	Information about both local and international scientific grant projects implemented by scientific staff during the last 20 years											
Project number ID number	Project title	Name of the grant call	Funding organization	Grant budget (total)	Start and end dates	d Principal investigator	Key personnel	Project Summary	Detailed description (for the completed project)	Achieved results		
GE-2506 FR-21-4196	Scientific substantiation of the possibility of creating new bactericidal zeolite filter materials for purification- decontamination of water from various sources Obtaining ursolic, oleanolic, betulinia caids from agro-industrial wastes, synthesis of their derivatives and evaluation of biological activity	Applied gran	International Science and Technology Center ISTC Shota Rustaveli National Science Foundaiton (SRNSF)	210 130 USD 233 000 GEL	1.05.2022 - 30.04.2025 14.03.2022 - 14.03.2025	Vladimer Tsitsishvili Imeda Rubashvili	Nato Mirdzveli, Nanuli Dolaberidze, Manana Nijaradze, Zurub Amiridze, Bela Khutsishvili, Tekla Kapanadze K. Ebralidze, M. Tsitsagi, M. Chkhaidze, M. Alibegashvili R. Kakava, T. Bukia	The goal of the project is to create methods of chemical modification and transformation of clinoptilolite and other natural zeolites for the production of bactericidal filter materials suitable for water purification and decontamination We are investigating sequential extraction of pentacyclic triterpenoids, derivatization. We are also working on the elaboration of analytical methods of target products and study of bioactivity				
CARYS-19-442	Bactericidal zeolite fillers for paper production	Applied gran	Rustaveli National Science Foundaiton (SRNSF), International Bank for Reconstruction n and Development t (IBRD)		29.07.2020 - 29.07.2021	Vladimer Tsitsishvili	N.Mirdzveli, Z.Amiridze, A.Tsertsvadze, G.Khutsishvili, K.Virsaladze, T.Kapanadze, B.Khutsishvili, N.Chalidze, M.Panayotova, N.Dolaberidze M.Nijaradze	The goal of the project was to obtain bactericidal materials using heulandite- clinoptilolite from Georgia, study their properties and use them as a filler for the production of bactericidal paper	Microporous materials containing silver, copper and zinc were prepared using a new environmentally acceptable ion exchange method; The synthesized materials retained the crystal structure of zeolite, contained a sufficient amount of biocidal metals, and exhibited bacteriostatic activity against gram-negative bacteria Escherichia coli, gram-positive bacteria Staphylococcus aureus and Bacillus subtilis, fungal pathogenic yeast Candida albicans, and fungus Aspergilus niger, and the mixtures of different forms were synergistic and had higher activity than individual materials. Filled papers were produced in the paper factory of the company 'Papers' and their general mechanical properties (basis weight, thickness, durability, etc.) were investigated. The introduction of zinc-containing zeolitic filler gave the paper bacteriostatic action against Escherichia coli, and these two fillers are recommended for use in the production of bactericidal paper.	chemistry (ion exchange in the 'solid' state), materials science and medicine (bactericidal adsorbent-ion exchangers), bacteriology (silver, zinc and the effect of the synergistic action of copper), as well as from an economic point of view (possibility of replacing expensive silver with cheap copper and zinc)		
FR-18-2600	Scientific feasibility of creating nanocrystalline bactericidal sorbents on the basis of Georgian natural zeolites and the study of corresponding mechanisms	Fundamental Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	128 000 GEL	27.02.2019 - 27.02.2021	Nato Mirdzveli	Manana Nijaradze, Nanuli Dolaberidze, Zurab Amiridze, Nino Sinauridze, Ketevan Virsaladze, Tekla Kapanadze	The main direction and the research goal of the work is the investigation of mechanisms of nanocrystalline bactericidal material formation, including determination of regularities of hydrothermal crystallization and ion exchange processes, as well as development of optimal conditions to prepare zeolite sorbent with high sorption and detoxifying properties, which will be widely used in medicinal practice since it is highly demanded.	The sphere of application of the results of the project is medical practice, including the creation of new medical preparations. New methods expand the assortment of bactericidal preparations, and the sorbents with high capacities and antitoxic propertiesare interesting from a commercial point of view in accordance with the sales of similar products, price-forming factors, etc. Assessment of production costs both for pilot and large-scale technologies, as well as consideration of environmental aspects of production and application of new zeolite products is planned.	In order to obtain nanocrystalline bactericidal sorbents, the solid-phase method of chemical treatment of zeolitic adsorbents—in one-change was used for the first time, which allows to increase the assortment of similar materials in a short time with lower costs. Many researchers were interested in the results of the project, both in Georgia and abroad, because an important task in this field is to create a theoretical and experimental basis for researching the properties of zeolitic sorbents, which is indicated by the dynamics of the increase in the number of open publications and patents. Application oftanocrystalline sorbents with high content of antibacterial metalscan solve many problems in medical practice.		
AR-18-741	Obtaining of hydroinsulation materials, highly effective penetrant and other products by wasteless processing of several industrial and petroleum deposites	Applied Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	390 000 GEL	2019–2021 (prolonged to the end of 2022)	Guram Khitiri	Ioseb Chikvaidze, Raul Kokilashvili, Tinatin Gabunia, Nino Samsonia, Nino Zviadadze, Givi Bazghadze	The issue of waterproofing of building constructions, various purpose buildings and structures is one of the urgent problems of modern times. Currently, concrete, reinforced concrete, metal materials are used for this purpose, which are quite expensive and are not produced in the region of Georgia. Importation, transportation and customs clearance of waterproofing materials seriously increases the builders' costs of and increases the cost of the building as well. Our goal is to obtain high-quality waterproofing materials seed on our own resources, creation of methodology for obtaining of highly effective insulation (waterproofing) materials for use in the following directions: waterproofing of concrete, reinforced concrete, metal, wood and other building structures, flat roofing, filling and gluing of cracks, spraying solutions and emulsions, spreadable matrics and adhesive layered materials, hydro-and anti-corrosive insulation of pipelines, including the oil and gas pipelines; modernized asphalt material; hard and flexible tiles and etc., drawing up specific proposals and working methods to get the planned products.		Up to 50 samples of insulating materials of different composition (including sand-based) and initial used tyre powder have been prepared. The process of observing is in progress.		

The effective way to achieve the nutrition regime of plants is to use mineral and organic fertilizers. Effect of using mineral fertilizers is very low, as after being introduced in soil, part of nitrogen fertilizers are either washed out or evaporated, and part of phosphate fertilizers are absorbed by the soil and turn into an sparingly soluble form. Use factor of this kind of fertilizer is only 15-25%. Natural zeolites are widely used in agriculture. Introduction of mineral fertilizers washing out of nutrition elements from the soil. We propose new nano technological method to receive anionic substitute. This zeolite structure without changing its structure, by the formation of the anion substitutional phase. Due to the molecular sieve properties of the zeolite, ammonia cations, anions of phosphoric acid and other micro elements introduced into the zeolite structure, gradually pass into the soil. The interaction of phosphoric acid with soil ions is minimal, which maximizes the efficiency of fertilizer use. Enriched at nano-level with phosphorous, ammonia, potassium, calcium, iron,

Marina Zautashvili, Tinatin

Burdjanadze, Giorgi Iluridze,

Sharashenidze, Nina

Mumladze Manana

Giorgi Antia

used in open field for almost all types of agricultural crops, greenhouses, as well as as well as on decorative plants.

sulfur) fertilizer obtained, due to its multifunctional universal properties may be

Using natural zeolites from local raw materials, a zeolitic material is obtained by nanotechnological methods, which includes nitrogen, phosphorus, potassium, calcium, iron, magnesium, boron, zinc, copper, molybdenum, manganese

The proposed zeolite nanoporous material is an "inorganic capsule - molecular sieve", the operation of which is mainly based on the principle of anion exchange - the gradual transfer of phosphoric acid anions in the soil, which is well supported by the molecular-sieve properties of zeolite. Due to this, the contact of phosphoric acid anions in the soil and, accordingly, the formation of calcium, magnesium, iron and aluminum phosphates, which are insoluble or difficult to dissolve in water, are minimized. Also, the ecological danger that can occur by soil cultivation and changing its structure is reduced to a minimum

Phosphorus utilization rate increases; The fertilizer is of prolonged (long-term) action; improves soil aeration; it keeps moisture in the soil for a long time and continuously supplies it to the plant; works as a storage reservoir of elements necessary for plant life and growth; is a source of trace and zeolites in the soil allows us to guarantee the long-term effect of fertilizers and elements and thermoregulators; minimizes phosphorus loss; It is an environmentally efficient product; makes it possible to reduce plant maintenance costs:

Fertilizers with similar properties and composition are almost not found on the market in our country, or if they are quite expensive or of low method is based on introduction of ammonium dihydphosphate and some cations in quality, therefore, the production of such a universal fertilizer obtained using local natural raw materials creates great prospects for its use. Considering the simplicity and low cost of fertilizer production, the prospect of using the proposed nanomaterial as a universal fertilizer will become more realistic

At present, there are mainly two types of phosphorus fertilizers sold in the market; These are simple phosphorus-containing fertilizers and complex phosphorus-, nitrogen-, and potassium-containing fertilizers. Applying simple fertilizer to the soil requires addition of nitrogenous and potassium fertilizers. Complex phosphorus fertilizers, such as the French-made "Everton" or "Europak" available on our market, are covered with a membrane made of organic substances, so that phosphates do not turn into insoluble forms that cannot be absorbed by plants when they come into contact magnesium and microelements (boron, zinc, manganese, molybdenum, copper and with the soil. The total percentage of nitrogen, phosphorus and potassium in this fertilizer does not exceed 40%, and the rest of the fertilizer is organic ballast, which is another factor of soil pollution.

The fertilizer offered by us is cheaper compared to the French fertilizer, the total percentage of nitrogen, phosphorus and potassium is more than

On the territory of P. Melikishvili Institute of Physical and Organic Chemistry, 50%, and the most important thing is the zeolite containing the ballast. If we take into account that it is possible to adjust the amount of The resulted fertilizer due to its multifunctional universal characteristics can be used microelements and potassium in the proposed fertilizer, then once again we will be convinced of the superiority of the proposed fertilizer. in open field for almost all types of agricultural crops, sapling farming, greenhouses, Fertilizers of this type are practically not produced in Georgia, because the project is focused on the development of innovative and technological transfer with a perspective of commercialization, a small-scale enterprise was organized on the territory of P. Melikishvili Institute of Physical and scientific conferences.

a small-scale enterprise was organized, where the proposed fertilizer is produced, which is competitive with the corresponding type of imported fertilizers; patent, scientific publication in a ranked journal; Participation in 2

	Complex, prolong-acting	Applied
AR-18-601	zeolitic fertilizer obtained by nanotechnology	Research State Grants

		Rustaveli National			
omplex, prolong-acting colitic fertilizer obtained y nanotechnology	Applied Research State Grants	Science Foundaiton (SRNSF)	420000 GEL	17.12.2018 - 17.12.2021	Giorgi Tsintskaladze

Shota

FR-18- 3889	Synthesis of coordination compounds of biometals with anesthetic substances and research of their physical-chemical properties	Fundamental Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	222 000 GEL	21.02.2019 - 21.02.2022	Nani Zhorzholiani	Koba Amirkhanashvili, Leli Metreveli, Aleqsandre Dadianidze, Ani Shubitidze
FR-17_187	Investigation of formation of fine-dispersed zeolite crystals and the feasibility of creating new materials	Fundamental Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	120 000 GEL	20.12.2017 - 20.12.2019	Nanuli Dolaberidze	Manana Nijaradze, Vladim Tsitsishvili, Nato Mirdzveli Nino Sinauridze, Ketevan Virsaladze, Tekla Kapanadz
FR-17_331.	Development of a new technology for ways to overcome environmental problems caused by mineral fertilizers	Fundamental Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	210 000 GEL	20.12.2017– 19.12.2020	Givi Papava	Riva Liparteliani, Eldar Gugava, Eter Gavashelidze, Nazi Gelsalvili, Davit Kvaratskhelia, Ketevan Archvadze
		The competition of state scientific grants was announced as part of the					

Biodegradable polymers Targeted Science and

synthesis and application Research and Technology

in environment protection Development Center in

Achievements in the field of researches in biotechnology and metabolic processes. organism only in the form of coordination compounds, since they give the body ability to absorb all vital microelements in a balanced and optimal way. Using simple, optimal methods, depending on the pH medium, 60 individual biocoordination compounds were obtained with the general formula (AnsH)2 [MX4]·nH2O(type I) ecaine: M=Ni(II).Zn(II).Mn(II). Cu(II). Fe(II). Fe(III). Sn(II). Co(II). Cd(II). Cr(III) (I); M=Co(II), Ni(II), Zn(II), Mn(II), Cu(II), (II) ; X=Cl-, NCS-. In the complexes, the order of metal-ligand coordination was established by IR spectroscopy. The process of complex formation in solutions and the thermal stability of the synthesized compounds have been studied. The molecular and spatial ture of the complexes (AnsH)2[MX4]·nH2O, where Ni(II), Zn(II), Co(II), Cn(II) was solved by X-ray diffraction. Stereochemical aspects are discussed: the influence of the metal-complex and the organic ligand on the coordination process; on the internal coordination domain of the complexes. Relationship between structure and properties of the complexes. It is important that the biologica activity of several coordination compounds against microorganisms (B. subtilis, S. Aureus, E. coli, C. albicans) is several times greater the bioactivity of the drugs themselves - Lidocaine and Novocaine.

