

Definition:

Any of various complex organic compounds produced by polymerization, capable of being molded, extruded, cast into various shapes and films, or drawn into filaments, and then used as textile fibers.

History:

Alexander Parkes unveiled the first man-made plastic at the 1862 Great International Exhibition in London. This material -- which was dubbed Parkesine, now called celluloid -- was an organic material derived from cellulose that, once heated, could be molded but retained its shape when cooled.

In 1907, chemist Leo Hendrik Baekland, while striving to produce a synthetic varnish, stumbled upon the formula for a new synthetic polymer originating from coal tar. He subsequently named the new substance "Bakelite." Bakelite, once formed, could not be melted. Because of its properties as an electrical insulator, Bakelite was used in the production of high-tech objects including cameras and telephones. It was also used in the production of ashtrays, and as a substitute for jade, marble, and amber. By 1909, Baekland had coined "plastics" as the term to describe this completely new category of materials.

The first patent for polyvinyl chloride (PVC), a substance now used widely in vinyl siding and water pipes, was registered in 1914. Cellophane was also discovered during this period.

Plastics did not really take off until after the First World War with the use of petroleum, a substance easier to process than coal into raw materials. Plastics served as substitutes for wood, glass, and metal during the hardship times of World War's I & II. After World War II, newer plastics, such as polyurethane, polyester, silicones, polypropylene, and polycarbonate joined polymethyl methacrylate and polystyrene and PVC in widespread applications. Many more would follow and, by the 1960s, plastics were within everyone's reach due to their inexpensive cost. Plastics had thus come to be considered "common," a symbol of our consumer society.

Since the 1970s, we have witnessed the advent of 'high-tech' plastics used in demanding fields such as health and technology. New types and forms of plastics, with new or improved performance characteristics, continue to be developed.

Types:

Plastics are divided into three distinct groups: thermoplastics , thermosets and bio-plastics.

Thermoplastics soften when heated and harden on cooling. More than 80 percent of plastics are thermoplastics, examples of which include:

- High density polyethylene (HDPE) - used for bottles for detergents, food products and toys
- Low density polyethylene (LDPE) - for products such as (bin liners, and flexible containers
- Polyethylene terephthalate (PET) - used in bottles, carpets & food packaging
- Polypropylene (PP) - used in yogurt and margarine pots, automotive parts, fibers, and milk crates
- Polyvinyl chloride (PVC) - is made from oil and salt and is used for window frames, flooring, wallpaper, bottles, and medical products

Thermosets are hardened by a curing process and cannot be re-melted or re-molded.

Examples of thermosets include:

- Polyurethane (PU) - used in coatings, finishes, mattresses, vehicle seating, and building insulation
- Epoxy - adhesives, boats, sporting equipment, electrical and automotive components
- Phenolics - used in ovens and circuit boards
- Unsaturated polyesters – used for windmills, car body parts, and boats

Bio-plastics, which are bio-degradable, are developed from plant materials and bacteria.

