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器具・容器包装の溶出試験における試験溶液調製時の温度制御に関する検討

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Thermal control on preparation of a test solution for migration test of food-contact products

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Abstract

The temperature of migration solutions on the preparation of a test solution for migration tests of food-contact products was monitored using a temperature data logger under several heating conditions. Temperature transitions of the solutions heated via four types of water baths set at 60°C were similar, and the temperature increased with time reaching 60°C ± 2°C after heating for 15 min. On the other hand, the temperature increase of the solutions heated using drying ovens was slower than that heated by water baths, and in some cases, the temperature did not reach 60°C ± 2°C. Furthermore, the temperature differed according to the drying ovens and the position in the oven. The temperature of the migration solutions by the total immersion method performed at 60°C for 30 min using water baths and drying ovens temporarily decreased to 56.5°C–58.0°C after applying the samples into the solution. Further, the temperature increased rapidly and was maintained at 60°C ± 2°C using a water bath set at 60°C. The temperature increase of the solutions heated using drying ovens set at 60°C was slower and reached 60°C ± 2°C after heating for more than 15 min. However, it was maintained at 60°C ± 2°C using a drying oven set at 65°C, and it was also maintained using a drying oven set at 60°C when the migration solution preheated at 65°C was used. The temperature of the migration solution by the total immersion method performed at 95°C also temporarily decreased to 85.8°C–90.9°C after applying the samples into the solution. However, the temperature was maintained at 95°C ± 5°C using a water bath set at 95°C and drying ovens set at 105°C, 110°C, and 115°C. On the other hand, the temperature of the migration solution by the single surface testing performed at 60°C decreased considerably to 44.4°C–51.3°C upon pouring the migration solution into a single surface migration vessel and did not reach 60°C ± 2°C after heating for more than 20 min. However, by heating the single surface migration vessel at 60°C before pouring the migration solution into the vessel, the temperature slightly decreased to 59.1°C–59.7°C and was maintained at 60°C ± 2°C using a water bath set at 60°C and a drying oven set at 70°C. The temperature of the migration solution using the single surface testing performed at 95°C also decreased to 89.2°C–90.1°C upon pouring the migration solution into the vessel with preliminary heating at 95°C. Subsequently, the temperature was maintained at 95°C ± 5°C using a water bath set at 95°C or a drying oven set at 115°C. Migration tests into 4% acetic acid by the total immersion method were performed using two rubber gloves, and the resulting total evaporation residue levels and the migration levels of zinc and calcium were compared under several heating conditions. No significant differences in their migration levels were observed in the cases where the migration solution temperatures were maintained within 60°C ± 2°C or 95°C ± 5°C.

Keywords : 溶出試験、試験溶液、浸出用液、浸漬法、片面溶出法
migration test, test solution, migration solution, total immersion method, single surface testing

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