Starch-Based Bioplastic as Optical Indicator for Ammonia in Processed Meat

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The topic of this investigation were the properties of potato starch-based plastics as an indicator system for ammonia in processed meat. The aim was to investigate whether bioplastics made from potato starch and a plasticizer can act as an effective indicator system for detecting ammonia in processed meat. The desired physical properties were hardness, elasticity, and transparency, whereas the chemical properties were assessed by the acidic hydrolysis. The sources of starch used were pure, commercial and the one extracted from raw potato. The plasticizers examined were glycerol, urea, and ascorbic acid. It was found that the samples with the most desirable physical properties are extracted starch plasticized with glycerol or urea. It was also found that differences between the plasticizers were not as significant as the origin of starch. The results of acidic hydrolysis by 1.0M HCl, determined by the VIS spectrophotometer, showed that the fastest decomposition occurs in extracted starch with glycerol with the rate of 2.46 % per hour, whereas the slowest was pure starch with glycerol at 0.84 % per hour. Therefore, the most suitable bioplastics is made from extracted starch with urea. Further investigation on the sensory system was continued only on pure and extracted starch with either glycerol or urea. Bromothymol blue indicator was successfully incorporated into the bioplastic and time needed for the color change from yellow (acidic) to blue (basic) was up to 5 minutes in almost all the samples. Time needed for the color change decreased with the increase of ammonia and indicator concentrations. Sensor’s reversibility on air and in acetic acid was evaluated with the time needed to return to the initial yellow color, where the acidic environment was more efficient.

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