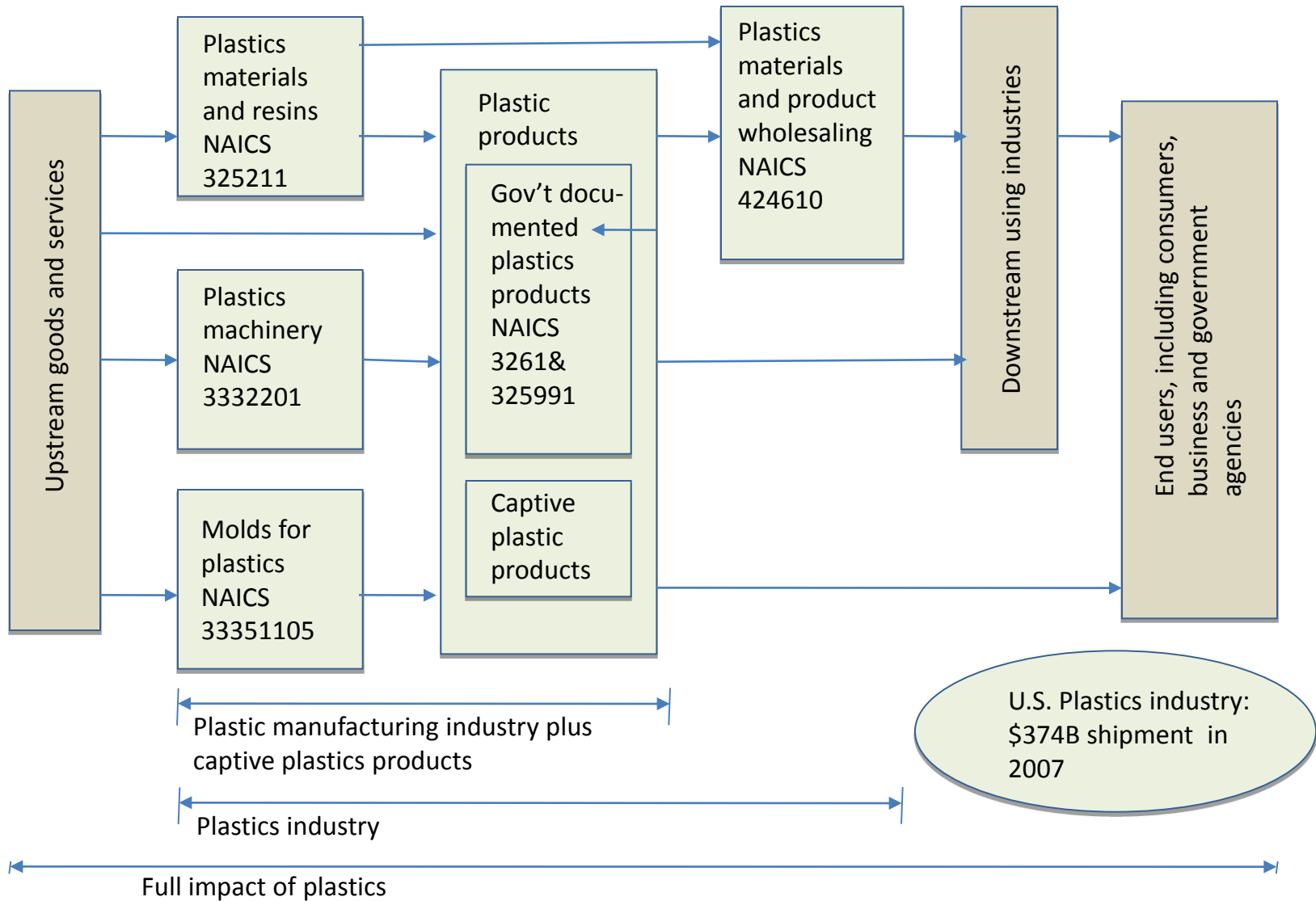
There are three techniques used to produce bio-plastics:

- Converting plant sugars into plastic
- Producing plastics inside micro-organisms
- Growing plastics in corn and other crops

