

- b) By the method of variation the length of O-alkyl and structure of main radical of phosphoric acid derivatives we can derive ions of gold from silver.
- c) There are such compounds, which extract ions of Pt, Os, Au, and Ag from technological solution effectively.

We worked out methods of defining the content of metals in factory sewages.

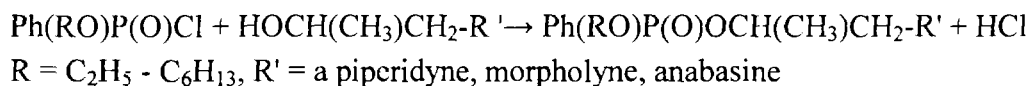
## SYNTHESIS, STRUCTURE AND COMPLEX FORMING ABILITY OF PHOSPHORYLATED DERIVATIVES OF HETEROCYCLIC COMPOUNDS

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The derivatives of acids of phosphorus, due to variety of properties, are a subject of numerous researches. Now it is known, that the derivatives of acids of phosphorus apart from insect, neurotoxic, antienzymic and other kinds of physiological activity have also complex forming properties. As extra reagents of noble metals particularly are analyzed by the derivatives of dithiophosphoric acids although organophosphorus compounds with one nucleus of sulfur make extraction properties.

Therefore, with the purpose of detection of effective extra reagents of ions of argentum the phosphorylated derivatives of heterogeneous ring compounds were synthesized:



Structure of the obtained connections is confirmed by the results IR-, PMN- and mass-spectrometry.

In an IR-spectrum O-hexyls-O - [piperidinoisopropyl] phenylphosphonate has lines of absorption bands of the following functional groups ( $\nu$ , cm<sup>-1</sup>): (P-O-C<sub>5</sub>H<sub>11</sub>) 990-1000, (P = O) 1260, (P-C<sub>6</sub>H<sub>5</sub>)1450, (C-N in cycle) 1550.

In an IR-spectrum O-pentyl-[anabasinoisopropyl] phenylphosphonate has lines of absorption bands of the following functional groups ( $\nu$ , cm<sup>-1</sup>): (P-O-C<sub>5</sub>H<sub>11</sub>) 990-1000, (P = O) 1250, (P-C<sub>6</sub>H<sub>5</sub>)1450, (C-N in cycle) 1550.

In a spectrum  $\Pi$ MP about O-pentyl-[morpholinoisopropyl] phenylphosphonate in the field of a weak field (7, 18-7, 29 p.m.) the multiplet about tones of phenyl group is watched. Methine proton resonates at 4,66 m.d. as multiplet. The signals O-CH<sub>2</sub> of protons of morpholinic cycle appear at 3,58 m.d. (4H) by the way of triplet. The protons N-CH<sub>2</sub> (6H) three methylene groups will derivate a composite multiple at 2, 10-2, 70 m.d.. The signal of methyl group's protons (3H) is watched at 1,15 m.d. as doublet. Final methyl group resonates at 0, 87 p.m. Six of C-CH<sub>2</sub> of groups give a complex signal in the field of 1, 2-1, 8 m.d.

The obtained connections are analyzed as extra reagents of ions of argentum from salt-sulphate acid medium. Process of extraction was analyzed by a method of radioactive



nuclides of metals ( $^{110}\text{Ag}$ ). The synthesized connections have appeared by weak extra gents of ions of argentum irrespective of the nature and density of inorganic acids. As the results of the lengthening of alkyl radicals in a molecule there is a rise of efficiency of extraction of metals. By rather more effective extra gent of metal has appeared in phosphorylated derivative of anabasine ( $E = 52\%$ ).



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## PHOSPHORYLATED DERIVATIVES OF ANABASINE: SYNTHESIS, CONSTITUTION AND COMPLEXFORMING PROPERTIES

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With the purpose of detection of new effective extragents of metals from number of sulphurcontaining derivatives of acids of phosphorus with different functional groups, analysis of effect of the different factors on selectivity of allocation of metals, installation of optimum conditions of an extraction, the detections of effective extragents of noble metals from industrial sewage waters, are synthesized phosphorylated derivatives of the anabasine - O-alkyl-O-(anabasinopropyl)- and O-alkyl-O-(anabasinobutyn-2-yl)phenylphosphonates and O-(anabasinopropyl)- and O-(anabasinobutyn-2-yl)diphenylphosphonates

In an IR-spectrum about O-pentyl-O-[anabasinopropyl]phenylphosphonate

There are absorption band of the following functional groups ( $\nu$ ,  $\text{cm}^{-1}$ ): (P-O-C<sub>5</sub>H<sub>11</sub>) 990-1000, (P = O) 1250, (P-C<sub>6</sub>H<sub>5</sub>)1450, (C-N in cycle) 1550.

In a spectrum PMR O-(anabasinobutyn-2-yl)phenylphosphonate in the field of a weak field apart from signals of two phenylic radicals the signals of a b-displaced pyridine, reference for a molecula anabasine are observed: H<sub>αα</sub>-8,46 p.m., H<sub>α</sub>-8,41 p.m., H<sub>γ</sub>-7,60 p.m. And H<sub>β</sub>-7,15 p.m. A double triplet at 4,70 p.m. And triplet at 3,05 p.m. Belong to signals OCH<sub>2</sub> and N-CH<sub>2</sub> of groups, accordingly, separated by acetylene bond.

The signals of piperidine cycle of anabasine have the following chemical shifts: H<sub>2a</sub>-3,27 p.m., H<sub>6e</sub>-2,78 p.m., H<sub>6a</sub>-2,45 p.m., and remaining protons (6H, m, CH<sub>2</sub>) are in resonance in the field of 1,1-1,9 p.m.

The analysis of mass-spectrometer decay of the synthesized connections has shown, that the mass-spectrometer fragmentation M\* about - O-alkyl-O- (anabasinopropyl) phenylphosphonates flows past in different directions and is characterized, as against about O-alkyl-O-(anabasinobutyn-2-yl)phenyl-phosphonates, large number of phosphor containing ions; the availability of the second phenylic radical in molecules anabasincontaining derivatives of a diphenylphosphinic acid essentially changes fragmentation of a molecular ion.

Usage of connections as extra gents of gold and argentum from technological solutions has shown, that some of them allow in 80 times more effective to extract ions Au, than Ag.