

THE DEVELOPMENT AND USE OF MODERN CHEMICAL MATERIALS

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NEW ENZYME FOR HYDROLYSIS OF WASTES CONTAINING COLLAGEN

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Leather manufacture is one of the most polluting branches of industry in the world because of many chemical processes and hazardous materials, used in them. In order to replace harmful chemical products proteases, which can reduce pollution by changing some of its chemical materials, are used in the tanning processes. Collagen wastes hydrolysis by proteases allows production of hydrolysates, which can be used as a secondary raw material for fertilizers, cosmetic products and for other useful products to be made. Aim of the research was to check the suitability of new enzymatic preparation for hydrolysis of hide proteins and determine optimal conditions for the process.

Pieces from butt part of salted cowhide after soaking and washing omitting fleshing was cut into pieces 3x3 mm and experimental series were prepared from these pieces. The analysis of the pieces was done and it was obtained that absolutely dry hide samples contained 92.9% proteins.

New enzymatic preparation (EP) *Vilzim PRO Conc* produced by JSC “Baltijos Enzimai” (Lithuania) was used for the investigation.

Firstly, proteolytic activity of the EP *Vilzim PRO Conc* was determined according to Anson method using sodium caseinate as substrate (Fig.).

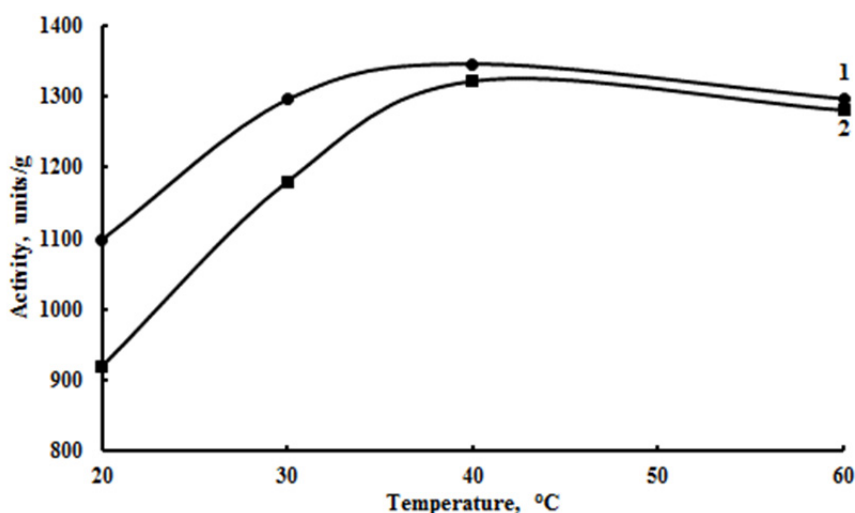


Figure. Dependence of EP *Vilzim PRO Conc* activity on temperature. 1 – pH 7; 2 – pH 9.5.

The treatment of hide (1 series contained 2 g of soaked hide pieces) prepared for investigation was carried out in a laboratory shaker with agitation 120 rev. per minute under the conditions: H₂O 50 ml, temperature varied from 20 till 60°C, EP *Vilzim PRO Conc* 0.1; 0.5; 1 or 3 % (% based on hide mass), duration 24 hours.

The change of sample mass was evaluated by gravimetric method: after the process, the treatment solutions were percolated through sieve. The residuals taken from sieve (if had been found) were dried and their absolutely dry mass was determined. The percolated solutions were analysed for total proteins. The total proteins were established by Kjeldahl's procedure. The obtained results are presented in Table 1 and Table 2.

Table 1 – Hide mass change during enzymatic hydrolysis

Amount of enzyme preparation <i>Vilzim PRO Conc</i> used for treatment, % based on treated sample mass	Decrease of sample mass during treatment (%) when pH of treatment solution is			
	7		9	
	treatment temperature, °C			
	20	60	40	60
0.1	11	13	12	13
0.5	11	84	19	73
1	12	100	21	100
3	16	100	24	100

Table 2 – Amount of proteins in solution after enzymatic hydrolysis of hide

Amount of enzyme preparation <i>Vilzim PRO Conc</i> used for treatment, % based on treated sample mass	Amount of proteins (% based on treated sample's absolutely dry mass) when pH of treatment solution is		
	7		9
	treatment temperature, °C		
	20	60	40
0.1	4.5	26.4	3.4
0.5	6.7	56.2	6.2
1	11.2	81.6	11.0
3	27.0	81.4	19.1

The run of enzymatic hydrolysis depends on the conditions of the process: temperature, pH of medium and amount of enzyme preparation used for the process. The enzyme preparation *Vilzim PRO Conc* efficiently hydrolyse hide proteins at temperature 60 °C when pH of medium is 7-9. Complete hydrolysis of collagen containing wastes is reached under the mentioned conditions adding the enzyme preparation 1% or more.

The obtained results allows the proposition that new enzyme preparation *Vilzim PRO Conc* is promising for the utilization of collagen containing wastes.