Preparation of panocrystalline bactericidal materials is possible by re-crystallization of cheap natural zeoliteswith developed micro-porous structure and high ionexchange capacity, like analcime and phillipsite

Due to good solubility of nitrogenous fertilizers its greater portion is lost uselessly as a result of leaching and evaporation. Besides economic losses it results in global environment pollution According to our opinion one of the efficient ways to avoid these problems is application of polymer fertilizers, which are hardly soluble in water. At their introduction into soil, at the impact of degradation microorganism fertilizer is transformed and it passes to the form, which is easily assimilated by plants. This process proceeds slowly and a plant manages its assimilation. Besides, in vegetation period, a plant is provided with dozed and (in case of pellet forms) on and it develops normally, whih is a prerequisite for obtaining used in polymer chemistry - polycondensation. To obtain polymerized carbamide. we'll modernise this method, which is a new innovative method for obtaining polymerized fertilizers. We'll implement task-oriented synthesis of polymers to receive linear structure polymers where labile peptide bonds will be preserved. This, together will enable to carry out purposeful synthesis of polymerized fortilizers of unique structure and properties acting by prolongation mechanism, simply and at low economic expenditures. This is why the works to be implemented within the frames of the submitted Project are doubtlessly significant and actual. Obtaining of polymerized, biodegradable fertilizers of desired structure, acting by the prolongation mechanism by the modified polycondensation method, by leading the reaction in purposeful direction is the scientific and technological novelty in the planned research. Polymerized fertilizers obtained by such innovative approach are characterized by unique properties, which is conditioned by linear structure of the obtained fertilizers, where labile peptide groups are preserved, which makes easier adaptation of degradation microorganisms and the degradation ability. In special literature there are no data about polymerized nitrogenous fertilizers, biodegradable producing multi

Environment protection is the most urgent problem. Nitrogen fertilizers - occupy the first place by scales of application. Due to good solubility its significant share it washed-off or evaporated. Development of ecologically safe, profitable mineral fertilizers will enable us to replace easily washed-off nitrogenous fertilizers with polymerized ones. The project will enable to develop such technology through creation of polymer composites containing modified microorganisms and polymerized fertilizers. Project realization will resolve following major objects 1.study of carbamide and thio-carbamide polycondensation and co polycondensation processes mechanisms; investigation of peptide groups-cont linear macromolecules creation process; 2, modification of degrading activity microorganisms 3. development of technology to obtain polymer and co-polymer based composites by application degradation microorganisms: Application of polymerized fertilizers will prevent their wash-off into soil and global environment pollution. Project realization will give impetus to progress of researches for Chitrekashvili, Nazi Gelashvili, obtaining new generation, ecologically safe, economically profitable fertilizers by

Marina Gurgenishvili, Nora

Dokhturishvili. Ia

Eter Gavashelidze

Ukraine STCU 70 000 USD 2017 - 2019 Eldar Gugava

Using simple methods, 60 coordination compounds containing biometals and anesthetic substances have been synthesized, the general formula of have led scientists to significant conclusions - microelements should enter the living which is (AnsH)2[MX4] nH2O(I) and [M(Ans)2X2](II). The composition and individuality of the complexes were established by the methods of elemental, phase, and diffraction analysis. Their solubility in water and various organic solvents was studied. To establish the nature of the ligand ond, the dentatity, and the coordination properties of the acidoligands, the studied IR spectra of type I complexes do not allow one to establish the metal-ligand coordination bond, but broad bands are observed in the compounds in the region 2633-2885 cm-1 indicate the existence of the cation the formation of structures: the effect of acid ligands on the inner sphere of the -(AnsH)+. And also an absorption band is observed, which refer to the stretching vibrations of tetrahedral anions. In complexes of type II, the and [M(Ans)2X2] (type II), where Ans is the main form of Lidocaine, Novocaine and coordination bond between the metal and the ligand occurs through the oxygen atoms of the carbonyl group and the nitrogen atoms of the aminc group. The specific properties of thermo-oxidative degradation were established from the heating curve, the rate of weight loss, and the emperature range of the decomposition process of the complexes. In compounds of type I and II, endo-effects correspond to the oxidation of 2 moles of the ligand. Exo-effects correspond to the loss of acid ions. In all cases, the end product of thermolysis is metal oxide. Complex formation in Fe(III)-Lid-NCS- and Fe(III)-Tm-NCS- systems was studied. The complex is extracted with ether, isobutyl alcohol, chloroform. The best extractant is chloroform. Of the studied cations, the extract of Fe(III) complexes is the most sensitive and it is promising from the point of view of the etric determination of Fe(III). Complete X-ray diffraction study of single crystals of the following chemical compo (LidH)2[MeX4] nH2O, where Me=Cu(II).Ni(II).Zn(II).Co(II): This method refined the molecular structure and spatial structure of the synthesized complexes. Single crystals mainly crystallize in syngonies; monoclinic and centrosymmetric-triclinic. In the structures, metal ions coordinate with their further use in pharmacology The role of hydrogen bonds in the formation of structures: Influence of acid ligands ligands in the form of two tetrahedral (ugly or regular) anions [MecI412-. [MerNCS]412- or [Ni(NCS]42H2O]2-, while protonated cations remain in . The data obtained during the study are necessary not only for the the outer coordination sphere. Anions and cations are linked by intermolecular hydrogen bonds. The Kirby-Bauer method revealed the imicrobial activity of the Co(II), Ni(II), Zn(II), Cu(II) complexes. It has been established that the biological sensitivity of the compounds in relation to strains of staphylococcus (S. Aureus), Escherichia coli (E. coli), bacilli (B. Subtilis) significantly exceeds the sensitivity of pure lidocaine or Novocaine. Of note are the thiocyanate complexes Co(II) and Ni(II), whose bioactivity is quite impressive. The compounds can certainly be used of coordination compounds makes a significant contribution and promotes the to treat fungal (Candida albicans) disease

> According to the obtained results, it is determined that there are mesopores (hole-like, cylindrical) with average diameters of 22.4 in the arachite aggregates; 54.4 nm. Calculated by the Barrett-Joyner-Halenda method. The identity of the crystal structure of the samples is confirmed by X-ray $diffractometric\ analysis\ method.\ Scanning\ electron\ microscope\ images\ show\ that\ the\ size\ of\ the\ largest\ crystallites\ is\ 50\ \mu m.\ An\ ecologically$ profitable method of obtaining metal-containing sorbents with bactericidal properties has been developed. Bactericidal zeolitic adsorbents and ioi exchangers have been obtained - with a high content of silver, copper and zinc, maintaining the crystal structure and other properties, which are sing materials for use in the medical field and for environmental measures (water purification, restoration of contaminated soils -disinfection The chemical composition of the final products is studied, the specific surface area, pore size and volume are determined based on the adsorption measurements. X-ray diffractometric analysis and so-called The stability of their structure has been confirmed using the spectroscopy method. Electron microscopic images are shown. Ion exchange parameters are established:

Static exchange capacity 3.5 meg/g, dynamic exchange capacity 2.7 meg/g, activation energy = 4.6 for Ag; 42.3 - for Zr Intense growth of the population requires continuous increase of food products - especially production of cereal crops. But agricultural designati lands suffer constant decrease thanks to the increased urbanization and intensification of industry. One of the ways to resolve the problem is significant increase of hectare norms of mineral, in particular nitrogenous fertilizers, which results in environment pollution, since, as is known, nous fertilizers are well soluble in water, are easily washed off and lost in soil uselessly, which results in tremendous economic loss and global environmental contamination. This is why development of innovation technologies to produce ecologically safe and profitable mineral fertilizers has a decisive significance for our further survival, and hence it is the urgent problem. Such technology enables us to replace easily washed-off nitrogenous fertilizers by polymerized ones, which are not easily washed-off and in vegetation period provide plants with dosed regulated, controlled nutrition and harmonious development. The aim of the present Project was to develop an innovative technology to create by targeted polycondensation the biodegradable polymer nitrogenous fertilizers acting with prolongation mechanism, to prevent environn pure product and for increase of productivity. We'll use the most significant method pollution and to eliminate the economic losses caused by leaching and evaporation. Therefore it is a scientific and innovative technological novelty Polymer compositions were developed, containing modified, adapted microorganisms able to destruct polymer fertilizers and polymerized nitrogenous fertilizers, practical implementation of which allows to solve the following problems: -for the first time, targeted synthesis to obtain a new generation polymerized fertilizers using a modernized polycondensation method and a process mechanism has been implemented; -The method of synthesis of polymers with peptide groups in the main polymer chain was first developed; -Modification and stage-wise adaptation of microorganisms able to destruct polymers was first implemented: -Innovative technology has been developed to obtain cereal crops palletted-capsulated composites containing destructive microorganisms. Application of polymerized nitrogenous fertilizers enables us to extirpate tremendous economic losses due to their washing-off to the soil, to provide environment protection from global pollution by nitrogenous fertilizers, protect the environment from pollution. 7. The use of prolonged nitrogen to reduce significantly hectare norms of nitrogenous fertilizers, to ensure dosed, controlled nutrition of plants, their harmonious development in getation period and to obtain ecologically safe products, to elevate productivity and labor efficiency and others. Results of Project implementation fertilizers by - 50% and increase yields by 15-39%. 8. The use of polymerized will give stimulus to the progress of researches in advanced agrarian countries to obtain ecologically friendly, economically profitable new generation polymer fertilizers by application of targeted polycondensation synthesis. - A method based on monomers containing reaction-capable multigroup monomers by pilicondensation has been developed for the synthesis of linear heterozygous polyomers, prolonged polymerized nitrogenous fertilizers. - The mechanism of the polycondensation reaction and the main regularities of the process are studied. It is shown that by changing the molar ratio of the initial components and other parameters, it is possible to change the composition and chemical structure of polymers. - Using this method will give us a wide opportunity to obtain various types of prolonged fertilizers. - A technology has been developed for life of technical means, preserve the structure of the soil, etc.Sh. The grain in emponent compositions in which polymerized, biodegradable nitrogen fertilizers with a prolongation mechanism are used

> The interaction of carbamide and formaldehyde was studied both in aqueous solutions and in the pores of the sorbent. Carbamide-formaldehyde oligomers were obtained by us in an aqueous medium. The reaction was carried out in a neutral, slightly acidic or slightly alkaline medium. A neutral or slightly alkaline medium creates favorable conditions for the production of carbamide methylene derivatives, further structuring wa carried out in an acidic medium. During the reaction in the pores of the diatomite at the first stage, the formation of carbamide methylene derivatives, the subsequent transformation of methyl groups and the formation of methylene and dimethylene ether bonds occurs, which is confirmed by infrared spectroscopic examination. The process of carbamide sorption in diatomite vapors was studied. It was found that the amount of sorbed urea in the pores of diatomite increases with increasing temperature, which is explained by a decrease in the viscosity of molten urea, which facilitates the penetration of urea molecules into the pores of diatomite. At a temperature of 150-155 °C, the degree of sorption reaches 23-25%. The influence of duration and temperature on the sorption process was studied. The process of carbamide desorption from sorbate was also studied. Natural and thermally activated diatomite were used as a sorbent. The pores were saturated with molten urea. In the case of natural sorbents, the sorbate contains 20% carbamide, and in the case of activated diatomite = 25-35%, which is explained by the increase in porosity and pore size of the diatomite as a result of heat treatment. Studies have proved that with an increase in the duration of polycondensation, with an increase in the degree of structuring, the desorption of urea from diatomiotic pores decreases with a decrease in the amount of free (non-reacting) urea, and after the completion of polycondensation, the desorption of urea practically no longer occurs. The process of structuring sorbed urea in the pores of diatomite in the range of 135-155°C has been studied. The rate of structuring at this time is somewhat reduced compared to the case when structuring is carried out under normal conditions, in a reaction vessel, without the participation of diatomite. To develop a method for obtaining multicomponent draped compositions, the components of the composition: Polymerized carbamide, diatomite, superphosphate, potassium developed and the main technological parameters have been established. 9. It chloride, trace elements (magnesium, boron, zinc, manganese, copper, cobalt) in the form of salts were previously dispersed in a porcelain mortar. Then each piece was individually placed in a rod-shaped mold. Multicomponent dredged compositions were obtained by pressing them under are of 25, 50, 100 and 150 Pascal. The temperature varied from 25 to 80C. Carbamide and superphosphate under pressure of 50 Pascal are formed in the form of a rod at room temperature. With increasing pressure and temperature, the mechanical strength of the molded rod increases Tests have shown that the multicomponent mixture under pressure is formed well enough at room temperature and the resulting rod has a sufficiently high mechanical strength, which is quite sufficient for its use in soil. Based on the data of the method for obtaining multicomponent sitions, the technology for obtaining the composition was developed, the main technological parameters were determined

- · Using simple optimal methods, depending on the pH of the medium, 60 individual biocoordination compounds were obtained.
- · Method of metal-ligand coordination established
- The thermal stability of the compounds has been studied The process of complex formation in solutions is considered, and the
- conclusions obtained are generalized in the direction of analytical chemistry The molecular and spatial structure of the synthesized compounds has been
- established. Stereochemical aspects are considered: influence on the process of coordination of a metal and an organic ligand; the role of hydrogen bonds in complexes: Structure and bioactivity
- · Several coordination compounds Co(II), Ni(II), Zn(II), Cu(II), have been identified, the biological activity of which against microorganisms significantly exceeds the activity of Novocaine or Lidocaine

The implementation of the project will result in:

- Enrichment and development of Inorganic and Coordination Chemistry as a
- · Expansion of the range of biologically active substances with the prospect of
- development of coordination and analytical chemistry, but also promising for the treatment of metal deficiency pathology.
- . The creation of a theoretical and experimental base for the synthesis and study development of this direction. Especially since the development of coordination

The possibility of formation of fine-dispersed, transitional porous analcime, as well as the optimal ratios of mineral-forming suspensions and gels, which participate in the crystallization process and are important for the formation of eolitic crystals, have been established.

