

Industrial Development of Adhesives

Detail Introduction :

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The Industrial Production of adhesives began in the 17th century. In 1690, the Netherlands first created a factory to produce natural polymer adhesives. In 1700 Britain established a factory mainly producing glue.

In the early 19th century, Switzerland and Germany sold casein, an adhesive extracted from cow's milk. Afterwards, the salt produced by casein and quicklime appears to make a solid adhesive. The United States built its first adhesive factory in 1808, creating animal glue and soy protein glue. In the mid-19th century, people began to manufacture plywood with natural adhesives such as animal glue, starch glue, and casein.

In the 20th century, synthetic adhesives appeared thanks to the development of modern polymer technology. The Production of synthetic resin adhesives began with the invention of phenolic resins by L.H. Baekeland in 1907. In 1909, Baekeland published two essential patents for the phenolic resin industry, and in 1910 he founded the Bakelite Company in the United States, becoming the founder of the phenolic resin industry. In the 1920s, the United States trial-produced natural rubber pressure-sensitive adhesives in 1925, and alkyd resin adhesives came out.

In the 1930s, the urea-formaldehyde adhesive was put into industrial Production by the British Cyanamid Company in the United Kingdom; the polyvinyl alcohol adhesive that could be produced in small batches was trial-produced in Canada; the Soviet Union successfully trial-produced polybutadiene rubber; the United States successfully developed it in 1931. In 1933, Germany developed styrene-butadiene rubber and natural butadiene rubber. In 1935, it started trial production of polyisobutylene. In 1937, AG Bayer successfully developed polyurethane. In 1939, the United States introduced polyvinyl acetate adhesives to market. In the 1940s, the United States developed butyl rubber and developed melamine adhesive in 1941. It was successfully trial-produced and put into mass production of unsaturated polyester adhesive; in 1942, Dow Corning Company put silicone resin into Production. In 1945, GE first developed silicone rubber. The world's first epoxy adhesive was put into Production and exhibited at the Swiss Industrial Exhibition. Epoxy adhesives have since become famous as all-purpose adhesives. In 1949, the United Kingdom successfully developed a series of polyacrylate pressure-sensitive adhesives.

During the Second World War, due to the needs of the military industry, the adhesives also had corresponding changes and development, especially the adhesives applied to the structural parts of the aircraft; the "structural adhesives" appeared, mainly Phenolic-acetal, phenolic-nitrile, phenolic-chloroprene adhesives.

1941, the British Aero Company invented a phenolic-polyvinyl acetal resin hybrid structural adhesive, brand name is "Redux," which was used in the bonding of the main wing of fighter jets in July 1944 and was successful. In 1944, adhesive was the first to successfully bond a clutch on a tank.

In the 1950s, the United States took the lead in the development of adhesives. In 1953, Loctite successfully developed an anaerobic adhesive, and the polyamide hot-melt adhesive produced by the Bostik division of Emhart was used for the hem of the shoe upper. In 1955, Dupont Company was the first to obtain a polyimide. In 1957, the Eastman Kodak Company of the United States invented the cyanoacrylate instant adhesive, which opened a new era of instant bonding, which can bond and position in a few seconds to form a strong bond. In 1959, DuPont's glycidyl methacrylate came out, and in the following year, EVA was put into production. In 1959, Eastman Kodak Company in the United States mass-produced Eastman instant glue. Later, the glue was also used to human bond tissue and was used clinically.

In the 1960s, EVA hot-melt adhesives began to appear, and the development of adhesives reached a stage which greatly enriched the varieties of adhesives and broadened the adhesive market. In 1961, Namco Company in the United States developed high-performance high-temperature-resistant polybenzimidazole; the same year, DuPont developed a similar polyimide adhesive. In 1962, Westing House Company of the United States developed polyphenyl ether adhesive, and Dow Corning Company also developed solvent-free silicone resin adhesive in the same year. In 1963, SBS was first industrially produced by the American Shell Petroleum Company. In 1965, Shell Chemical Company produced SBS and SIS, a block copolymer of styrene and isoprene. In 1965, Air Products developed VAE copolymer emulsions. In 1969, Midland Company in the United Kingdom successfully trial-produced polyphenol ether adhesive.

In the 1970s, the rate of new varieties of adhesives decreased slightly, but the adhesive industry gradually shifted to the stage of serialization and improvement. During this period, many varieties also appeared, such as the commercial production of 1,2-polybutadiene by Japan's Soda Company in 1970, the polyphenyl ether sulfone developed by British ICI Co., Ltd. Ethylene-type solvent-free silicone resin adhesive, liquid polymer developed by DuPont and polyaddition-type triazine resin adhesive from Ciba Geigy Company in Switzerland, etc. In 1975, the American Du Pont Company modified the first-generation acrylate adhesive to chlorosulfonated polyethylene rubber and first produced the second-generation acrylate adhesive (SAR). Since the 1980s, the development of adhesives has gradually developed towards functionalization, specialization, grades and large-scale development. Rohm & Haas has developed hot melt pressure-sensitive adhesives. Loctite has developed structural anaerobic adhesives and UV-curable adhesives. In 1984, reactive hot-melt polyurethane adhesives first appeared on the US market, marking a new development in hot-melt adhesive technology.

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