

Basic study on the stability of food additives with heating and storage conditions under room temperature, refrigeration, and freezing

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Abstract

As a basic model to investigate the effects of after opening food packaging on the stabilities of food additives, changes in the stabilities of 2 types of antioxidants and 6 types of preservatives with heating and storage were examined using LC-MS/MS. Although a significant decrease of 57% was observed in the residual percentage of butylated hydroxytoluene (BHT) stored at room temperature in water phase for one month, none of the other food additives showed significant reductions when stored for one month under any of the conditions tested. All food additives were showed remaining over 88% under sealed conditions in the water phase at 95°C for 30 minutes and with microwave oven heating for 3 minutes. However, under open conditions, significant decreases were noted in the residual percentages of BHT and butylated hydroxyanisole (BHA), indicating reductions in the water phase were due to volatilization from the water phase by heating. Decreases were detected in the residual percentages of all food additives after heating on a hot plate at 190°C for 10 minutes. Reductions in the preservative effects of benzoic acid, sorbic acid, and paraoxybenzoic acid were less with wet heating, such as boiling and steaming, than with dry heating, including baking, stir-frying, and frying. The present results support the effects of preservatives in food being maintained during the cooking process and after the opening of food packages, which contribute to food safety.

Keywords : food additives, heat stability, after opening food packaging, effect of preservatives

I Introduction

Food additives used in the manufacture of foods are processed, distributed, and then ingested by humans through the cooking process in restaurants and homes. They are used within a range of standards that do not exceed the acceptable daily intake (ADI) ¹⁾. The safety and usefulness of the amount and content of food additives used in processed foods before food packages are opened have been confirmed by the manufacturers. After food packages have been opened, food is consumed at the responsibility of restaurants and ordinary households based on use-by and best before dates ²⁾. Although food is generally eaten immediately after packages have been opened, cooked food may be stored in a home freezer for a long period of time. Confectionery is also stored at room temperature or in a refrigerator for a specific period of time after being removed

from its packaging. The intake of food additives in general households has been investigated using a total diet study that considered increases and decreases in chemical substances due to processing and cooking ³⁾. However, limited information is currently available on the sustainability of the effects of food additives in food after the cooking process or the usefulness of additives during the storage of confectionery. Regarding the stability of food additives during cooking, heating of antioxidants in fats and oils was previously reported ⁴⁻⁶⁾, although no report has recently been published on this issue. A more detailed understanding of the stability of food additives in food during the cooking process after food packaging has been opened as well as during storage after cooking is important for establishing the safety of food once its packaging is opened. There have been extensive efforts in recent years to reduce food waste, with the extension of food expiration dates being