1 A method based on monomers containing reaction-canable multigroup monomers by pilicondensation has been developed for the synthesis of linear heterozygous polyomers, prolonged polymerized nitrogenous fertilizers. 2. The mechanism of the polycondensation reaction and the main regularities of the process are studied. It is shown that by changing the molar ratio of the initial components and other parameters, it is possible to change the composition and chemical structure of polymers, 3. Using this method will give us a wide opportunity to obtain various types of prolonged fertilizers. 4. A technology has peen developed for producing multicomponent compositions in which polymerized, biodegradable nitrogen fertilizers with a prolongation mechanism are used together with other necessary elements necessary for plant nutrition 5. The use of multicomponent dredged-encapsulated compositions ensures utonomous, dosed nutrition of the plant and its normal development during the growing season, obtaining environmentally friendly products. The research esults are widely used in developed agricultural regions and countries, 6. Multicomponent dredged compositions are controlled-release fertilizers that fertilizer in the composition allows to reduce agrotechnical norms of nitroge nitrogen fertilizer will avoid flushing and dumping, and consequently economic losses; the consumption of seed material will be reduced to 30-40 kg ha. 9. The coefficient of nitrogen absorption by the plant increases significantly The tenth Complex fertilizer will be applied to the soil once, which will provide significant savings in labor resources, fuels and lubricants, extend the service the crushed composition of the seed material is protected from rodents, birds 1. The interaction of carbamide and formaldehyde in aqueous solutions, pores of a natural sorbent has been studied. 2. At the initial stage of the aqueous solution, methylene derivatives are formed, and the reaction is bimolecular. 3. The stability of methyl groups depending on pH has been studied. It has been shown that the stability of the methyl groups is high in the neutral and slightly alkaline regions, 4. Both the formaldehyde binding reaction and the condensation of methyl groups depend on the concentration of reagents depend on pH and temperature. At high concentrations, bimolecular reaction evail, and the equilibrium shifts towards polymer formation. In the neutral or alkaline region, dimethyl ether bonds are mainly formed. When the temperature rises or the temperature changes, the oligomers undergo further polycondensation, 5, polycondensation of carbamide and formaldehyde was carried out in the pores of the sorbent. Some kinetic regularities of this process have been studied. It is shown that the reaction has a second order 6. First of all, polycondensation of carbamide was carried out in the pores of a natural sorbent - diatomiote. 7. A technology for obtaining a long-acting fertilizer pased on carbamide has been developed. 8. The technology of obtaining multicomponent dredged compositions from polomerized carbamide has bee has been established that agrotechnical standards for the use of prolonged nitrogen fertilizers are reduced to 50-60% with a corresponding economic effect. Grain yield increases to 15-30%. The use of polymerized nitrogen fertilizer practically eliminates its washing and spreading, the seeding rate is reduced by 45-50 kg, the nitrogen absorption coefficient increases. During the growing season, the plant is provided with dosed nutrition, which contributes o its normal growth and development, increasing yields and obtaining

								waste water from antibotics (including prairing center). The following tasks were completed.
								Physico-chemical study of zeolite (structure, chemical purity, determination of zeolitic phase) by instrumental - Fourier transform infrared
								spectrometric and X-ray diffractometric methods; Obtaining its nanomodified forms; Adoption, optimization and validation of highly efficient liquid
							The information concerning the existence and dissemination of antibiotics in	chromatographic method for quantitative determination of norfloxacin, moxifloxacin, ceftriaxone in aqueous solutions;
							ecosystem became clear to scientists approximately 30 years ago. Nowadays,	Statistical processing of analytical data obtained as a result of method validation, estimate uncertainty for each method;
							aforementioned substances are believed to be anthropogenic pollutants of the	Construction of a flow-type adsorption device for studying the adsorption of research antibiotics under dynamic conditions;
							environment and pose serious threat for aquatic and terrestrial organisms.	preparation of model solutions of different concentrations of antibiotics; Studying the adsorption process of each antibiotic in different variants of
							Antibiotic residues in the environment, even in very small quantities, cause the	zeolite layer height and granularity under static and dynamic conditions;
							development of resistance inbacterial populations, which in the nearest future will	Physico-chemical examination of zeolitic samples saturated with antibiotics by instrumental methods; study of the regeneration process; Study-
							guaranteed reveal the decline of their therapy effectiveness against infectious	evaluation of antibiotic degradation/transformation in zeolitic samples under the influence of oxidizing solution;
							diseases. Nowadays scientists already know about the existence of antibiotics in soil,	Statistical processing of the analytical data obtained as a result of the experiment and determination of the dynamic parameters of the adsorption
							food, plants, as well as in surface, waste, and drinking waters. That's why the	statistical processing or the analytical data obtained as a result of the experiment and determination of the dynamic parameters of the adsorption process of antibiotics:
							existence of aforementioned substances in the nature poses risk for human health	
								Evaluation of possibilities of using zeolitic samples and proposal of a principle scheme for purification of waste water from antibiotic impurities.
							and demands from scientists, effective tools of remediation, to carry out the research to prevent such substances from getting in the environment and disseminate.	Natural zeolite - clinoptilolite was selected for the preparatory work of the research, the content of the zeolite phase was determined by the so-
							Within the framework of the project the adsorption of antibiotics (norfloxacin,	called spectroscopy and X-ray phase methods; Nanomodified forms of zeolite were prepared;
							moxifloxacin, ceftriaxone) will be conducted on natural and synthetic zeolites and	Optimization and validation of highly efficient liquid chromatographic method for quantitative determination of norfloxacin, moxifloxacin, and
							on their nano-modified forms. Validated liquid chromatographic methods will be	ceftriaxin in aqueous solutions took place;
							used to identify absorption capability of zeolites towards antibiotics, including the	As a result of the validation of the method, statistical processing of the obtained analytical data was carried out. Uncertainty was assessed for each
		Shota					assessment of indefiniteness.	method;
		Rustaveli					Based on the results, the effective adsorption method of cleaning wastewaters from	Quantitative chromatographic analysis method for antibiotic concentration control has been developed.
	Adsorption method of	National				Kordzakhia Teimuraz,	antibiotics will be created and the sorbent will be obtained. The mentioned zeolite	Adsorption of antibiotics on zeolite was first performed under static and dynamic conditions. The experiment was carried out in dynamic conditions
	purification of wastewaters Funda					Pirtskhalava Nino, Zautashvili		on a specially constructed flow-type laboratory device.
	from antibiotics using Resea		210 000	09.12.2016 -		Marine, Dzagania Maia,	least possible expenses. It can be considered as one of the most important steps	Using the Langmuir and Freundlich adsorption models, the influence of the initial concentration of the antibiotic solution, flow rate and pH value,
#217138	natural zeolites State	Grants (SRNSF)	GEL	09.12.2019	Eprikashvili	Rubashvili Imeda	towards eliminating antibiotic resistance.	as well as the contact time of the zeolite/antibiotic solution in the system, on the adsorption process was investigated and evaluated. The results
								The objective of the present study was to develop sequential extraction procedures for the major carotenoids - beta-carotene, lycopene
								anthocyanins from agro-industrial waste materials - tomato skin, tangerine, orange peels and grape skin using the ultrasound-assisted extraction
								and the supercritical fluid extraction techniques. A rapid, effective and selective high performance liquid chromatographic method for quantitative
								determination of beta-carotene, lycopene and anthocyanins in organic extracts solutions was developed and validated with respect to robustness,
								specificity, linearity-range, accuracy, precision, limit of detection (LOD) and quantitation (LOQ) as well. The effect of the operating pressure, the
								temperature, the extraction time, the flow rate of supercritical fluid, the sample size, the ultrasound power and the solvent nature used was
		Shota						investigated. The optimal conditions for extraction were found. The LOD and the LOQ are 0.0081µg/mL and 0.00405 µg/mL for beta-carotene,
		Rustaveli						0.034 µg/mL and 0.0085 µg/mL for lycopene, respectively. No interference was observed. The content of beta-carotene per 1 g of dried agro-
		National					Selective and fast sequential extraction methods of natural food colorants from	industrial waste material varies 8,39-12.75 µg (tomato skin), 25,65-32.18 µg (tangerine peel), 41,66-59.16 µg (orange peel) and the content of
	Extraction and analysis of Funda						agroindustrial waste and fast effective and selective chromatographic methods for	lycopene - 165.11-179.56 µg (tomato skin), 11.12-17.91 µg (tangerine peel), 8.37-10.65 µg (orange peel). The optimal conditions for extraction
	natural food colorants Resea		105 000	13.12.2016 -	Imeda	K.Ebralidze, M.Tsitsagi,	the analysis of target products-carotenoides and anthocyanines have been elaborated	
№217394	from agroindustrial waste State		GEL	13.06.2018	Rubashvili	M.Chkhaidze, N.Burkiashvili	within framework of the grant project.	anthocyanins were found. The cambration curve of the developed FFEC method is linear over a concentration range 0.04-00.0 µg/mit for total anthocyanins expressed as cyanidin chloride (r 2 =0.9999); the average recovery equals to 95.62 %.
1721/394	from agromoustrial waste State	Grants (SKNSF)	GEL	15.00.2018	RUUASHVIII	w.Chkhaiuze, N.Burkiashvili	within trainework of the grant project.	antnocyanins expressed as cyaniain cnioride (r 2 = 0.9999); the average recovery equals to 9 > 0.02 %. The content of the zeolite phase of the selected natural zeolite - clinoptilolite was determined by the so-called spectroscopic and X-ray phase
							Cement production arises a global ecological damage because clinker kiln smoke	methods; The basic scheme of the technological process of catching gases (CO2, NOx, SOx) in a clinker furnace with a zeolitic sorber; A flow-type
							gases emit technogenic compounds in the environment: 742-825kg/t CO2, 1,15-	adsorption installation was constructed for studying the sorption properties of Georgian natural zeolite (clinoptilolite) on the example of aggressive
							9,18kg/t SOx and 0,285-1,14kg/t NOx. Its share in the environment in CO2	gas model mixtures. They prepared a model mixture of waste gases (CO2, NOx, SOx) from a clinker furnace, whose distribution was checked by
							emissions equals to 6-8%. It is assumed as the facilitator to the global problems –	gas model mixtures. They prepared a model mixture of waste gases (COZ, NOX, SOX) from a clinker furnace, whose distribution was checked by the gas chromatography method. In the end, optimal conditions of analysis were selected. They improved the polymer sorbent for regulating the
							emissions equals to 0-070. It is assumed as the facilitator to the global problems –	the gas chromatography method, in the end, optimal conditions of analysis were selected. They improved the polymer sorbent for regulating the

Raiden Skhvitaridze, Irakli

Rustaveli

National

240 000

30.11.2016 - Teimuraz

Fundamental Science

State Grants (SRNSF)

Research Foundaiton

Canture of emission (CO2

SOx, NOx.) from the

clinker kiln and their

generates the "Greenhouse effect"/"Acid rain". Technogenic CO2, SOx, NOx at the same time facilitate the emergence of global environmental problems and they are the necessary structural compounds, for the modification of the cement composition and intensive reinforcement. It contributes to formation of fiber-needle habitus crystal-hydrate, calcium hydro-carbo-aluminate, ettringite/thaumasite and the structure self(Nano)reinforcement, reduction of anisotropic feature. A demand on high functioning cement-concrete appeared in Georgia which cannot be satisfied due to the fragility of its structure / mechanical strength anisotropic feature, less sustainability against bending loads. Zeolite tuff has abundance/unique have the ability to adjoin compounds CO2, SO2, NOx, emitted during cement clinker burning, through sorption method. These compounds are environmental hazard, but through sorption adjoining with zeolite-after zeolite modification and cement-concrete constructive containing, structural nano-modifier compounds. The project objective is to:

