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EVALUATION OF NOVEL HIGH INTENSITY PULSED UV SOURCES FOR PROCESSING FOOD BEVERAGES

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ABSTRACT Ultraviolet (UV) technology has potential to become a novel non-thermal method for minimal processing of liquid foods. Presently a monochromatic low pressure mercury lamp (LPM) is mainly applied for UV treatments. The efficiency of novel high intensity pulsed (PUV) lamps is potentially greater than LPM due to high intensity and broader spectrum that may penetrate low transmittance UV liquids like foods. Performance of three PUV sources with various energy per pulse of 31 J (PUV-1), 344 J (PUV-2) and 644 J (PUV-3), was evaluated measuring effects on pre-selected markers in apple juice, milk and 30% fructose solution. Color, pH, soluble solid content, viscosity and absorption spectrums were measured. Vitamin C and enzyme activity of polyphenol oxidase in apple juice and alkaline phosphatase in milk were determined. LPM lamp was used as a baseline for comparison. The effects of pulsed lamps PUV-1 and PUV-3 on the beverage properties were comparable with the LPM lamp. For example pH of fructose decreased by 2.98% for LPM lamp and by 3.18% and 4.51% for PUV-1 and PUV-3 respectively. Vitamin C content was reduced by 2.41% in apple juice and 35% in milk for LPM, while reduction of 1.24% (PUV-1) and 2.01% (PUV-3) in apple juice, 26% (PUV-1) and 24% (PUV-3) in milk was observed for pulsed lamps. PUV-2 lamp caused higher loss of vitamin C in apple juice (10%) and milk (35%) and reduced pH of fructose by 6.02%. These results indicate that PUV lamps constitute promising alternative for non-thermal treatment of beverages that shorten processing time.

Keywords: high intensity UV sources, apple juice, milk, fructose.