10.30 - 10.45	Coffee Break
10.30 - 10.45	Coffee Break	10.45 - 12.30	Lectures
10.45 - 12.30	Lectures	12.30 – 13.30	Lunch Break
12.30 - 13.30	Lunch Break	13.30 - 15.00	Lectures
13.30 - 15.00	Lectures	15.00 – 15.30	Coffee Break
15.00 - 15.30	Coffee Break	15.30 - 17.00	Lectures
15.30 - 17.00	Lectures	17.00 – 17.30	Discussion
17.00 – 17.30	Discussion		

Course Organizer – TechnoBiz Communications

TechnoBiz Communications, Bangkok publishes monthly magazine "Plastic Technology Asia" and organizes technical training courses and conferences related to plastic and rubber industries in Asia. Information on training courses is available at www.technobiz-asia.com .

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Contact Person : Ms. Saowalak, Program Coordinator

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PVC Processing

Registration Form

We register for ❑ 3-4 November 2008, Century Park Hotel, Bangkok, THAILAND

❑ 6-7 November 2008, Grand Seasons Hotel, Kuala Lumpur, MALAYSIA

Organization Name …….....

Address …….....

……..

Tel ……..Fax …….. Email ……

Contact Person …….. Tel ……..…… Email ……..

Participant Name

Participant 1: ……. Position ……..…… Email …….....

Participant 2: ……. Position ……..…… Email …….....

Participant 3: ……. Position ……..…… Email …….....

Participant 4: ……. Position ……..…… Email …….....

Registration Fee per Participant : 750 US$

Payment Method

❍ Cheque / Draft Payable to "TechnoBiz Communications Ltd., Part."

❍ Bank Transfer to Bangkok Bank PCL, Ratchada-Latphrao Road Branch, A/C No: 177-0-65819-1
A/C Name: TechnoBiz Communications Ltd., Part., Swift Code: BKKBTHBK

❍ Credit Card ❑ Visa ❑ Master Card

Card Number ……

Cardholder Name …….

Last 3 digits on signature panel ……Card Expiry Date …….

Signature of Cardholder ……

Date ……...

Please send completed registration form

TechnoBiz Communications Ltd.

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