- Create a zeolite sorption capture-cleanup Nanotechnology from technogenic oxides (CO2,SOx,NOx) of the gases emitted from cement clinker burning kiln; - Create ZEO-litic Nanotechnology for utilization of ZEO-litic sorbents saturated Giorgadze, Giorgi Tsintsaladze, with technogenic oxides (CO2,SO3,NO2) in form of mineral additive during

To study the sorption properties of natural zeolite (clinoptilolite), its nanomodified forms, and to develop an adsorption method for cleaning wastewater from antibiotics (including pharmaceutical production). The following tasks were completed: Physico-chemical study of zeolite (structure, chemical purity, determination of zeolitic phase) by instrumental - Fourier transform infrared pectrometric and X-ray diffractometric methods; Obtaining its nanomodified forms; Adoption, optimization and validation of highly efficient liquid chromatographic method for quantitative determination of norfloxacin, moxifloxacin, ceftriaxone in aqueous solutions Statistical processing of analytical data obtained as a result of method validation, estimate uncertainty for each method; Construction of a flow-type adsorption device for studying the adsorption of research antibiotics under dynamic conditions preparation of model solutions of different concentrations of antibiotics; Studying the adsorption process of each antibiotic in different variants of eolite layer height and granularity under static and dynamic conditions; Physico-chemical examination of zeolitic samples saturated with antibiotics by instrumental methods; study of the regeneration process; Study-

Using the Langmuir and Freundlich adsorption models, the influence of the initial concentration of the antibiotic solution, flow rate and pH value, 2 Scientific publication in a ranked journal; Participation in scientific as well as the contact time of the zeolite/antibiotic solution in the system, on the adsorption process was investigated and evaluated. The results conferences

and the supercritical fluid extraction techniques. A rapid, effective and selective high performance liquid chromatographic method for quantitative etermination of beta-carotene, lycopene and anthocyanins in organic extracts solutions was developed and validated with respect to robustness pecificity, linearity-range, accuracy, precision, limit of detection (LOD) and quantitation (LOO) as well. The effect of the operating pressure, the emperature, the extraction time, the flow rate of supercritical fluid, the sample size, the ultrasound power and the solvent nature used was nvestigated. The optimal conditions for extraction were found. The LOD and the LOQ are 0.0081µg/mL and 0.00405 µg/mL for beta-carotene, 0.034 μg/mL and 0.0085 μg/mL for lycopene, respectively. No interference was observed. The content of beta-carotene per 1 g of dried agrondustrial waste material varies 8.39-12.75 µg (tomato skin), 25.65-32.18 µg (tangerine peel), 41.66-59.16 µg (orange peel) and the content of ycopene - 165.11-179.56 µg (tomato skin), 11.12-17.91 µg (tangerine peel), 8.37-10.65 µg (orange peel). The optimal conditions for extraction anthocyanins were found. The calibration curve of the developed HPLC method is linear over a concentration range 0.04-80.0 µg/mL for total anthocyanins expressed as cyanidin chloride (r 2 =0.9999); the average recovery equals to 95.62 %. 3 Articles: 1 Patent The content of the zeolite phase of the selected natural zeolite - clinoptilolite was determined by the so-called spectroscopic and X-ray phase nethods; The basic scheme of the technological process of catching gases (CO2, NOx, SOx) in a clinker furnace with a zeolitic sorber; A flow-type dsorption installation was constructed for studying the sorption properties of Georgian natural zeolite (clinoptilolite) on the example of aggressive gas model mixtures. They prepared a model mixture of waste gases (CO2, NOx, SOx) from a clinker furnace, whose distribution was checked by the gas chromatography method. In the end, optimal conditions of analysis were selected. They improved the polymer sorbent for regulating the change in concentration and developed a method that is accentable for the absorption of harmful impurities (CO2, NOx, SOx) with natural zeolites in dynamic conditions. Additives obtained by grinding zeolite modified with CO2, NOx, SOx compounds separately and simultaneously were prepared in laboratory conditions for test cement. Cement-concrete contained 0, 7, 20 and 35% zeolitic tuff. Testing has shown that the addition of 20% zeolite does not change the quality of the cement, saving us the cost of 20% cement and obtaining the same grade of C45 concrete. In semiproduction conditions - a zeolite filter was placed in the flue pipe of the clinker furnace with a grid, the filter was checked on the 7th, 14th, 21st and

28th day. The cement was tested at the European standard level using the EN 196 method. The obtained concretes were tested for anisotropy, water permeability, frost resistance, wear resistance, and durability. Concretes were tested for anisotropy according to EN 12390-5:2009 ("Testing hardened concrete - Part 5. Flexural strength of test specimens, NEQ"). The average bending strength of C-50 class concrete columns without concrete, while their bending strength was 56.8 MPa, was 6.53 MPa (11.496%). And the average bending strength of the poles made with less features, however, it is less used in cement production, which is a problem. Zeolites cement, while the average bending strength was 49.75 MPa, amounted to 7.771 MPa (15.62%), that is, the anisotropy decreased 1.358 times Concrete samples containing younger tuff were tested for water permeability according to clause 2 of GOST (state standard) 12730.5-84 ("Concretes. Methods for determination of water permeability") on the CONTROLS company pressure water permeability device 55-C0244/BV. Two cubes from the mentioned samples were tested according to the European standard EN 12390-8:2009; Sample delay 8 atm. It was pressurized utilization in the cement composition with the modified zeolite- they will become a for 72 hours and after that the concrete cubes were split. The depth of water penetration in one sample was found to be 30 mm; And in the second sample, the depth of water penetration is 25 mm (see pictures 8, 9, 10 and 11 - Appendix 6), that is, the mixing of younger tuff in the composition of cement does not reduce the ability of concrete to be waterproof. The test of the samples on frost resistance was carried out on the control device of temperature mode (-200C+200C) of the company CONTROLS - 10-D1429, which was set to the freeze-thaw mode (±200C) with the following cycle. 1). Preparation of samples for testing and testing was carried out according to the basic method according to GOST 10060-2012. The samples were tested after 200 cycles of freezing. After 200 freeze-thaw cycles, the average value of the compressive strength of C-45 concrete samples is 44.29 MPa, and the average value of C-55 concrete samples is 48.97 MPa. Concretes were tested for abrasion resistance according to GOST 13087-81 (Concretes. Methods of determination of abrasion). The wearability of concretes made using cements without additives was in the range of 0.89-

				Shota Rustaveli National				
		New approaches in the synthesis of geraniol, nerol	Fundamental Research		140 000	13.12.2016 -	Tsiuri	V.Tsitsishvili, N.KokiaS
•	217868	and citral	State Grants	(SRNSF)	GEL	16.08.2020	Ramishvili	T.Bukia, G.Kurtsikidze
	'8/35/11- 11/1559/06	Development-Validation of Quantitative Determination and Separation Method of Carotenoids in Organic Extracts obtained from Fruit, Vegetables and their Agro-industrial Waste Materials	Grant for young scientists' research inter nship abroad		7046 GEL	18.01.2016 - 18.03.2016	Imeda Rubashvili	Imeda Rubashvili
F	R/436/6-480/14	Synthesis, study and application of metal complexes	Fundamental Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	150 000 GEL	04.05.2015 - 04.05.2018	Leila Japaridze	L.Japaridze, Ts.Gabelia, E.Salukvadze, N.Osipov T.Kvernadze, S.Urotadz (O.Lomtadze)

Shota

Rustaveli

National

150 000

GEL.

05.05.2015

04 05 2018 Eldar Gugaya

Nunu Maisuradze

Science

Research Foundaiton

State Grants (SRNSF)

Synthesis and study of

Nitrogenous Fertilizer

and development of

Prolonged effect

FR/370/10-100/14. innovative technology

Geraniol (trans -3.7-dimethyl-2.6-octadiene-1-ol), nerol (cis-3.7-dimethyl-2.6octadiene-1-ol) and citral (3.7-dimethyl-2.6-octadiene-1-al) are valuable aromatic these substances via isomerization and oxidation reactions of terpene alcohols linalool C10H18O ((±)3,7-dimethylocta-1,6-diene-3-ol) and geraniol. New classes of the secondary terpene alcohol linalool; It was also intended to isomerize geraniol to obtain neroli. material - systems of different acidity, with equal diameter of mesopores and containing small shares of micropores prepared on the basis of micro-mesoporous BEA-type zeolite were used as catalysts. Isomerization and oxidation reactions were I. the use of new class of materials as catalysts in the above-mentioned isomerization reactions - micro-mesoporous composite catalysts: In catalysts or without them, with or without solvents in inert atmosphere or in oxidation reaction – in air stream at relatively low temperatures (27-150°C). It is shown that: 1. On exposure (200 W, irradiation time - 1h) to catalysts RBEA-25 or BEA-150 and microwaves on D-linalool entering the composition of ethereal oil of coriander seeds when using methanol as solvent in argon atmosphere or when conducting reaction in the air without solvent takes place D-linalool regioselective transformation into trans-geraniol without nerol generation; trans-geraniol yield/selectivity on mentioned catalysts equals 27.5/92.5 and 24.3/87.7, respectively, while D-linalool transformation degree is 29.7 and 27.7% at 40 and 70 °C. 2. Under the influence of microwaves and/or ultrasound (capacity 150-650 W, temperature 40-80°C) geraniol is oxidized in air stream to targeted citrals: the mixture of cis-/trans isomers - geraniol and neral is generated in the following ratio 4/1: it is important that under mentioned conditions geraniol epoxidation reaction generation of 2,3- epoxygeraniol, 2,3-epoxygeranial and 6,7-epoxygeranial occurs, a well. These results show that via relatively easy way (compared to existing one) using microwaves and/or ultrasound it is possible to synthesize citrals and epoxyaldehyds from geraniol.3. On simultaneous exposure to zeolite catalyst RBEA-

and validation of new, rapid, modern, effective and selective HPLC method for quantitative estimation of carotenoids in extracts obtained from tomato, tangerine and orange wastes using multistep extraction method (supercritical fluid extraction) The research includes uncertainty estimation of method for. The results of the research will contribute to develop of laboratory technology and then production technology of delivering carotenoids from agricultural wastes of fruits and vegetables that therefore, gives the roots of future prospects for delivering not only carotenoids but other profitable compounds as well.

The purpose of the research provided for by the scientific grant project was to develop and obtain environmentally friendly compositions, therapeutic and prophylactic purposes against iron deficiency (physiological) anemia, for use in the field of animal husbandry (pig breeding), both injection and oral administration. Preparation of recommendations and guidelines for their application, based on the results of tests of their effectiveness in pig farms and personal subsidiary plots. Co complexes with D-fructose, glycine and purified water. As well as orally acceptable compositions containing complexes of Fe, Zn, Mn, Cu, Co with Dfructose. Se-methionine, glycine and ascan clay, which can be used to ensure stable growth and development of adolescent piglets. The second stage of the research included laboratory testing of rational doses of prepared compositions for injection and oral administration, and the third stage included verification and confirmation of the effectiveness of the compositions of the established optimal prescription composition in pig breeding.

The project envisages application of nitrogen fertilizer-carbamide, which can be introduced into pores of natural sorbents and its structuring (polymerization and ensation reactions), resulting in macromolecules, which practically do not dissolve in soil solutions and due to the large size of molecules are not desorbable from pores. Under the action of soil microorganisms. They slowly degrade and release additional nitrogen. The nitrogen content in the system can be increased from 2.5 to 20-25%. The solubility of fertilizer can be regulated by changing the degree of polymerization, and the degree of polymerization can be regulated by changing the molar ratio of the initial components. Synthesis of prolonged fertilizer on the basis of carbamide will be carried out by the interaction of carbamide and aldehyde component, during the reaction in nalgob. On the basis of prolonged nitrogenous fertilizer, multicomponent fertilizer will be obtained, the use of which will ensure ecologically clean food products and environmental protection from Givi Panava Nazi Golashvili global pollution with nitrogenous fertilizers.

