

Use of Polymer Species Containers in Food Technologies



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Opinion

In food technology, various types of polymer containers for packaging products are widely used. On the market, this type of packaging is in great demand among consumers and food manufacturers, as it has the following advantages: the packaging is safe for health, ensures the safety of the product, reliable, aesthetic, airtight, compatible with the production of a wide range of products, affordable, there are technologies recycling of used packaging.

Polymer packaging is produced from the following materials:

- polyethylene, polypropylene, polyvinyl chloride, polycarbonate, polystyrene, polyethylene terephthalate (trays, cups, jars, etc.).
- lamister packaging, lamister (steralcon) is a composite material, which is an aluminum foil, varnished on one side and laminated with a polypropylene film on the other side, depending on the thickness of the foil, the stiffness of the lamister packaging changes.
- bags made of aluminized foil and polymers.
- containers made of multilayer combined materials, which are based on polyvinyl acetate copolymer, polyethylene, etc. (soft containers, bags, film bags).

Polymeric packaging materials for food products, depending on the materials used, mechanical resistance and degree of strength, are divided into rigid, semi-rigid and soft.

For example, semi-rigid packaging includes containers such as cups, jars, single- and multi-section pallets made of polypropylene, polyvinyl chloride, high-impact polystyrene, a number of copolymers and coextrudes. This type of packaging is made from high barrier multilayer polymeric materials such as PET/EVOH/ CPP (polyethylene terephthalate/ethylene vinyl alcohol/oriented polypropylene copolymer) used for sterilized meat, fish and other

products. Thin lids for these types of containers are made of aluminum foil with the application of thermoplastic or thermoforming varnish for hermetic sealing of the package by heat sealing [1-3].

Semi-rigid packaging includes a combination of polymer-coated cardboard packaging with aluminum foil as a barrier layer. This group includes packages of various sizes and shapes, designs such as "Tetra Pak", "Tetra Brik", etc. The sizes and shapes of packaging can be very different - portion packages in the shape of a tetrahedron (Tetra Classic), packages with square and rectangular sections. Polymeric cardboard combined packaging is not heat-resistant, so aseptic packaging of the product is used for it. The term "combined packaging, container" denotes not only the structure of the material from which the container is made, but also denotes the types of materials from which the container is made, for example, the metal body of the can and the lid made of polymer material, or the polymer body of the container and the lid made of lamister [1-3].

In the production of food products, the storage of which must be ensured by heat treatment, polymer containers based on polyethylene terephthalate (PET), polyethylene, polypropylene, polyamide-11 and other heat-resistant polymeric materials are used. Ordinary PET packaging withstands low product packaging temperatures of 70-75°C, if the temperatures are above this level, then irreversible deformation of the container occurs. Heat-resistant PET containers are designed for packaging juices, drinks, sauces, seasonings, beer, followed by the use of various methods of high-temperature heat treatment: aseptic preservation, "hot filling", pasteurization and sterilization [4,5].

C-PET is a packaging made of a polymeric material with special components that ensure its mechanical strength over a wide range of high temperatures. This is a disposable durable heat-resistant container-tray, which is sealed with special multilayer

polyethylene heat-resistant films by heat sealing. C-PET competes with aluminum metal containers. It is used for packaging first and second dinner courses, sauces, semi-finished products that are subjected to high-temperature heat treatment, for example, sterilization, to obtain long-term storage products, as well as for cooking dishes at home in ovens, microwave ovens [2,6, 7].

Soft polymer packaging is the most popular packaging with the consumer, as a rule, transparent or opaque flexible packaging in which the product can be stored for a long time. This container changes its shape and size during filling with the product. Doy-pack pouch bags made of combined polymeric materials are a prominent representative of soft polymer packaging. There is a fold in the bottom of the bag, which, when the container is filled with the product, moves apart, forming the bottom, allowing the package to stand. It is used for packaging liquid, pasty and flowing products (mayonnaise, ketchup, sour cream, condensed milk), for packaging baby food products with different designs of hermetic caps-fittings.

Interesting and promising are soft polymer multilayer containers "retort bags" made of special materials that must be neutral in their properties to food products, heat-sealing, without shrinkage and heat-resistant at temperatures above 100°C, during the time necessary for the heat treatment of the product. Retort packaging is a rectangular flexible laminated bag made of polymeric materials (aluminum foil laminated with layers of polymeric materials (laminates) based on polymer films without using foil) 80-160 microns thick, with four hermetically sealed seams. Manufacturers are looking to replace aluminum foil with more advanced and cheaper barrier materials such as EVOH or multi-layer barrier film consisting of PET/Al/Bony/PP, PP/Bony/PPP (PET-polyethylene terephthalate, Al-aluminum foil, Bony-high barrier polymer, PP-polypropylene, PPP-oriented polypropylene). This is a light, high-quality, durable packaging, convenient to use, in which food products (first and second canned lunch dishes, animal feed, etc.) are packaged with a long shelf life of up to 2 years [1,3,8].

For juices, drinks, pastes, purees, wines, a combined Bag in Box type can be used, consisting of a rigid outer package (barrel, box) made of cardboard, polymer or metal, inside of which there is a soft polyethylene liner bag with the product. This type of container allows manufacturers to deliver their products in an economical way, in conditions of safety, stability, while maintaining

natural properties, while the product remains fresh to the last drop. Bag-in-Box protects the product from spoilage even after opening the package, ensuring its freshness for a long time [1,2].

Progressive types of polymer packaging are "active", biodegradable, 3-D packaging, controller packaging, as well as packaging with antibacterial protection. The "activity" of the packaging becomes possible due to the fact that the material from which it is made is biologically active: immobilized additives (for example, enzymes, gas and moisture absorbers, flavors, antimicrobials) are tightly held in the matrix of the polymer material. The packaging allows you to adjust the microbiological balance inside, and therefore the shelf life, for example, of meat products in such packaging is extended by 2-3 times. Often, a modified and controlled air environment is used in "active" packaging. This is a rather expensive technology, but a high percentage of preservation, for example, of fruits and vegetables that do not lose moisture and do not rot, pays for its use, especially in warehousing conditions [9].

Thus, for packaging food products, the most popular and widespread today is packaging made of polymeric materials. Requirements for packaging materials are determined by the type of food products, the conditions for their processing, storage and transportation.

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