

**Production** Nature provides a constantly self-renewing supply of raw material in the predominant substance of plants, cellulose. Cellulose occurs in nature, above all, as the skeletal substance of wood, in cotton and bast fibers and in all woody plant parts. The impetus for the significant development of modified natural substances based on cellulose was given in 1859 by the patent No. 787 granted to the British chemist, Th. Taylor for an invention for increasing the strength of parchment paper and vulcanized fiber. The assortment of new substances included not only celluloid, rayon or cellophane but also enamels and the cellulosic ester group.

### Fabrication and properties

Besides cellulose, for a large part of the cellulose derivatives, the theoretical melting point is above the decomposition point, which eliminates these substances from consideration for thermoplastic processing. Cellulosic esters, on the other hand, are suitable for thermoplastic processing. The preferred processes included injection molding, extrusion, extrusion-blown molding and hot forming. In this case, as a rule, preliminary drying (3 h at 80°C) of the hydrophilic granulate is necessary.

Cellulosic esters have antistatic properties, which is why they are commonly used in electronic devices. To the extent that high insulating properties are required, however, these materials are unsuitable. In addition, they are crystal-clear, impact-tough, scratch-resistant, easily stained but not permanently weather resistant and chemically stable.

Molded parts and semi-products from cellulosic esters are easily shaved, screwed and welded. They may also be glued with the same gluing solutions as long as they belong to the same ester type. Shaped parts from different cellulosic esters or other materials are glued together with two-component adhesives. As a rule, gluing is preferred to welding; ultrasonic welding is presently making inroads.

### Applications and economical aspects

Other examples of application of cellulosic esters are tool handles, hammerheads, screen handles, operating heads, combs or eyeglass frames.

Considering the complicated production process, cellulosic esters presently have a relatively high market price of €3.00 to €4.00 per kg. This price is presently clearly higher than that of petrochemical polymers such as polyolefins or polystyrene, which may be substituted by cellulose esters. Developments in bacterially produced cellulose have shown that competitive prices can be achieved in this way.

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