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# Characterization of Sodium Tripolyphosphate and Sodium Citrate Dehydrate Residues on Surfaces

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## Abstract

Sodium tripolyphosphate (STPP) and sodium citrate dihydrate (sodium citrate) are the most widely used components in detergent formulations. Here, we characterized these two components on glass surfaces to assess their possible exposures from white spots on dishwasher-washed dishes. Ultraviolet/visible near infrared spectroscopy UV/Vis-NIR absorption spectroscopy, Fourier transform infrared spectroscopy (FTIR) in the attenuated total reflectance mode (ATR-FTIR), Raman spectroscopy and laser ablation-inductively coupled plasma mass spectroscopy (LA-ICP-MS) were utilized to design a calibration model for a range of STPP and sodium citrate concentrations (1 to 8% w/w) precipitated on glass surfaces. STPP and sodium citrate residues on the dishwasher-washed dishes were also determined quantitatively using ATR-FTIR by utilizing these calibration models. In addition, cytotoxicity assays were performed to elucidate the influence of STPP and sodium citrate on human embryonic kidney cell survival. Cell viability results showed a decreasing trend in the number of cells cultured with increasing

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