**ACIDIC HYDROLYSIS OF WASTE FEATHER BIOMASS – PROCESS SCALE-UP**

Hanika J.1, Rousková M.1, Šolcová O.1, Šabata S.1, Jírů M.2, Hurková K.2

1 Institute of Chemical Process Fundamentals Czech Academy of Sciences

2 University of Chemistry and Technology, Faculty Food and Biochemical Technology

**Abstract**

The paper present novel data on acidic hydrolysis of waste chicken feathers in presence of water solution containing carboxylic acid catalyst with the pKa value lower than 4, in stirred batch reactors, in the temperature range from 114°C to 150°C and at the pertinent vapour pressure of reaction mixture. The process was scaled-up from laboratory bench scale to pilot plant dimensions using batch high pressure autoclaves. Process conditions were applied according to patent application1. Knowledge of kinetic aspects of the feather hydrolysis and process parameters operation window are inevitable for a successful process scale up2,3.

**Experiment**

Low molecular proteins, amino-acids and free fat acids formation by parallel keratin and tri-acyl-glycerol hydrolysis were investigated under similar reaction conditions in our previous studies2,3. Experiments were carried out using fried chicken feathers from Rabbit Co. Trhový Štěpánov. This waste material (typically 300 ml, weight 75 g and 1500g) together with 1 and 15 litters tap water and small amount of malic acid (up to 150 g) was put into pressure autoclaves, volume 2 and 25 litters, (see figure), respectively. The reaction product was separated by filtration to liquid hydrolysate (pH of the hydrolysate was about 5.5 in all cases) and solid waste which was dried to investigate a mass balance equilibrium of hydrolysis. The mass balance of the individual tests was nearly identical. The mass deficit was undoubtedly caused by handling losses as emptying the autoclave, separation of reaction products, filtration and drying of the solid waste. Liquid filtrate was analysed using HPLC/MS and GC/MS methods. The total content of soluble peptides of a low molecular weight and amino acids distribution were determined in the hydrolysate for all samples. Several samples were used for screening of feather fat hydrolysis products like free fatty acids, mono-, di- and tri-glycerides of different fatty acids as well.**** The experiments confirmed the statement: *The waste chicken feathers represent the promise biological resources4.*

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**Literature**

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Fig.1: Pilot plant 25 litre autoclave, Nano-Mag Technologies Pvt. Ltd., Mumbai

 (stainless; design temperature and pressure: 250 oC; 100 bars)