Geraniol, neroli and citral are valuable aromatic substances, so they are used in the perfumery industry; They are also strategic raw materials "building blocks" in the synthesis of vitamins A. E and K. carotenoids, ionones and methylionones: They are also used in pharmaceuticals. In the substances. Project goal was the catalytic, sonochemical and microwave syntheses of production of aromatic substances in the world, geraniol and citral each account for about 10%, which is 10,000 t/year. The goal of the project was to synthesize these substances with known reactions using new approaches: 1. Obtaining primary alcohols - geraniol and nerol by isomerization of

> 2. Preparation of terpene aldehyde citral by oxidation of linalool, its containing coriander oil and geraniol. New approaches, i.e. new ways of receiving meant at the same time the tasks of the project:

conducted under conditions of microwave, ultrasonic irradiation, in the presence of particular, on systems with different acidity, the same diameter of mesopores and a small fraction of micropores prepared on the basis of BEA-type

II. Conducting the above-mentioned isomerization (a) and oxidation (b) reactions under conditions of microwave and ultrasound irradiation without a catalyst. III. Using a catalyst and microwave/ultrasonic radiation as an activator of processes in the above-mentioned isomerization

The results of the project implementation are in accordance with the set tasks: I. 1). Catalytic transformations of terpene tertiary alcohol - linalog at temperatures of 60-170 °C in an inert area (nitrogen, argon or helium) are multi-route on microporous BEA type zeolites and their modified micro-mesoporous forms with transport mesopores of 3.5 and 3.8 nm in diameter; Dehydration, cyclization, condensation and isomerization reactions of linalool occur; At this time, the degree of conversion of linalool is 4-40%, geraniol and nerol are obtained with selectivity, respectively 45-12%, but with a small yield (2-5%). 2). Catalytic transformations of terpene primary alcohol - geraniol on microporous BEA type zeolites and their modified micro-mesoporous forms with transport mesopores of 3.5 and 3.8 nm diameter at temperatures of 27-150 °C in an inert area (nitrogen, argon or helium) are multi-routed; Geraniol dehydration, cyclization, C-C bond expansion and isomerization reactions take place; At this 2. Geraniol is regioselectively oxidized to citrals under the influence of time, the degree of conversion of geraniol is 3-99%, at 27-40 °C selectivity to neroli is equal to 46 and 64%, respectively, but its yield is low (2-4%), microwaves and/or ultrasound in the air stream - cis-/trans isomers are formed. The novelty is that in both cases (1) and (2) at a relatively low temperature on studied micro- and micro-mesoporous BEA type zeolitic a mixture of geranial and neral, in which the trans-isomer significantly ctor" long-chain and macrocyclic compounds are obtained from geraniol and linalool in a one-step way; sesquiterpene alcohols C15H26O (trans, predominates trans -farnesol) and trans-isomers of C14H24O (2E.6E)-6.11-dimethyl-2.6.10-dodecatrien-1-ol) molecules: Namely, with selectivities of 33 and 52%, while degrees of conversion of geraniol are 18-34 and 42-61%. On the BEA-25 and RBEA-25 catalysts, trans, trans-farnesol, formed from geraniol, is joined by another isoprene group to form trans, trans, trans-geranylgeraniol, which forms the monocyclic diterpenic alcohol thunbergol are obtained from geraniol with 63% selectivity

The objective of the present study was to develop sequential extraction procedures for the major carotenoids - beta-carotene and lycopene from The present research planned within internship program concerns the development agro-industrial waste materials - tomato skin, tangerine and orange peels using the ultrasound-assisted extraction and the supercritical fluid extraction techniques. A rapid, effective and selective high performance liquid chromatographic method for quantitative determination of betacarotene and lycopene in organic extracts solutions was developed and validated with respect to robustness, specificity, linearity-range, accuracy precision, limit of detection (LOD) and quantitation (LOQ) as well. The effect of the operating pressure, the temperature, the extraction time, the flow rate of supercritical fluid, the sample size, the ultrasound power and the solvent nature used was investigated. The optimal conditions for extraction were found. The LOD and the LOQ are 0.0081 µg/mL and 0.00405 µg/mL for beta-carotene, 0.034 µg/mL and 0.0085 µg/mL for lycope respectively. No interference was observed. The content of beta-carotene per 1 g of dried agro-industrial waste material varies 8.39-12.75 µg (tomato skin), 25.65-32.18 µg (tangerine peel), 41.66-59.16 µg (orange peel) and the content of lycopene - 165.11-179.56 µg (tomato skin), 11.12-17.91 µg (tangerine peel), 8.37-10.65 µg (orange peel).

After testing in laboratory conditions (on white rats) and obtaining positive results, newborn piglets of the Zakhesi pig farm (owner Tsiklauri Anna) were selected as objects (experimental animals) for testing the prepared compositions (injectable and orally acceptable). For the experiment, according to the principle of analogues, eight newborn piglets were taken from one nest (4 for experimental and 4 for control observation). In animals with signs of iron deficiency anemia, we injected an injectable preparation (Fe (II) - 7.5%: Co (II) - 0.07%: glycine 0.5%: D-fructose 24.3%; water purified - 67.63%), on the 3-4th day after birth in a volume of 2-2 ml, containing 150 mg of elemental iron. According to the results At the first stage of the project for the treatment of anemia in newborn piglets, it was of the studies, preparations containing 7.5 g/100 ml - 3.75 g/100 ml of elemental iron are non-toxic and safe for newborn piglets, and an injectable planned to prepare injectable compositions of various concentrations containing Fe. preparation containing 7.5 g/100 ml of iron is characterized by a higher efficiency.

Therapeutic and prophylactic drug for oral administration (Fe(II) - 7.5%; D-fructose - 24.3%; Cu(II) - 0.1%; Zn(II) - 0.1%; Mn(II) - 0.06%; Co (II) -0.07%; glycine - 0.5%; selenomethionine 0.0000642%; ascan clay - 67.8%) is designed to ensure a stable course of growth and development of injection piglets, Also for the prevention of stress manifestations caused by weaning from the mother and changing feed at the end of feeding in adolescent piglets. According to the results of studies, it is advisable to give 20-25-day-old piglets an oral preparation dissolved in water as an additive to liquid feed (0.25-0.5 g of the drug together with 250 g of standard feed per piglet). After 6-7 days, piglets should be transferred to solid feed with the addition of an oral preparation (0.5-1.0 g of the drug as an additive per 450 g of rationed feed) for 10 days, which leads to a stable increase in the weight of piglets - in the experiment on compared with control

Nitrogenous fertilizers are well soluble in water. As a result of washing-off and evaporation their significant part (up to 50%) is lost, which is accompanied by not only economic loss but also by global contamination of environment resulting in the heaviest ecological problems. Extremely great significance is attributed to elaboration of secure and economically profitable new technologies for manufacturing safe mineral fertilizers, amely for obtaining mineral fertilizers of prolonged action. With this in view we have studied interaction of carbamide and formaldehyde in wate solution and in the pores of natural sorbents. In water solution at the initial stage we observe formation of methylol derivatives. Reaction is bimolecular. Stability of methylol groups was studied with respect to pH. It was shown that their stability is high in neutral and weak alkali media. Both the formaldehyde addition reaction and condensation of methylol groups depend on reagents concentration, pH and temperature. At the alteration of temperature or pH oligomers undergo further condensation. Some kinetic regularities of the process are defined. It was shown that the established. 9. The type of soil changes the quantitative and qualitative reaction is of the second order. It was for the first time that carbamide polycondensation was carried out in the pores of natural sorbent - diatomite. composition of physiological groups of microorganisms and individual species Technologies were developed for obtaining fertilizers acting by prolongation mechanism, as well as multi-component pelleted compositions on its base; the main determining technological parameters of the processes were defined. For biodegradation of nitrogen-containing fertilizers of prolonged action, we carried out modernization of fermentative organization microorganisms able to degrade polymerized nitrogenous fertilizers, ts modification and adaptation to new nutrient substrate. Active strains of microorganisms were obtained which contribute to degradation. Stagewise adaptation of degradation microorganisms and the process of biodegradation of fertilizers of prolonged action were studied. Microbial degradation of polymer fertilizer starts from beginning of a logarithm phase (approximately 12-18 hrs) and ends after 124 hrs. Within this period microorganisms manage to assimilate at about 20% of nitrogenous polymer fertilizer. Fertilizer of prolonged action obtained by us will be used in Georgia as well as in any agrarian state of the world, which will provide for high economic and ecological effect. Social effect will be reflected in protection of the population from various heavy diseases.

The tasks defined by the project have been completed 1. Under the action of catalysts RBEA-25 or BEA-150 and microwaves on Dlinalool, regioselective conversion of D-linalool to trans-geraniol occurs without the formation of nerol: This does not occur when converting racemat linated under the same conditions

3. During simultaneous action of zeolitic micro-mesonorous catalyst and ultrasound or catalyst and combined ultrasound/microwayes, linalool and nerol

1. I. Rubashvili, M.Tsitsagi, K. Ebralidze, V. Tsitsishvili, L. Eprikashvili, M. Chkhaidze, M. Zautashvili. Extraction and Analysis of the Major Carotenoids of Agro-Industrial Waste Materials using Sequential Extraction Techniques and High Performance Liquid Chromatography. Eurasian Journal of Analytical Chemistry. 2018, 13(2), em06; Karukhnishvili, N. Dvali, K. Loria, Validation of HPLC method for determination of active ingredients' residues of Vicazid uncoated tablets (Pyrantel 100 mg/ Mehendazole 150 mg) on surfaces in the pharmaceutical manufacture. 30th International Symposium on Chromatography "ISC 2014". 2014, 14-18 September, Salzburg, Austria

According to the results of laboratory and field tests, the optimal receptor composition of the compositions was established, and, consequently, the regulatory characteristics of their consumption in terms of the content of iron and other macro- and microelements in injectable and orally acceptable compositions, with the best indicators.

Based on the materials collected and the results obtained, interin recommendations and instructions for the use of injectable and orally acceptable compositions for therapeutic and prophylactic purposes have been developed.

Based on the results obtained, two patent applications were filed, for which a

1. The interaction of carbamide and formaldehyde in the pores of water and sorbent has been established, the formation of a methylene derivative occurs in an aqueous solution at the initial stage and the reaction is biomolecular, 2. The stability of nH-dependent methyl groups has been established. It has been shown that the stability of the methyl groups is high in the neutral and slightly alkaline regions. 4. polycondensation of carbamide and formaldehyde is carried out in the pores of the sorbent. Some kinetic regularity of the process has been established. It is shown that the reaction has a second order, 5. For the first time polycondensation of carbamide was carried out in the pores of natural sorbonne-diatomite. 6. The technology of obtaining a prolonged-acting fertilizer based on carbamide has been developed. 7. The technology of obtaining multicomponent dredged compositions from polymerized urea has been developed and the main technological parameters have been established 8. The substitution of saprophytic bacteria and cellulose microorganisms on alluvial acidic and brown-carbon soils of the Kakheti region has been Tenth, the total number of microorganisms from the studied soils is significantly higher in alluvial acidic soil (Lagodekh soils) than in rocarbonate soil. (Sagarejo, tsnori, sighnaghi). Eleventh climatic and geographical conditions significantly change the quantitative composition of microorganisms in the same type of soil. 12. The soil microflora of the browncarbonate type is relatively rich in microorganisms digesting fertilizers. 6 physiological groups of microorganisms were identified, including saprophytes As a result of selection of fungi from saprophytes, in particular aspregillus (a pure mushroom culture of Aspergillus spp. was identified.) .In general,

	Synthesis and study of						
	prolonged effect and		Shota				
	degradable polymer nitre;		Rustaveli				
	Development of		National				
	innovative technology for	Fundamental	Science				Zaur Lomtatidze, Nora
	multi-component pellet	Research	Foundaiton	150 000	05.05.2015 -	Marina	Dokhturishvili, Ketevan
FR/38/10-160/14	composites on its base	State Grants	(SRNSF)	GEL	04.05.2018	Gurgenishvili	Papava
		Democracy					
		Commission					
S-GE800-15-GR-	Development of Biofuel in	small grants				Kakha	
126	Georgia - project Ecobus	program	USA Embassy,	19 250 USD	2015-2016	Kharchkhadze	Natela Khetsuriani

Intense growth of the population calls for incessant increase of production of farm produce which can be achieved by assimilation of new areas. But arable lands are decreasing annually because of progressing urbanization and intensification of industry. One of the ways to provide population with foodstuff, is inculcation of intense advanced technologies in agriculture, in particular, application of nitroger containing chemical fertilizers in increased dose. According to available data, annually more than 200 million ton nitrogenous fertilizers are introduced into soil in the whole world. Because of their especially good water solubility, the main part of fertilizers (up to 100 million ton) is lost due to their evaporation and washing off, which alongside with tremendous economic losses results in global environmental pollution (water reservoirs, rivers, ground waters, ponds, lakes, seas, wells and others). Nitrogenous fertilizers, as a result of evaporation, reach high atmospheric strata, destruct ozone laver, which becomes a reason of many heavy metahemaglobogenia et al). The project goal is realization of synthesis o hardly soluble in water polymer nitre, which at introduction into soil suffers degradation at the impact of soil degradation microorganisms and transforms into easily assimilable form. Research novelty is that the synthesis of prolonged effect polymer nitre (polymerization and polycond first time. Synthesis is carried out in the pores of natural zeolite. The present project offers development of innovative technology for obtaining multi-component pellet polymer nitre-containing composition, which will enable to decrease substantially agrotechnical norms of nitrogenous fertilizers (by 50-60%). Introduction of prolonged effect nitre, as well as natural sorbents (zeolite, diatomite), in the pores o which polymer nitro is formed simultaneously creates favorable terms for propagation of microorganisms which degrade polymer nitre, Among all type nitrogenous fertilizers used in practice, unconditional leaders are nitrates -nitric

biodiesel pilot plant. Chemical and spectral analysis of biofuel was performed. a website www.biodiesel.ge was created, brochures were printed, a documentary educational film was shot and a conference was held.
As part of the grant, the following safe and less dangerous means against pests and diseases of grapes have been developed and tested (in real conditions - in the

- vinevard): · Pheromone traps prepared according to a new synthesis scheme to predict the
- New insecticide-acaricidal drug "Antipest" against scale insects and mites · oil-emulsion preparation of a new prescription composition against the hibernatin phase of pests

spread of grape worm;

New fungicidal drug "Dihydrophosphate" against powdery mildew and rot; Micronutrient-enriched humic nutritional preparation prepared on the basis of local natural raw materials - peat, to improve the growth and development of grapes and increase immunity to disease

The aim of the project was to conduct field trials of the developed preparations against pests and diseases of various agricultural crops, especially grapes and fruit trees (apples, peaches), which are priority for Georgian agriculture. If the positive results and effectiveness are confirmed, the basis for their successful commercialization will be created

In the case of the production and sale on the market of cheap and highly effective insectacaricides, fungicides and nutrients with a low environmental impact, the costs Bordeaux liquid (copper sulfate + lime) was used as a reference. will increase

The development of environmentally friendly and profitable fertilizers is of paramount importance for our existence. This technology will allow us to replace soluble nitrogen fertilizers with polymerized ones and use biological nitrogen together with them. The presented project will allow us to research and develop such technologies by creating multicomponent compositions containing nitroger bacteria and polymerized fertilizers. Such fertilizers significantly (up to 50-60%) reduce the need for nitrogen fertilizers necessary for optimal plant growth and development.. The proposed long-acting nitrogenous fertilizers also contain natural sorbents (zeolite, diatomite), where nitrogenous fertilizers can be released in the pores of these sorbents, which at the same time create favorable conditions for the reproduction of bacteria. The creation of stable and stable structured forms of urea an absolutely necessary condition for increasing the efficiency of fertilizers and reducing the dependence of plants on biogenic processes of their assimilation. For structural degradation of carbamide, we modernize the enzymatic structure of microorganisms, its modification and adaptation to a new nutrient substrate.

