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PVC Handbook

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Vorwort

Preface

In this single handbook the editors aim to give a diverse audience of readers a complete account of all aspects of PVC – from monomer manufacture to polymerization; the gamut of such additives as stabilizers, lubricants, plasticizers, impact modifiers, fillers and reinforcing agents; blends and alloys; compounding and processing; characterization; combustion resistance and weatherability; product engineering design; applications; environmental and safety; and finally the PVC industry dynamics. Jim Summers' Introduction presents a good historical background on PVC and several of the individual chapters give a historical perspective to the technologies therein. The handbook contains both practical formulation information as well as a mechanistic view of why PVC behaves as it does. The authors are from both industry and academia. Not surprisingly, many of the industry authors are from the former BF Goodrich laboratories, where much of the industry's technology was developed. Overall, however, about ten PVC and chemical- supplier companies are represented by the authors.

When I joined the BF Goodrich laboratories from graduate school in the mid-sixties, PVC research was one of the many challenges there. I had the great privilege of many conversations with Dr. Waldo Semon, who was still roaming our halls at that time. One of his quotes that will always stick with me was: "Chuck, you'll find that PVC is perhaps the most inert chlorine compound in existence." His words preceded by decades the health and safety concerns with chlorinated materials in general. But they are true today. PVC is a very safe material when used and disposed of properly.

I probably wouldn't have agreed to take on this daunting task if it weren't for tremendous contribution of my co-editors, Jim Summers and Chuck Daniels. With the addition of their broad network of PVC experts, we were able to organize this sterling group of authors. And, they made many detailed technical enhancements to the diverse chapters. Thanks also to Christine Strohm and coworkers at Carl Hanser Publishers for soliciting outside recommendations regarding the make-up of the handbook and for many enhancements in the chapters' readability.

Many of the fundamental technology discoveries related to PVC were made in the 1930's through the 1950's. Since those times, continuous improvement, broadening of applications, and process improvements for cost reduction and safety have been the mainstay of PVC research. The billions of pounds of PVC made today still use the free radical catalysts discovered in the '30's. On the innovation front, some readers will be familiar with the PVC Technology Consortium organized by the Edison Polymer Innovation Corporation and carried out over the period 1998 to 2005. I have been privileged to direct this consortium of twenty one sponsor companies from fourteen countries who funded 12 research projects in six universities. I'd like to point out a few highlights of results from that consortium. Rich Jordan University of Chicago), Bill Brittain (University of Akron) and Tony Rappe (University of Colorado) and coworkers gained great understanding toward the metallocene polymerization of vinyl chloride, but in the end were unsuccessful. Their very excellent work has been published and will hopefully stimulate future success in some laboratory. On the other hand, Virgil Percec (University of Pennsylvania) and coworkers have succeeded in living radical polymerization of vinyl chloride. This technology has produced narrow molecular weight distribution homopolymers as well as a range of block copolymers (both high Tg and low Tg). Several publications and patents have resulted from this landmark work. Bill Starnes (College of William & Mary) and coworkers have discovered a family of new non-metal PVC stabilizers. Chapter 4 herein and several publications and patents describe the results. Jim White and coworkers (University of Akron) have published and patented new high performance alloy technology, including new block-copolymer compatibilizers. Joe Kennedy and coworkers (University of Akron) have published and patented some novel modifications of PVC via anionic polymerization. Kyonsuku Min and coworkers (University of Akron) published on the preparation of PVC-polyurethane alloys by their reactive formation in a twin screw extruder. Eric Baer and Anne Hiltner (Case Western Reserve University) published excellent fundamental studies of toughness, creep and fatigue resistance in PVCs. Jerry Lando and Morty Litt (Case Western Reserve University) attempted to modify PVC stereostructure by polymerization additives. And, Miko Cakmak (University of Akron) published on the characterization of chemical and morphological changes in PVC compounds during extrusion processing by on-line measurements. I personally hope that this body of published and patented knowledge will result in a renaissance for PVC – resulting in many new applications and continued good growth.

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