



Use FTIR as a Tool for the Analysis of Sodium Metasilicate in Ham Product

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Objectives

Sodium metasilicate (SMS) is a USDA approved antimicrobial for use in meat and poultry processing. It can be applied into RTE (Ready to Eat) meat surface up to 6% solution at a rate not to exceed 300 ppm of the finished products. However, no any research was performed by using FTIR (Fourier transform infrared spectroscopy) to evaluate the amount the SMS. The objective of this study was to quantitate sodium metasilicate added into RTE ham product and analyzed by using FTIR.

Materials and Methods

RTE ham was cut into square size. Ten grams ham was immersed into 50 mL food grade different concentrations of SMS solution (1.0 to 6.0%). Samples treated with distilled water without adding SMS was control treatment. After immersion for 10 min, drained liquid and air-dried for 2 min. Samples were transferred into Whirl-Pak bag containing 50 mL distilled water and homogenized with stomacher at 235 rpm for 2.5 min. The homogenized mixture was filtered with Whatman Grade 1 Qualitative Filter Paper. The homogenates were centrifuged at 6,000 rpm for 10 min at 25°C. The supernatant were transferred into a clean test tube, and filtered with 0.45- μ m disposable syringe filter. The filtrate was used for FTIR measurement. The control samples supernatant spiked with known amounts of pure and food grade SMS were analyzed by FTIR.

Results

The software Delight was used in data analysis. The partial least square (PLS) model was used to predict analyst concentrations in tested samples. The number of PLS latent variables was optimized based on the lowest root mean square error of prediction (RMSEP) values to avoid overfitting of spectral data. The second derivative transformation results showed that FTIR spectroscopy was able to distinguish the 2 prominent absorption bands at 885 cm^{-1} and 1,023 cm^{-1} . Data from the fingerprint region 1300 to 850 cm^{-1} showed the prediction results were obtained with $R = 0.9817$ and RMSEP = 552.3 ppm for pure SMS, and with $R = 0.9117$ and RMSEP = 388.6 ppm for spike pure SMS. The prediction results demonstrated that $R = 0.994$ with RMSEP = 0.1912%, and $R = 0.9601$ with RMSEP = 0.2886% for industrial SMS and spiked samples, respectively.

Conclusion

These results show that the FT-IR spectroscopy in the 1300 to 850 cm^{-1} wavenumber region could be potential a very reliable technique for quantitate sodium metasilicate in RTE meat samples. It can be used as quickly and simply technique to estimate the amount of sodium metasilicate in meat products. However, more researches should be performed to determine the lower concentration of SMS applied into the RTE and other types of meat samples.