Nitrogen-fixing bacteria and structured nitrogen fertilizers used in the composition

will allow us to reduce the agrotechnical norms of nitrogen fertilizers by 50-60%.

According to modern data, a significant part of nitrogen fertilizers, due to their good solubility in water, is lost as a result of their decomposition and 1. To obtain polymer nitrate, polyethylene polyamine, obtained as a result of washing, which, in addition to huge economic losses, leads to global environmental pollution. At the same time, nitrogen fertilizers as a result of polymeranalogical conversion of polyvinyl chloride, was used to obtain a melting, getting into higher layers of the atmosphere, cause the destruction of the ozone layer, which is the cause of many serious diseases on Earth. polymer adductor. Studies were conducted to study the process of its Therefore, the development of environmentally safe and cost-effective new technologies for the production of safe long-acting mineral fertilizers is interaction with nitric acid. 2. A technology has been developed for obtaining of great importance. Based on the above, the aim of the research was the synthesis of a nitrogen fertilizer of prolonged action based on a nitrogen fertilizer, which can be carried out in the pores of natural sorbents. For this purpose, a polymer adductor obtained as a result of polymerological transformation of polyvinyl chloride from polyethylene polyamine was studied. In the case of the use of low-molecular polyvinyl chloride for polymer transformation, the structuring of polyethylene polyamine and the subsequent synthesis of polymer adduction are carried out. The final product of the reaction is an amorphous mass that is poorly soluble in water and is a nitrogen fertilizer acting by a prolonged mechanism. A chlorinated polymer was selected and studied. Its fractionation by molecular weight was carried out. Low-molecular and high-molecular fractions were selected, in which nitrogen-containing monomers will be replaced in the future. -Studies have been conducted on the synthesis of polymer nitrate for the production of polymers and oligomers containing functional groups. - Experiments have been carried out to replace chlorine atoms dissolves after application to the soil, therefore, the plant uses it throughout the in polyvinyl chloride with amino groups. - It is established that the variable parameters of the process are: temperature, duration and molar ratio of growing season, evaporation and leaching of fertilizer decreases sharply, the the initial components. The optimal conditions for the reaction are: temperature 1650C, reaction duration 8 hours, molar ratio of polyvinyl chloride coefficient of nitrogen assimilation by the plant increases by 10-12%. 5. The and ammonia, respectively, 1:4. The polymer adductor is synthesized on the basis of polyethylene polyamine obtained as a result of the polymer analogous transformation of polyvinyl chloride. The reaction of polyvamine interaction with nitric acid was studied. The main variable parameters of bureau-carbonate, chestnut and alluvial soils of Georgia for agricultural the process are temperature, molar ratio of reagent components, concentration and duration of the reaction. - A technology has been developed for purposes has been studied in order to isolate microorganisms that decompose nent drained encapsulated composites of basic food elements (NPK) based on polymer nitrate, where 50% urea formaldehyde oligomer and 4% aqueous starch solution were used as fixators. - Practical recommendations and a production scheme for obtaining multicomponent draped compositions have been developed. For the biodegradation of the long-acting fertilizer, the enzymatic mechanism of microorganisms decomposing polymers, its modification and adaptation to a new nutrient substrate were modernized. Active strains of oxidizing microorganisms were obtained. The gradual adaptation of microorganisms decomposing polymers and the process of decomposition of fertilizers of longed action have been studied. When using seed material processed using a new technology, in parallel with productivity and quality indicators, special attention is paid to the cost of production, the level of which is determined by the amount of costs that were spent on obtaining these products. The use of our expanded fertilizer will be possible both in Georgia and in any agricultural country in the world, which will provide a of producter present in the microflora. Therefore, when using fertilizers a great economic and environmental effect. The social effect is manifested in the protection of the population from various serious diseases

The production technology of alternative renewable fuel - Biodiesel - was developed The physical and chemical characteristics of biodiesel and petroleum diesel were studied. Different mixtures of biodiesel and petroleum diesel fuel and introduced. Several tons of biofuel were produced at the Ilia's University on the were produced on the pilot plant located in the Ilia's University use in internal combustion engines without their modification. Physical and chemical analysis of biodiesel and petroleum diesel B20 blend was ameters of biofuel were optimized according to the international standards, and carried out. Standard characteristics of studied fuels are the following: density at 150C, explosion temperature, OC, kinematic viscosity, mm2/sec; for the first time in the history of Georgia, cars started to run on biofuel. In addition, cetane number, acid number mg KOH/g of fuel; sulfur content, mg/kg; content of polycyclic aromatic hydrocarbons %; explosion temperature, OC: biofuel for the first time in Georgia. The website www.biodiesel.ge was created. total pollution, mg/kg; cokeability (in 10% of sediment),%; corrosion on a copper plate (3 hours at 500C); content of fatty acids and methyl ether, %; brochures were printed, a documentary educational film was shot and a istance to oxidation, n/l g/m3; fractional composition: 90% distillation temperature 0C; ash content, %

> In early spring (the first decade of March), the trees of the apple orchard of farmer Vano Kakashvili (Golden variety) were treated with an oilemulsion preparation of an experimental batch. The oil preparation of the Italian company (Sipkam) - "Sipkamol" was used as a reference Unsprayed plants were taken as control. According to the census conducted in late spring, the oil preparation of the experimental batch is more effective than the preparation "Sipkamol", chosen as a reference.

Pheromone traps were used to predict the spread of pests (grape mealybug, eastern codling moth) and determine the exact timing of the use of pyrethroid preparations against them. It has been established that with the help of pheromone traps it is possible to predict the spread of the pest, as The content of turpentine oil in the composition of the preparation *Antipest* well as determine the exact timing of the chemical control of the caterpillar phase of all three generati

On the experimental plot of the apple orchard of farmer Vano Kakashvili (Skra village), a trial batch of the Antipest insect-acaricidal preparation was tested against aphids, codling moth and hawthorn ring moth. The effectiveness of the drug "Antipest" in the fight against pests of grapes and fruit trees was compared with the best imported insecticidal drugs used in production. In the fight against aphids, the drug "Decis Prof" (Bayer's company) and the drug "Aktelik" (Syngenta's company) were taken as standards, and in the fight against apple fruit moth and hawthorn moth, insect-acaricides "Koragen" and "Avant" (DuPont's company).

On the basis of zinc hydro- and dihydrophosphates [Zn(H2PO4), ZnHPO4], a practically environmentally friendly fungicidal preparation "Antifungal" has been developed to replace moderately toxic preparations containing copper. Field trials were carried out on trial plots of the peach When preparing combined mixtures of humic preparations with orchard and vineyard of farmer Zurab Toliashvili. The effectiveness of the drug for the prevention of grape rot and peach leaf curl has been tested.

of farmers for the maintenance and care of crops will be significantly reduced. Their Nutrient preparations prepared on the basis of humins extracted from peat and coal, containing, along with the main trace elements (Fe, B, Mn, Cu. green organs does not develop. The effect of humin preparations on increasing products will become competitive. Accordingly, their incomes and social conditions

Co. Zn. Mo), as well as Si, were used in the form of combined mixtures with insectoacaricidal and fungicidal preparations

Intensive population growth requires an increase in food production. One of the ways to solve this problem is the use of intensive agricultural technologies, which is associated with the use of mineral fertilizers, especially nitrogen-containing (saltpeter and urea) fertilizers in increased doses. been studied. 2. At the initial stage, methylene derivatives are formed in an Due to the extremely good solubility of nitrogen fertilizers in water, a significant part of them is lost as a result of washing and evaporation. These economic losses are accompanied by pollution of the environment - soil, water and atmosphere, which creates dangerous environmental conditions. are monomolecular. 3. depending on the pH, the stability of the methyl groups Therefore, the development of environmentally friendly and profitable fertilizers is crucial for our existence. In order to avoid environmental pollution with nitrogen fertilizers, a new method for obtaining polymerized nitrogen fertilizers based on urea by polycondensation has been leveloped, the reaction mechanism and the regularities of the processes, the influence of various factors on the course of the reaction have been studied, and optimal conditions for the reaction have been determined. The interaction of urea and formaldehyde has been studied in aqueous solutions and melts. In an aqueous solution, methylene derivatives are formed at the initial stage. The reaction is bimolecular, and dissociation reactions are monomolecular. Depending on the pH, the stability of the methyl groups is high in neutral and slightly alkaline regions. When the pH neutral or alkaline medium, dimethylenester bonds are mainly formed. When is less than 7, an esterification reaction occurs. When pH = 4-7, dimethylester bonds are formed and the reaction is bimolecular. When the pH changes in the range of 3.7-5.5, the reaction of the interaction of the methyl group with imine groups is mainly carried out, followed by the reaction of the interaction of the methyl group with imine groups is mainly carried out, followed by the reaction of the interaction of the methyl group with imine groups is mainly carried out, followed by the reaction of the interaction of the methyl group with imine groups is mainly carried out, followed by the reaction of the interaction of the interaction of the methyl group with imine groups is mainly carried out, followed by the reaction of the interaction of the intformation of methylene bonds. Both the formaldehyde binding reaction and the condensation of methyl groups depend on the concentration of reagents, on the pH of the medium and temperature. At high concentrations, bimolecular reactions prevail and the equilibrium shifts to the right towards polymer formation. In neutral or alkaline media, dimethylene ether bonds are mainly formed when the temperature rises or when the pH changes, the oligomers undergo further polycondensation, which leads to the structuring of the polymer. If the molar ratio of formaldehyde and urea is less than 1:1, then there is no place for structuring. The activation energy of the condensation process is equal to 14.5-15.9 kcal/mol. The synthesis of carbamide-formaldehyde oligomers in the alloy was carried out. Some kinetic regularities of the process in the temperature range 110-125°C, the molar ratio of urea and formaldehyde 1:2 have been studied. The reaction rate constants retain constant values during the reaction when was carried out for the first time. 7. In order to study the effect of long-term based on studies in which the transition of ammonium ions occurs slowly, in parts, is they are calculated according to the second-row equation. The linear dependence of the change in the logarithm of the reaction rate constant on the inverse absolute temperature also indicates the second order. The linear dependence on the duration of 1/a-x is also preserved. The activation energy is equal to 1554 kcal/mol. Multicomponent compositions containing nitrogen-fixing microorganisms and polymerized fertilizers have been developed. Nitrogen fertilizers of prolonged action also contain natural sorbents (zeolite, diatomite), in the pores of which the synthesis of polymer identified. 8. In vitro tests have shown that prolonged nitrogen fertilizer does fertilizers by polycondensation was carried out for the first time. The enzymatic organization of microorganisms decomposing polymers has been modernized, its modification and adaptation to a new nutrient substrate has been carried out. Active strains of nitrogenous microorganisms were obtained and propagated, as well as step-by-step adaptation of microorganisms decomposing polymers and initiation of decomposition of

multicomponent compositions of the necessary nutrients (NPK) for plants based on polymer nitrate, polystyrene and ponywiline polymers were used for encapsulation. 3. Practical recommendations and a production scheme for obtaining multicomponent draped compositions have been developed, 4. The prolonging effect of polymer nitrate has been studied, the process of transition into the soil and into the plant after fertilization has been determined. Studies have shown that prolonged nitrogen fertilizer (polymerized saltpeter) slowly qualitative and quantitative composition of microflora (microorganisms) of (decompose) polymer clay. 7 physiological groups of microorganis strains were isolated. 6. The saprophytic microflora of the soils of the Kakheti region has been studied, which is qualitatively more or less similar in names but sharply differs in species and quantitative indicators, 7. The type of soil and, consequently, its microflora differ as qualitative. And the quantitative composition. Consequently, the biodegradation of fertilizer probably occur with different intensity in the soil, which is due to the difference in the number qualitative and quantitative analysis of the soil microflora is necessary, 8.

