

NEW RAW MATERIALS – THE KEY TO INDUSTRY GROWTH

William E. Broxterman, Ph.D.
Chairman

The ChemQuest Group, Inc.
Cincinnati, Ohio

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The U.S. adhesives industry has two admirable characteristics. The first is that it is part of a global industry that has been in existence for thousands of years. Indeed, examples of adhesive usage have been found in ancient Egyptian tombs. When one considers all of the industries that were created, passed through their growth and decline phases and then disappeared in that time, it is quite remarkable.

The second characteristic is that it has consistently out performed U.S. GDP over the last 30-40 years. Although the growth has slowed over the past decade, its growth is still expected to exceed GDP over the next five years. This is also remarkable. In 2004, ChemQuest estimates the size of the U.S. formulated adhesives industry to be 6.82 billion dry pounds, with an average annual growth rate of 3.9%/year. This growth rate is at least 0.5% faster than 3.4%/year rate expected for U.S. GDP.

Why has this industry continued to display this vitality? Who should get the credit for such an astonishing growth record? In this writers opinion the credit is shared equally by the adhesive formulators and the raw material suppliers.

The adhesive industry has always benefited from the fact that it is a component of the fastening industry. As such, a significant percentage of its enhanced growth has been from its ability to capture market share from other types of fasteners (nails, screws, staples, rivets, etc.). Yet, there are many other examples of growth not related to other fasteners. For example, when the changes that have occurred in signage are considered, ranging from interstate highway signs to fleet marking decals, the growth of pressure sensitive adhesives in these applications have arguably come at the expense of the paint and coatings industry.

The adhesive industry has benefited from a continuing evolution of new applications for adhesives to attack. Furthermore, there is every reason to believe that new applications will continue to emerge, and adhesive formulators deserve a great deal of credit for their ability to identify these opportunities and their expertise in formulating new adhesives to meet these needs in a timely manner. However, it must also be acknowledged that many of these success stories are heavily dependent on the development of new raw materials with improved properties.

On a historical basis the raw materials used in this industry went through a significant upheaval in the 1930 to 1940 time frame. This period coincided with the early discovery and development of



polymers. Prior to 1930 virtually all adhesives were made from naturally occurring raw materials such as starch, casein, rosin, animal / fish parts and natural rubber, among others. Since these materials were all water soluble, water based adhesives were not only the dominant technology but virtually the exclusive technology.

Since 1940, polymers have moved steadily from an embryo to sophisticated polymer architectures. During the period of 1940 through 1965, which I have arbitrarily termed the “early synthetic” period, most of the polymers that received significant commercial development attention were primarily homopolymers, or simple copolymers. Included in these “early synthetic” polymers were polyvinyl alcohol, polyvinyl chloride, polyvinyl acetate, polychloroprene, styrene butadiene, as well as others listed in Table 1.

By contrast, those polymers that received their major commercial development effort in the adhesives industry after 1965, I have termed “New Synthetics”. Interestingly, the introduction of a new raw material class never replaces an existing class in all of its applications. Instead, it typically replaces some of the existing demand from the incumbent raw materials, but the enhanced properties allow formulators the opportunity to capture new applications where existing adhesives couldn’t compete.

Table 1

Types Of Raw Materials

<u>Natural Product</u>	<u>Early Synthetics</u>	<u>New Synthetics</u>
Bitumens	Hydrocarbons	Acrylics
Casein	Butyl Rubber	Structural Acrylics
Animal/Fish	Nitrile Rubber	Anaerobics
Cellulosic	Polychloroprene	Cynoacrylates
Terpenes	Phenolics	Epoxies
Rosin Derivatives	Polyisobutylene	Polyamide
Natural Rubber	Polyethylene	Polyester
Starch/Dextrine	Polypropylene	E V A
Silicates	Styrene Butadiene	Block Copolymers
	Polyvinyl Acetate	Silicones
	P V C	Polyurethanes
		V A E
		Acrylic Vinyl Acetate



For this reason, there is still significant demand for the natural product-based adhesives today. In fact, ChemQuest estimates that these raw materials, as a group, accounted for almost 30% of the 2004 formulated adhesive demand. However, they are continuing to lose market share and are expected to account for less than 20% of the industry growth over the next five years. Suppliers of many of these materials have continued their investment in modifications of its products and more efficient manufacturing processes. This is most notable among suppliers of starches, rosin derivatives and terpenes. Without that investment the decline would have been far more dramatic. It's also interesting to note that the high price of oil, and products derived from it, is giving new life to some these products due to formulators finding new ways to utilize them with synthetics as a way to manage costs.

When the Early Synthetics are considered as a class, they account for 42% of the 2004 adhesive demand; but they are also losing market share while accounting for only 33% of the growth. The New Synthetics clearly emerge as the growth stars accounting for almost 50% of the expected growth although they account for only 28% of the total 2004 demand.

Table 2

2004 U.S. Formulated Adhesive Demand

(In Billions of Dry Pounds)

	<u>2004</u>	<u>Annual Growth Rate</u>
New Synthetics	1.95	6.3 %/yr
Early Synthetics	2.87	3.1 %/yr
Natural Product	<u>2.00</u>	2.6 %/yr
TOTAL	6.82	3.9 %/yr

This simple analysis clearly shows how the newer classes of raw materials are responsible for enhanced industry growth. It is this conclusion that makes the business environment of the past three years so troubling. During these years, most raw material suppliers found its costs increasing with little opportunity to pass through price increases. As such, costs were reduced wherever possible, including R&D costs, and capital investment. Now, because of that reduced investment, shortages are occurring and prices are quite naturally moving up. This will allow them to reinvest in their businesses. While this investment will clearly be made in manufacturing, we should all hope that some of this investment is also made in R&D. Without that investment, it is difficult to see how this industry can keep its vitality over the long term.



About the Author



Dr. William E. Broxterman

Chairman
The ChemQuest Group, Inc.,
(www.chemquest.com)

an international strategic management consulting
firm specializing in the
Adhesives, Sealants and Coatings industries,
headquartered in Cincinnati, Ohio.

Founder of The ChemQuest Group, Inc., Bill has worked with clients worldwide in the Coatings and the Adhesives and Sealants industries on issues ranging from acquisitions and divestitures to strategic market development and growth decision. He has been a frequent speaker on market dynamics and management for major industry associations and is quoted regularly in trade publications. Dr. Broxterman is a graduate of Xavier University with B.S. and M.S. degrees and received a Ph.D. from Purdue University. He held Director level management and strategic planning positions at Borden Chemical and research and development management positions at Dow Chemical prior to founding ChemQuest.

Contact Bill at (513) 469-7555 or wbroxterman@chemquest.com

Questions or request for additional copies of this paper may be directed to the author at:

The ChemQuest Group, Inc.
8150 Corporate Park Drive
Suite 250
Cincinnati, OH 45242

(513) 469-7555
(513) 469-7779 – FAX

www.chemquest.com