Characteristics

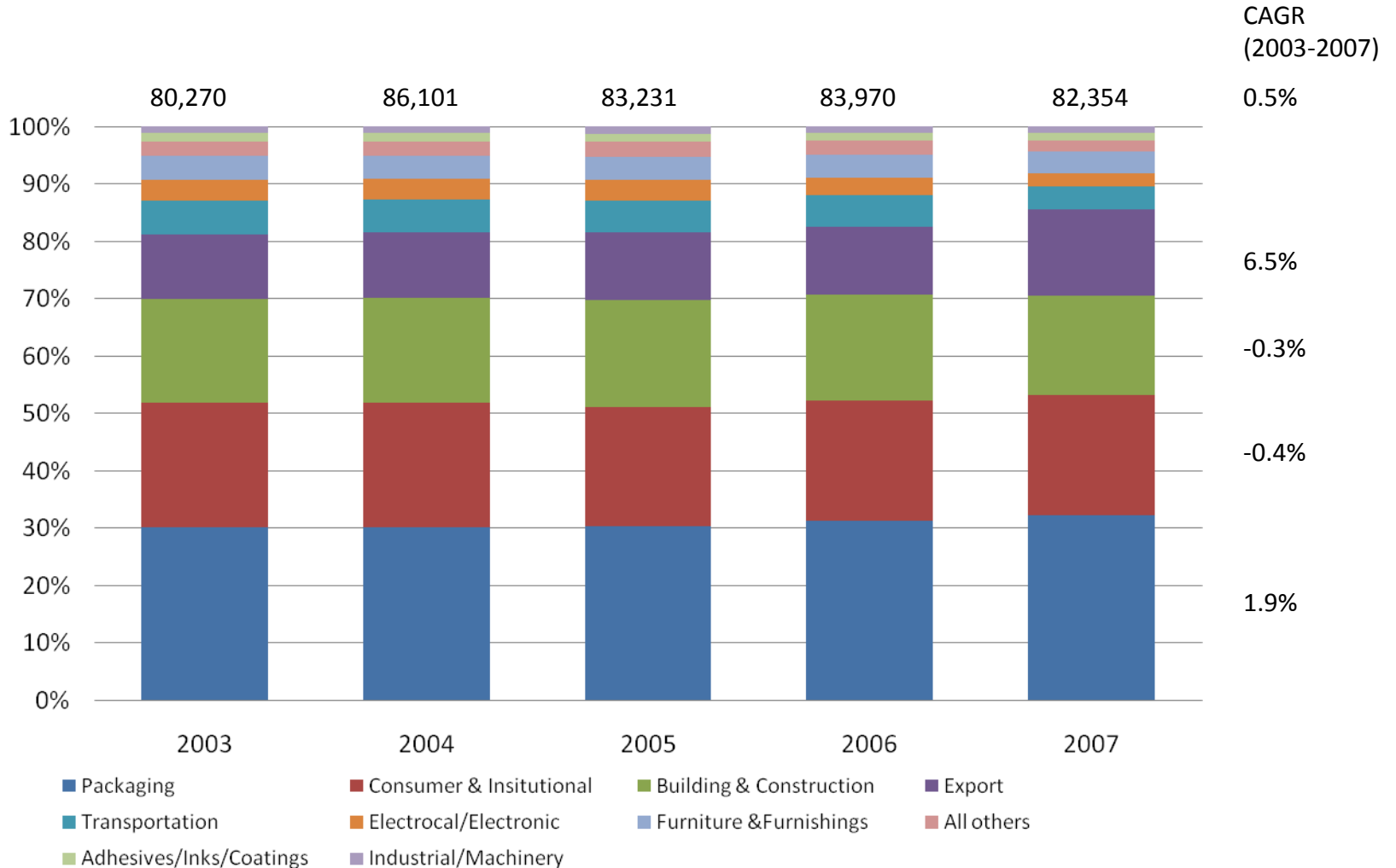
- Can be very resistant to chemicals
- Can be both thermal and electrical insulators
- Are generally very light in weight with varying degrees of strength
- Can be processed in various ways to produce thin fibers or very intricate parts
- Are materials with a seemingly limitless range of characteristics
- Are usually made from petroleum, but not always

----- PLASTIC INDUSTRY OVERVIEW-----



----- PLASTIC USAGE -----

Total sales & captive use of selected thermoplastic resins* by major market, 2003-2007
 (millions of pounds, dry weight basis)



* Include LDPE, LLDPE, HDPE, PP, Nylon, PVC, PS, Engineering Resins, ABS, SAN, Other Styrene Butadiene Latexes, Styrene Butadiene Latexes