An alternative renewable fuel - Biodiesel - production technology was developed and introduced. Based on the institute's laboratory research, several Chemical and spectral analysis of biofuel was performed, parameters of biofuel were optimized according to international standards, and cars started to run on

The oil-emulsion preparation of a new formulation, developed to control pests of the wintering stage of the period, is more effective than the oil preparation of the Italian company Sipkam - Sipkamol.

Entomological glue of a new composition, of trapping tapes and pheromone traps, installed on fruit trees and vineyards, do not soften or drip in hot summer conditions. The light color of the glue ensures good visibility of butterflies caught in pheromone traps.

leads to a prolongation of the insectoacaricidal action up to 22-25 days. As result, the low concentration of pyrethroid is sufficient to cover the duration of the development cycle and destruction of the nest. The effectiveness of "Antipest" is at the level of expensive imported insecticides used as standards. On the basis of zinc hydro- and dihydrophosphates {Zn(H2PO4), ZnHPO4},the fungicidal preparation "Antifungal" was developed to prevent grape rot and peach leaf curl.

insectoacaricidal and fungicidal preparations, homogeneous non-separating solutions are obtained. When processing plants, phytotoxicity (burning) of the resistance of grapes to drought, as well as the effect of silicon on the growth and development of apple and peach seedlings, is noticeable.

1. The interaction of urea and formaldehyde in aqueous solutions and alloys has aqueous solution and the reaction is bimolecular, while dissociation reactions is high in neutral and slightly alkaline media. When the pH is less than 7, an esterification reaction occurs. Both the formaldehyde addition reaction and the condensation of methyl groups depend on the concentration of reagents, on the pH of the medium and temperature. At high concentrations, bimolecular reactions prevail, and the equilibrium shifts towards polymer formation. In a the temperature rises or the pH changes, the oligomers undergo further polycondensation, which leads to polymer structuring, 4. It is shown that when the molar ratio of formaldehyde and urea is less than 1-1, there is no place for structuring, 5. The synthesis of carbamide-formaldehyde oligomers in the alloy was carried out. Some kinetic regularities of the process have been studied at a temperature range of 110-125°C, the molar ratio of carbamide and formaldehyde is 1: 2. It is shown that the reaction has a second order. 6 Polycondensation of carbamide in the pores of a natural sorbent – diatomiote application of nitrogen fertilizers on the soil microflora, a qualitative and quantitative analysis of various types of soil microflora was carried out. A number of physiological groups of microorganisms have been isolated and not exhibit biocidal properties on the soil microflora. 9. the conditions for the growth/development/cultivation of microorganisms of prolonged fertilizer of ructive action have been determined. The optimal pH for the cultivation of

		Shota			
Syntesis of nitrogenous		Rustaveli			
frertilizers and studi of		National			
physiological-biochemical	Fundamental	Science			Eldar Gugava, Nanuli
aspects of their microbial	Research	Foundaiton	150 000	02.04.2014-	Khotenashvili, Riva

State Grants (SRNSF)

Shota

Applied

Research

vineyard and fruit by

local means

harmless and accessible

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A.Dolidze, O.Lomtadze,

N.Kaytaradze, D.Kakashvili

Science

(SRNSF)

FR/237/3-121/13	Stude of impact of modification process on polyphenylene oxide and graphe structure, tribochemical and tribochemical and tribochemical antifriction material of improved properties Development of scientific bases for obtaining nano-	Fundamental Research State Grants Fundamental Research	Shota Rustaveli National Science Foundaiton (SRNSF) Shota Rustaveli National Science	150 000 GEL	02.04.2014- 02.04.2017	Ia Chitrekashvili Nanuli	Vitali Sherozia, Nunu Maisuradze, Shalva Papava Manana Nijaradze, Nato	scientific problem that requires in-depth research of the processes occurring during their processing and friction. To overcome this problem, first of all, it is necessary to choose a binder polymer with high mechanical properties. In order to overcome the disadvantages and partially improve wear resistance and thermal stability, it is necessary to choose a shifter a natural that has high thermal conductivity and is antifriction. Of the fillers known in the literature, only graphite statisfies these conditions. Analysis of fish products revealed that the reason for insufficient wear resistance and hear resistance in the polyphenylene oxide graphite system is the presence of ribro- and thermal oxidation of the lateral methy (CH ₂) group of the polymer during friction. To solve this problem, the idea arose to select the appropriate material and modify polyphenylene oxide and graphite in such a way as to individually reduce their friction coefficients with steel, eliminate polymer destruction and, at the same time, increase wear resistance. In this regard, the fluorine-containing oligomer -fluoroulkane, which in polyphenylene oxide causes the necessary structural changes necessary for the antification material, and is characterized by high thermal stability and manufacturability, rurned out to be acceptable. In graphite, it does not cause structural changes, but forms a binding layer with it on its surface, which reduces the coefficient of friction of graphite and the system as a whole several times. The structure and properties of modified polyphenylene oxide samples were studied by chemical. Its spectroscopy, mass spectral, thermogravimentic analysis and determination of thermal friction properties at various speech. The study of the properties of modified graphite wars such a properties at various speech. The study of the properties of modified graphite was mainly	Throc capac determ
	Giometrin - a drag against the parasitic mites of animals	Applied Research State Grants	Co-funded by the US Civilian Research and Development Foundation (CRDF Global) and the Shota National Science Foundation	38,100 GEL	01.04.2013 - 30.09.2013	Dolaberidze Omar Lomtadze	O.Lomtadze, G.Chimakadze, N.Shalvashvili, K.Chimakadze	Grant project 'Giometrin' - a drug against parasitic mites of animals, which was jointly funded by the US Civilian Research and Development Fund (CRDF-Globa) and the National Science Foundation Shorn Rustavelly, provided for the conduct of this kind of research, which will create a real prerequisite for the commercialization of this drug. The preparation against parasitic animal mites "Giometrin' is a composition of prolonged acaricidal action, which was developed within the framework of the grant No. GNSTSTOM-2-T2 Parasitis animal mites and their control in Georgia. The acaricidal activity of the drug "Gyometrin' is 22-25 days instead of 12-15 days of imported drugs. The prolonged actacidal effect of the drug "Gyometrin' and the safety used of the components on humans and animals are important prerequisites for their establishment in the veterinary market. The drug will be attractive to optential suers, fince when it is used, during the period of activity of parasitic mites,	meets
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Shota Rustaveli

Foundaiton

25.04.2013 - Ludmila

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of ecologically safe system Fundamental Science

Research

State Grants (SRNSF)

of protection of peach

FR/576/10-101/12 from pests and diseases

e creation of a multicomponent self-lubricating antifriction material is a complex scientific problem that requires in-depth research of the ocesses occurring during their processing and friction. To overcome this problem, first of all, it is necessary to choose a binder polymer with high and the study of tribochemical processes occurring during friction in echanical properties. In order to overcome the disadvantages and partially improve wear resistance and thermal stability, it is necessary to choose polyphenylene oxide filled with graphite nanopowder was carried out. It tur a filler a material that has high thermal conductivity and is antifriction. Of the fillers known in the literature, only graphite satisfies these nditions. Analysis of fish products revealed that the reason for insufficient wear resistance and heat resistance in the polyphenylene oxide aphite system is the presence of tribo- and thermal oxidation of the lateral methyl (CH₃-) group of the polymer during friction. To solve this oblem, the idea arose to select the appropriate material and modify polyphenylene oxide and graphite in such a way as to individually reduce their the surface of the graphite nanopowder, an embedded layer of fluoroalkane iction coefficients with steel, eliminate polymer destruction and, at the same time, increase wear resistance. In this regard, the fluorine-containing with a thickness of 2-5 microns forms, in which fluorine atoms are located gomer - fluorgalkane, which in polyphenylene oxide causes the necessary structural changes necessary for the antifriction material, and is aracterized by high thermal stability and manufacturability, turned out to be acceptable. In graphite, it does not cause structural changes, but rms a binding layer with it on its surface, which reduces the coefficient of friction of graphite and the system as a whole several times. The ucture and properties of modified polyphenylene oxide samples were studied by chemical, IR spectroscopic, mass spectral, thermogravimetric alysis and determination of thermal friction properties. The structure and properties of modified graphite samples were studied by X-ray ffraction and chemical analysis and determination of friction properties at various speeds. The study of the properties of samples obtained by the int processing of modified polyphenylene oxide and modified graphite was mainly carried out by the same methods: additionally, density, ughness and thermal conductivity were determined. At the initial stage, the structure of the modified fluoroalkane polyphenylene oxide was died and the tribochemical processes occurring during friction in polyphenylene oxide filled with graphite nanopowder were studied. It was und that fluoroalkan is an active modifier of polyphenylene oxide, converts 70% of it into an insoluble state. Also, the heat resistance of such a odified polyphenylene oxide improves by 2 times and significantly increases wear resistance, reduces the coefficient of friction and increases its bility to a temperature of 250°C. This increases the prospects not only of this material, but also of polymers similar in chemical structure for staining new, improved antifriction properties of various filler composites. Modification of graphite with fluoroalkane has been studied. odification of graphite with fluoroalkane will be studied for the first time. It is shown that fluoroclane does not cause structural changes in aphite. But on the surface of the graphite nanopowder, an embedded layer of fluoroalkane with a thickness of 2-5 microns forms, in which orine atoms are located along the periphery. This layer protects graphite grains from destruction by friction and, at the same time, significantly proves the self-lubricating ability of graphite. As a result, the friction coefficient of graphite can be reduced by almost 3-4 times. These results are obtained may be important for progress in this area of technology - to lead to nortant for the tribotechnical direction, since it can be used as a filler in other types of antifriction plastics, as well as separately as greases.

trough the direct chemical treatment of natural phillipsite (ion exchange, thermal and acid treatment), finely dispersed, high ion exchange pacity anti-toxic and antiviral properties containing silver, copper, zinc sorbents with prolonged action were obtained, which provides for the termination of some regularities of gel formation, hydrothermal crystallization and chemical modification in aluminosilicate systems, which sures the creation of highly efficient, pure zeolitic nanomaterials.

e aim of the project - "Giometrin - a drug against parasitic mites of animals" jointly funded by the Shota Rustaveli National Science Foundationo nd the US Civilian Research and Development Foundation (CRDF-Global), is to obtain a commercial prototype of the drug and prepare the cessary documentation for obtaining a license for state registration. To achieve this goal, it was necessary to perform the following tasks:

levelopment of technology for the industrial production of the drug;

the peach harvest, taking into account modern environmental requirements. The

misuse of pesticides against pests and diseases has catastrophically changed the

the pesticides used are lost to the environment, polluting the air, water and soil.

increase. Based on the foregoing, the creation in Georgia of a system for the safe

from pests and diseases using a mixture of fungicidal and insectoacaricidal

preparations with humic preparations containing essential trace elements was

studied. With the development of effective mixtures of such a complex action, the

frequency of spraying plants with preparations has been reduced, at the same time

feeding), will be absorbed by the root system of the plant. This circumstance will

from a scientific and practical point of view.

significantly affect the cost of plant protection measure

- ction of an experimental batch of a commercial prototype of the drug "Gyometrin";
- Study of the toxicological and allergic effects of the drug, by an organization of relevant competence

Preparation of documentation (safety report, instructions for use, production regulatory document, technological procedure for obtaining) that eets the requirements of the state registration of the drug "Giometrin" for veterinary drugs.

eld tests of the commercial prototype of the drug "Giometrin" were carried out in farms in various regions (Kakheti, Kvemo Kartli, Samegrelo, salka upland zone and suburbs of Tbilisi). The degree of infection of animals with ticks was determined. Ticks were collected from the skin of imals for their subsequent identification and study of the effect on them of the commercial prototype of the drug "Giometrin". the skin of animals treated with Hyometrin, single specimens of parasitic mites were observed on the 25-28th day after treatment. The drug otected cattle from the attack of blood-sucking zoophilous flies for 16-18 days. In the case of widely used imported acaricidal preparations, the esence of a parasitic mite on the skip of animals was observed on the 10-12th day, and the attack of flies - on the 5-7th day

carry out the work of the grant project, two peach orchards were selected in the village of Skra (Gori region), where they grew different varieties peach ("Elberta", "Krimchak", "Tsedisuri", "Nectarine", "Start Red Golden", "Uspeha", "Georgian peach"), Trial, standard and control plots were anned in selected orchards. The type and amount of preparations used were selected based on the number of plants in the provided plots. easures were taken against the wintering stages of widespread pests (eastern codling moth, mites, aphids, California scale insects) - spraying peach conditions peaches, and regain export value, it is necessary to improve the quality indicators of the ees with a water-oil emulsion and equipping trees with entomological glue belts.

