

Safety evaluation of PET bottles regenerated through mechanical recycling for use as liquid-seasoning and edible-oil containers

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Abstract

The safety of polyethylene terephthalate (PET) bottles regenerated through mechanical recycling (MR) for use as liquid-seasoning and edible-oil containers was evaluated through migration tests, as well as simulations using SML6 prediction software. MR-PET bottles were prepared from MR-PET pellets in which PET flakes intentionally contaminated with eight different surrogate contaminants and then regenerated in an actual MR process. The migration test conditions using the MR-PET bottles were set as follows: migration time of 5 months at 40°C (equivalent to the longest expiration date for seasonings and edible-oils of 2 years at 25°C), with 4% acetic acid, water, 20% ethanol, and heptane as the food simulants. The results showed that the concentrations of surrogate contaminants migrated into the food simulants were all below the migration limit of 10 ng/mL recommended by the Japanese Ministry of Health, Labor and Welfare (MHLW) in its guideline for the use of recycled plastic materials in food utensils, containers and packages. The simulation results under migration conditions of 2 years at 25°C and 5 months at 40°C predicted the migration amounts of surrogate contaminants to be well below the limit value of 10 ng/mL. The amount of antimony migrated to the aqueous food simulant (40°C, 4 months) was less than 10 ng/mL, which was less than the standard value of 50 ng/mL stated in the Food Sanitation Act. The results of this study confirm that MR-PET bottles fully satisfy the MHLW guideline and can be used safely as containers for liquid-seasonings and edible-oils.

Keywords : PET bottle, mechanical recycling process, liquid-seasoning container, edible-oil container

I Introduction

Social interest in the three Rs (reduce, reuse, recycle) and renewability¹⁾ has recently increased, as part of an effort to use resources more effectively. These principles have begun

to be implemented in the production of food containers and packaging. Synthetic resin materials, such as polyethylene terephthalate (PET) bottles and expanded polystyrene trays, are increasingly being recycled.

Mechanical and chemical recycling processes for synthetic

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