Teijin develops New Titanium-based Polyester Manufacturing Catalyst Technology

- Aiming to produce polyester products that are free from heavy metals -

Osaka, December 3, 2001 - Teijin Limited, a leading Japanese producer of synthetic fibers headquartered in Osaka, today announced that it has succeeded in developing epoch-making new catalyst technology for manufacturing polyester that will allow Teijin to provide polyester products that are even more environmentally friendly.

The new technology has been developed under the Teijin Group's philosophy of coexisting with the environment and placing a high priority on the preservation of nature. Teijin is adopting a comprehensive and systematic approach encompassing environmental safety, waste product countermeasures and recycling measures. This is intended to reduce the burden on the environment in an aim to realize a recycling-based society capable of sustainable development.

The new technology will allow Teijin to supply polyester products that are completely free from heavy metals such as antimony and germanium. Polyester products manufactured using this catalyst technology will not only lessen the burden on the environment, but will also benefit from improved quality in dyeability and vividness for fibers and flatness for films.

Through the utilization of this new titanium-based polyester manufacturing catalyst developed as an environmental technology, Teijin intends to further develop the system together with its users to realize products that lessen the burden on the environment. Details follow below.

1. Current situation of polyester manufacturing catalysts

(1) Antimony, germanium or titanium-based catalysts are generally used in polyester manufacturing. The type of catalyst is selected according to the application, such as for making fibers, film or PET bottles.

- Antimony-related catalysts are used for making fiber products. They realize a good balance of product quality including catalytic activity and product color, and have excellent cost-performance.

- Germanium-related catalysts are used as well as antimony-related catalysts in polyester film and PET bottle manufacture. However, because germanium is a rare metal, an alternative catalyst is required for the PET bottle field.

(2) Titanium-based catalysts do not involve heavy metals and they realize high catalytic activity when used as a polyester manufacturing catalyst. However, they have seen only limited use due to characteristics that make it difficult to control product qualities including the product color. Accordingly, in order to be accepted in the market, technical development was necessary to realize a balance between the catalytic activity and product quality. Although it is technically possible to control the product color by using other heavy metals, a solution of this type does not help to reduce the burden on the environment.

2. Teijin's new titanium-based polyester manufacturing catalyst

(1) Background to the development
Teijin has already developed chemical recycling technology that it intends to introduce as a new business in April 2002. The introduction of this system will allow polyester to be recycled almost indefinitely, helping to reduce the burden on the environment.

In addition, Teijin also considers the elimination of the heavy metal components of polyester products as a major research issue from the viewpoint of reducing the environmental burden incurred by these products over their complete lifecycle. As part of this research, Teijin has first developed this technology that allows production of polyester products that do not include any heavy metals whatsoever.

(2) Outline of the technology
When developing the new titanium-based polyester manufacturing catalyst that does not include any heavy metals, in addition to considerations relating to the environment, safety and hygiene, the catalytic activity and product quality were also important issues. In 1970, Teijin first started developing the new titanium-based polyester manufacturing catalyst technology. Since 1974, the company has commercialized titanium-based (heavy metal-reduced) polyester for several of its fiber, film and PET bottle applications. Building on this technology, Teijin has succeeded in greatly improving the technology to realize heavy metal free titanium-based manufacturing catalysts that balance catalytic activity with product quality. As a result, for fiber and film applications the new catalyst shows the same reactivity and basic characteristics as antimony-based catalysts while also demonstrating outstanding dyeability and vividness for fibers and flatness for films. Likewise, for PET bottle applications it has become possible to obtain comparable moldability and product color properties to those obtained with the previous catalysts.

(3) Teijin's principle in providing users with the ultimate environmentally friendly polyester
In addition to the fact that polyester is inherently safe, Teijin intends to develop its polyester business in order to be able to supply users with a material that remains environmentally friendly through its entire life cycle period from use to disposal.

(4) Number of related patents applied for by Teijin:
   Heavy metals reduction technology (1970-2001): 56
   Heavy metal free technology (1998-2001): 34

Reference material 1

Outline of Teijin Limited
Name: Teijin Limited
Established: June 17, 1918
Address: 1-6-7, Minami-honmachi, Chuo-ku, Osaka
Representative: President & COO Toru Nagashima
No. of employees: [Consolidated] 22,256 (As of end of March 2001)
                  [Non-consolidated] 5,216 (As of end of September 2001)
Net sales: [Consolidated] ¥761.4 billion (Period ending March 2001)
           [Non-consolidated] ¥272.6 billion (Period ending March 2001)
Scope of business: Business activities mainly relating to synthetic fibers, chemicals and medical treatment. Conducts global activities together with group companies through business bases in Japan and in more than ten countries worldwide.
Teijin has been ranked for the second consecutive year as a leader in the Dow Jones Sustainability Group Index, an international index of environmentally friendly companies.

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Teijin's new titanium manufacturing catalyst technology is an important technology for realizing a recycling-based society through both improving the environmental safety of products and as a measure that reduces waste products. The above diagram shows the polyester recycling final system that Teijin intends to introduce.

Note: DMT = dimethyl terephthalate, TPA = terephthalic acid, PET = polyester