

# Studies on the Migration of Melamine from Melamine Tablewares

MEI-HUA CHANG, WEI-LIANG YAN, YA-MIN KAO AND  
DANIEL YANG-CHIH SHIH

Division of Research and Analysis

## ABSTRACT

This research is aimed to establish the analytical methods of the migration amounts of melamine from commercially available melamine tablewares. According to Executive Yuan's Department of Health, hygiene standards of food utensils, containers and packaging, six migration conditions were applied, including water (60 °C, 30 min and 95°C, 30 min), 4% acetic acid solution (60°C, 30 min and 95°C, 30 min), 20% ethanol solution (60°C, 30 min) and *n*-heptane (25°C, 1 hour). The water, 4% acetic acid and 20% ethanol migration solutions added melamine isotope internal standard were injected into Oasis<sup>®</sup> MCX cartridges from which melamine was eluted with 5% ammonia in acetonitrile. The *n*-heptane migration solution was directly dried by nitrogen after being added melamine isotope internal standard and dissolved in the mobile phase solution. All were analyzed by LC/MS/MS. The average recoveries of the melamine at the spiked levels of 0.1, 0.25 and 0.5 ppm in all migration solutions were 97.1~108.4% and the coefficients of variation were 0.2~2.6%. The detection limits of melamine were 0.01 ppm. The developed methods were employed to analyze migration amounts of melamine in six conditions from 52 melamine tablewares. The results showed that the melamine was migrated from 51 samples in water (95°C, 30 min), 4% acetic acid solution (95°C, 30 min) and 20% ethanol solution (60°C, 30 min) except for one sample from which melamine was undetected in all conditions. Melamine was migrated from 1 sample at the level of 4.8 ppm and the remaining 50 samples less than 1.7 ppm. All results were compliant with the European Union standards for the specific migration limit (30 ppm) of melamine. The detected melamine migration amounts decreased in order of 4% acetic acid solution (95°C, 30 min) > water (95°C, 30 min) > 4% acetic acid solution (60°C, 30 min) > 20% ethanol solution (60°C, 30 min) > water (60°C, 30 min) > *n*-heptane (25°C, 1 hour), in which melamine in *n*-heptane solution were not detected and this may be related to the undissolvable property of melamine in *n*-heptane.

Key words: melamine tableware, melamine migration test, LC/MS/MS