

HYDROGENATION OF PHOSPHOLIPIDS

M. U. Babaev, Kh. S. Mukhamedova,
and S. T. Akramov

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Information in the literature on the hydrogenation of phospholipids mainly relates to the kinetics of the reactions of mixtures of phospholipids [1-3]. Fully hydrogenated phospholipids have been little studied [4]. To confirm the length of the chain of the fatty-acid residues of phospholipids, and also to study the properties of the hydrogenated phospholipids we have investigated the products of the exhaustive hydrogenation of the triglycerides, the total phospholipids, and the main homogeneous fractions of the phospholipids of the seed kernels of the cotton plant of variety "Tashkent-1" [5] from the 1972 harvest.

As the solvent for the glycerides and the phosphatidylcholines we used ethanol, and for the phosphatidylethanolamines, phosphatidylinositols, and combined phospholipids a mixture of ethanol and ether (1:7). The catalyst was palladium, prepared by a known method [6], using a support aluminum dust [7] with a Pd:Al ratio of 1:1. The phospholipids were hydrogenated in the form of 5-7% solutions at room temperature. Saturation with hydrogen was observed mainly in the first 5-10 min, and the whole process was complete in 25-30 min. The catalyst was separated off by filtration, and the solvent was evaporated to dryness in vacuum. The hydrogenated phospholipids consisted of white pulverulent substances insoluble in ethanol, ether, chloroform, and water and more or less soluble in chloroform-methanol (2:1), which melted with carbonization. The hydrogenated phosphatidylcholines contained 1.5% of N and 3.3% of P, with a molar ratio N:P = 1.0. The hydrogenated phosphatidylethanolamines contained 1.24% of N and 3.0% of P, with a molar ratio of N:P = 0.9. The hydrogenated phosphatidylinositols contained 3.35% of P.

Both the initial phospholipids and the hydrogenated phospholipids were subjected to alkaline hydrolysis (0.1 N KOH in CH₃OH at the boiling point of the mixture for 30 min), and the fatty acids split off, in the form of their methyl esters, were analyzed by GLC (Table 1).

It can be seen from Table 1 that the hydrogenation of the phospholipids took place completely and the main acids in the hydrogenated products were palmitic and stearic.

TABLE 1

Hydrogenation products	Fatty acids				
	C _{10:0}	C _{12:0}	C _{14:0}	C _{16:0}	C _{18:0}
Triglycerides	—	0.78	0.58	26.65	71.99
Total phospholipids	1.00	0.99	1.38	30.85	65.78
Phosphatidylcholines	1.80	3.52	1.65	22.38	70.65
Phosphatidylethanolamines	3.10	2.20	1.80	33.30	59.60
Phosphatidylinositols	0.70	0.70	1.20	38.40	59.60

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