



Soviet-era science, translated into English

CHEMISTRY

N. P. GRECHKIN

1960

SovietRxiv

View the original and related papers at <https://sovietrxiv.org/items/ru-196001.01945>

Source: Math-Net.Ru and CyberLeninka. Machine translation. Verify with the original.

Abstract

Full Text

CHEMISTRY

N. P. GRECHKIN

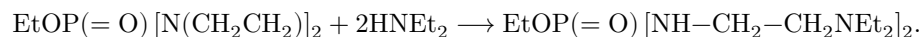
COPOLYMERIZATION OF DIETHYLENEAMIDES OF PHOSPHORUS ACIDS WITH BIFUNCTIONAL ORGANIC COMPOUNDS

(Presented by Academician A. E. Arbusov, March 7, 1960)

In our previously published works, the reaction of N-phosphonoaminoethylation of organic compounds was described (¹⁻³).

This reaction consists in the addition of ethyleneamides of phosphorus acids, with opening of the ethyleneimine ring, to various organic compounds containing suitable functional groups: NH₂, HNR, SH, OH, CH₂Cl, COOH, etc.

It has recently been shown (⁴) that diethyleneamides of phosphorus acids also enter into the above reaction, the addition proceeding at both ethyleneimine rings with their opening, for example:



The realization of this reaction led us to the idea that, upon interaction of diethyleneamides of phosphorus acids with bifunctional organic compounds possessing the listed groups—diamines, dicarboxylic acids (or with dibasic inorganic acids), dimercaptans, etc.—linear copolymers containing phosphorus in the chain can be obtained. Schematically, these reactions may be represented as follows:

- $$\text{HOOC}(\text{CH}_2)_{n\text{COOH}} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \text{HOOC}(\text{CH}_2)_{n\text{COOH}} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \dots$$

$$\longrightarrow \dots \text{OC}(\text{CH}_2)_{n\text{COOCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\text{NHCH}_2\text{CH}_2\text{OC}(\text{CH}_2)_{n\text{COCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\dots$$
- $$\text{H}_2\text{N}(\text{CH}_2)_{n\text{NH}_2} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \text{H}_2\text{N}(\text{CH}_2)_{n\text{NH}_2} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \dots$$

$$\longrightarrow \dots \text{NH}(\text{CH}_2)_{n\text{NHCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\text{NHCH}_2\text{CH}_2\text{NH}(\text{CH}_2)_{n\text{NHCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\dots$$
- $$\dots \text{HS}(\text{CH}_2)_{n\text{SH}} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \text{HS}(\text{CH}_2)_{n\text{SH}} + (\text{EtO})\text{P}(=\text{O})(\text{NCH}_2\text{CH}_2)_2 + \dots$$

$$\longrightarrow \dots \text{S}(\text{CH}_2)_{n\text{SCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\text{NHCH}_2\text{CH}_2\text{S}(\text{CH}_2)_{n\text{SCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\text{NHCH}_2\text{CH}_2\text{S}(\text{CH}_2)_{n\text{SCH}} 2\text{CH}_2\text{NH}-\text{P}(=\text{O})(\text{OEt})-\dots$$

an opaque wax-like polymer with a low melting temperature (about 60°) was obtained.

In amide copolymer-polycondensation of sebacic acid (1 mol) with benzidine (0.9 mol) and diethylamide of ethylphosphonic acid (0.1 mol), by heating in a stream of nitrogen to 220°, a solid, opaque, horn-like polymer was obtained. The physicochemical properties of the polymers obtained are being studied.

Thus, a new method has been proposed for obtaining phosphorus-containing polymers by means of the reaction of N-phosphonoaminoethylation.

Chemical Institute
of the Kazan Branch of the Academy of Sciences of the USSR

Received
4 III 1960

CITED LITERATURE

1. N. P. Grechkin, *Izv. AN SSSR, OKhN*, 1956, No. 5, 538.
2. N. P. Grechkin, *Proceedings of the 1st Conference on the Chemistry and Application of Organophosphorus Compounds*, Moscow, 1957, p. 243.
3. N. P. Grechkin, *Izv. AN SSSR, OKhN*, 1957, No. 9, 1053.
4. N. P. Grechkin, G. S. Bobchenko, *DAN*, **129**, 569 (1959).

Note: Figure translations are in progress. See original paper for figures.

Source: Math-Net.Ru and CyberLeninka. Machine translation. Verify with the original.