a milder pathway for hypervalent iodine(III) mediated ring contraction of conformationally rigid exocyclic-β-enaminones for the synthesis of cyclopentanones with concurrent cyanation [4]. Furthermore, the synthesized cyclopentanones serves as a basic template for the synthesis of new class of ∂-valerolactams by the applications of hypervalent iodine reagents [5].

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INFLUENCE OF MECHANICAL TREATMENT ON STARCH OBTAINED FROM PEA SEEDS*

Keywords: starch, crystallinity degree, raw materials, functional foods.

Currently the creation of functional foods or their components with desired properties and increased bioavailability are of great interest in food biotechnology. These foods allow to increase the overall level of consumption of proteins, dietary fiber, vitamins, etc. [1, 2]. Starch is a plant polysaccharide in many crops as cereals and legumes. Physicochemical modification of starch allows to obtain functional products. They are in demand in food and chemical industries. For example, in the production of biodegradable packaging films and functional foods [3, 4].

Mechanical treatment is one of the promising methods for changing properties of plant materials without using biological or chemical reagents. Another advantage of this method is the almost complete absence of waste. Mechanical treatment is very energy consuming process. However most research don't controlled the energy efficient of the technology used for various types of raw materials.

The aim of this work is study the disordering of the crystalline structure of pea starch due to mechanical treatment.

Mechanical treatment of pea starch was carries out in laboratory planetary ball mill with water cooling AGO-2. The exposure time ranged from 0 to 600 seconds.

The structural properties of starches were characterized by X-ray diffraction analysis according to the *Nara&Komiya* [5]. The crystallinity degree was calculated as the ratio between the area corresponding to the crystalline phase and the total area under the XRD curve using the formula:

$$CI = \frac{S_{cr}}{S_t} * 100\%,$$

where CI is crystallinity degree; S_{cr} is area corresponding to the crystalline phase; S_t is the total area.

Table 1 shows amorphisation of starch occurs with an increase in the time of mechanical treatment.

Table 1

Change in the crystallinity degree of starch after mechanical treatment

Characteristic	Time, s				
	0	15	30	45	60
Crystallinity degree, %	25,6	25,3	23,6	22,4	21,1
Energy consumption, W*h	0	2	4,2	6,6	8,6

A high-speed wattmeter was used to measure the energy consumption for the experiment to assess efficiency of mechanical treatment of starch by ball mill. The regularities found in changing the crystallinity degree and energy consumption allow a more rational approach to the creation of effective mechanochemical technologies.

Thus the effect of mechanical treatment on the disordering of the crystalline structure of pea starch is studied. It has been shown that a sample with a different crystallinity degree can be obtained with different times of mechanical action. Reducing the degree of crystallinity allows to obtain a more reactive product with improved mechanical properties. These products are in demand in the industry, for example, when creating biodegradable food films.

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LITHIUM 3-POLYFLUOROALKYL-1,3-DIKETONATES AS A VALUABLE BUILDING BLOCKS*

Key words: Lithium 3-polyfluoroalkyl-1,3-diketonates, 4-amino-pyrazoles, quinoxaline and pyridine derivatives, terpyridine.

Previously, we have introduced lithium 3-polyfluoroalkyl-1,3-diketonates (LDKs) in organic synthesis as building blocks and demonstrated benefits of their use compared to appropriate 1,3-diketones. They are readily accessible, stable on storage, and highly reactive. On the bases on LDKs, we have developed facile syntheses methods of fluoroalkyl-containing polyfunctional compounds [1–8], various linear and annulated heterocycles [1, 9–14].

We have significantly expanded the synthetic capabilities of LDKs **1** through nitrosation reactions and developed effective methods for the synthesis of 5-hydroxy-5-(polyfluoroalkyl)isoxazol-4(5*H*)-one oximes **3** [14], 4-amino-pyrazoles **4**, quinoxaline derivatives **5** and **6** [14] and new heterocyclic systems **7** and **8**.