Pheromone sexual traps of the pest were used for complex control (prediction of distribution and population reduction) of the eastern codling moth a simplified method using plant blocksynthons instead of the traditional (one of the main pests of peach fruits).

bioenvironment. Along with pests, their natural enemies are also affected. Most of Against peach pests, a composite preparation with a low ecological impact on the environment has been developed and applied, which includes turpentine oil obtained from pine resin, interacting synergistically with synthetic pyrethroids. The effectiveness of the developed composition is at Residual pesticides and their metabolites enter the human body along with plant and the level of existing imported pyrethroid preparations with a significantly low (almost 2 times) content of the main active ingredient. animal food. In such an ecological environment, human health deteriorates, diseases On the basis of water-soluble zinc salts (hydro- and dihydrophosphate), a preparation against fruit rot disease of peach - Monilia fructigen

(moniliasis) was developed and tested. production of environmentally friendly products, including fruits, is relevant both Nutrient preparation "Humafid" was prepared and used on the basis of humins isolated from peat with potassium hydroxide, where Mg, Fe and Mn were mainly used as essential elements. The supply of the plant with the Mg+2 cation is carried out both by adding Mg salts to the humic During the implementation of the grant project, the possibility of protecting peaches preparation and by means of a granulated nutrient preparation. A granulated preparation was obtained from peat by adding to the sediment

emaining after the extraction of humates, the calculated amount of magnesium sulfate (kieserite) and dolomite flour. The effectiveness of developed environmentally less dangerous insect-acaricidal, fungicidal and nutritional preparations (Antipestit, phosphate preparation, Gumafid) was compared with preparations traditionally used to protect peaches from pests and diseases (Antrakol, Aktara, Bordeaux solution, etc.). According to the test results, the developed drugs are not inferior in efficiency to imported drugs. At the same time, their use is less there is no place for losses, since the working solution, falling on the soil (with foliar dangerous from an environmental point of view and beneficial in terms of consumption, since they are locally produced and cost significantly (almost 40%) less than imported drugs.

1.A study of the structure of polyphenylene oxide modified with fluoroalkane out that fluoroalkan is an active modifier of polyphenylene oxide. 2. Modification of graphite with fluoroalkane was studied for the first time. It is shown that fluoroclane does not cause structural changes in graphite. But on along the periphery. This layer protects graphite grains from destruction by friction and, at the same time, significantly improves the self-lubricating ability of graphite. 3. Thermal conductivity, coefficient of friction, wear and thermal tability of polyphenylene oxide with various fillers with graphite nanopowder (EUT-1) were studied, tribochemical processes during friction in polyphenylene oxide filled with graphite nanopowder were also studied. 4. The influence of the processing process on the structure of modified polyphenylene oxide filled with 30 wt%, 45 wt% and 60 wt% modified graphite by static and dynamic methods was studied. 5. Based on our studies, we obtained an antifriction self-lubricating polymer composition of poly-2,6dimethylparaphenylene oxide (polyphenylene oxide) -{C4H4(CH2)2O-}, n=250-450, nanostructured graphite (particle size 80-120 Nm) and fluorinated oligomer R(CF₂)_nCI, where n=7-14, R = H, by COOH interaction. this ensures high thermal conductivity and heat resistance of antifriction self-lubricating polymer composites with a low coefficient of friction, high mechanical strength, resistance to water and increased wear resistance, 6. The results the introduction of highly efficient, new generation, antifriction self-assembled

As a result of the completion of the project, the hydrothermal crystallization in aluminosilicate systems and Laws of chemical processing and ways of making new nanoscale zeolitic materials on this basis: a) The method of obtaining nanosized zeolite crystals by recrystallization of natural zeolites in hydrothermal conditions: b) Method of obtaining nano-sized zeolite crystals by chemical modification; Using the results of the project will contribute to the development of the technology of nano-dimensional materials, Expanding the field of practical use, environmental safety, high yield and quality of the target

Documentation has been prepared for the Giometrin drug that meets the requirements for state registration of veterinary drugs 1. Conclusion of the G. Natadze Research Institute of Hygiene and Medical Ecology that the drug "Giometrin" is non-toxic, does not cause allergic

- manifestations and can be used to protect animals from parasitic mites Carrying out large-scale field trials to confirm the effectiveness and safety of the drug "Giometrin" in the regions of Georgia with different climatic 2. Instructions for the use of "Giometrin" in the form of a suspension with
 - acaricidal properties against parasitic mites of animals: 3. Regulatory document for the drug "Giometrin" - MST 001.2014 "Water-oil emulsion, with insecticidal properties, concentrated;
 - 4. · Technological regulations for the use of an oil-in-water emulsion concentrate with insecticidal properties (Giometrin preparation). The work envisaged by the grant project was completed in full. After the completion of the project, state registration and permission for the production of the drug "Giometrin" can be obtained after finding the area required for the production of the drug and equipping it in accordance with existing

requirements. organophilic surfactants) against widespread peach pests in the wintering phase has been developed and tested.

In the traditional formulation of a non-drying adhesive prepared on a polyisobutylene basis, aviation oil was replaced by industrial oil, aluminum oxide was replaced by montmorillonite clay from the Askan deposit, and paraffin was removed from the formulation. Glue, a new formulation, light in color, retains good adhesion for a long time and does not peel off in hot summer

Synthesis of the sex pheromone of the oriental codling moth was carried out by classical method for obtaining sex pheromones. In addition, in addition to the rubber dispensers traditionally used in pheromone traps, cubes made from natural zeolite (clinoptilolite) were used.

Designed by:

Composite preparation against peach pests, with a small environmental impact, the effectiveness of which is at the level of existing imported pyrethroid preparations, in conditions of 2 times less content of the main active substance. Drug against peach disease - Monilia fructigena - peach fruit rot. Liquid and granular nutritional preparations based on humins extracted from peat. Mg. Fe, and Mn salts were used to prepare liquid preparations, and magnesium sulfate (kieserite) and dolomite flour were used to prepare granular

An environmentally safe system for the complex protection of peach culture based on the obtained insecto acaricidal, fungicidal and nutritional preparations has been developed.

	Development technologies to obtain new generation nitrogenows fertilizus of prolonged effect with the purpoll of environment protection and application in viticulture	Applied Research State Grants	Shota Rustaveli National Science Foundaiton (SRNSF)	216 944 GEL	2013-2015	Eldar Gugava	Givi Papava, Zaur Lomtatidze, Riva Liparteliani, Nazi	The presented project is a completely different, new technology at the present stage, which has no analogues in the world. The aim of the project is to develop innovative technology for the production of nitrogen fertilizers, increase yields and quality indicators of grape crops and protect the environment from global pollution. For the first time, nitrogen fertilizer will be obtained using innovative technology, which will reduce the norms of grape vegetation by 50-60%, which will give a great economic and environmental effect. For grape crops, 2 types of nitrogen fertilizers or prolonged action will be synthesized. a linear structure fertilizer for fertilizers of prolonged action will be synthesized. a linear structure fertilizer (for simultaneous application), which will operate throughout the growing season. Such nitrogen fertilizers can be successfully used for other perennial crops. Therefore, the product obtained as a result of the project can have a very wide consumer not only in Georgia, but also in many countries of the world where viticulture is developed. Development of natural energy resources and energy saving technology is an issue of great importance in the modern world. Development of technology for utilization of solid fule wastes accumulated in the environment to obtain alternative fuel is an important direction, which in itself will lead to the saving of traditional energy resources and to the reduction of environmental pollution. Finding alternative sources of energy and creating energy away technology is son of the main	
/318/10-100/12	to obtain new generation introgenows fertilitius of prolonged effect with the purpoll of environment protection and application in viticulture Development of fuel briquette compositions and determination of technological modes of	Research State Grants	Rustaveli National Science Foundaiton		2013-2015 15.04.2013 – 15.04.2015	Eldar Gugava Natela Khetsuriani	Givi Papava, Zaur Lomtatidze, Riva Liparteliani, Nazi Gelashvili, Nanuli Khotenashvili	technology for the production of nitrogen fertilizers, increase yields and quality indicators of grape crops and protect the environment from global pollution. For the first time, nitrogen fertilizer will be obtained using innovative technology, which will reduce the norms of grape vegetation by 36-60%, which will give a great economic and environmental effect. For grape crops, types of nitrogen fertilizers of prolonged action will be synthesized: a linear structure fertilizer for application during the initial growing season and a spatial structure fertilizer for application admiring the initial growing season and a spatial structure fertilizer for application application), which will operate throughout the growing season. Such nitrogen fertilizers can be accessfully used for other perennial crops. Therefore, the product obtained as a result of the project can have a very wide consumer not only in Georgia, but also in many countries of the world where viticulture is developed. Development of natural energy resources and energy saving technology is an issue of great importance in the modern world. Development of technology for utilization of solid field wastes accumulated in the environments to bothain alternative fuels is an important direction, which in itself will lead to the saving of traditional energy resources and to the reduction of environmental pollution. Finding alternative	

Joseb Chikvaidze Tinatin

Shota

Methods for rational

AR/215/9-220/12 nineline residues

processing of petroleum

Rustaveli

Science

(SRNSF)

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Research

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AR/S

Among the nitrogen fertilizers used in agriculture, the products with the largest tonnage of production are ammonium nitrate and carbamide. In accordance with the plan provided for by the grant project, an innovative technology for obtaining a long-acting fertilizer has been developed, which is implemented for the first time and has no analogues. The synthesis of prolonged fertilizer is carried out in the pores of a natural sorbent also without the use of a sorbent, by a polycondensation reaction. Two methods of obtaining a prolonged fertilizer have been developed: by carrying reaction. 2. Two methods of obtaining a prolonged fertilizer have been out the process both in alloy and in solution. During the polycondensation reaction, a monomer - carbamide and a polymerized aldehyde paraform were used in the alloy. At the first stage, paraforms are depolymerized to 135 degrees. The resulting formaldehyde at the time of release is effects of the reaction duration, temperature, molar ratio of the reaction of the highly reactive. It interacts with carbamide to form methyl derivatives containing active functional methyl groups capable of reacting. When methylene groups interact or when they interact with carbamide, dimethylene ether and methylene group-containing oligomers are formed, respectively. Accordingly, a technology for obtaining a prolonged-acting fertilizer has been developed. Depending on the molar ratio of the initial components, macromolecules with a linear or spatial structure are formed. The first stage of the reaction proceeds at a temperature of 135-145 degrees, and at 150-155 degrees macromolecules are formed. The technical conditions for obtaining a prolonged fertilizer are as follows: in the case of fertilizers of a linear structure, the molar ratio of the initial components - carbamide and paraform is 1:0.9-1.2, respectively. In the synthesis of stage, fertilizers with a spatial structure - 1: 1.3-2.5 mol. The reaction temperature is 135-155 degrees. During the reaction in solution, the reaction vative temperature is 95-98 degrees. The pH of the solution at the end of the reaction, when precipitated in water - 3 hours. The duration of the reaction is 2-2.5 hours. To obtain a fertilizer with a spatial structure of prolonged action, the molar ratio of the initial components - carbamide and or the formaldehyde is 1:1.7, respectively. When the reaction mixture is deposited in water, pH = 3. The effect of the reaction duration, temperature, molar ratio of the initial components, reaction medium, concentration of the initial comp ents, catalyst, nature of the solvent and other factors of the course of the reaction was studied. Optimal reaction conditions have been established A high-molecular nitrogen fertilizer with a linear zers of structure of prolonged action has been synthesized both in alloy and in solution. The molar ratio of the initial components - carbamide and aldehyde - changed to 1: 0.8-1.2, respectively. The reaction temperature varied from 60 to 95 degrees during the reaction in solution. The duration molar concentration of the initial components varied from 0.8 to 1.1 mol/1. teous of the reaction is from 1 to 16 hours. The pH of the reaction medium is from 8 to 3. The concentration of the initial components is from 0.6 to 2 mol/l. During the reaction in the alloy, the reaction temperature varied from 70 to 155 degrees. The duration of the reaction at the initial stage was duct 2 hours, at 155 degrees it was 12 hours. The molar concentration of the initial components varied from 0.8 to 1.1 mol/l. The simplified structural formula of the formed polymer having a linear structure looks like this: -HNCONHCH2[NHCONHCH2]n - HNCONHCH2 Optimal reaction conditions have been established

The current shortage of thermal energy in Georgia is caused by limited amount of natural energy resources in the country. The production of combustible briquettes has a practical perspective of solving the problem of thermal energy, both in the central and mountainous regions of the country. The alternative thermal energy produced by the utilization of secondary raw materials will be used in household-utility, small enterprises and energergetics. Production of briquette fuel based on local secondary raw materials is a rational, highly efficient and profitable means to an end. Utilization of wastes also ensures the improvement of the ecological condition of the environment

Our goal was the production of fuel briquettes with different compositions using wastes of energy-bearing raw materials present in Georgia evaluation of physical-chemical, mechanical-technical characteristics, commodity properties of secondary raw materials and of the obtained is. The briquettes, selection of the optimal technological scheme, determination of the ecological effect obtained by their use and saved energy resources aining creation of the prerequisites for their introduction into production in the form of a recommendation

The stocks of combustible residues to be used on the territory of Georgia was studied and specified, namely: coal (wood), wood (sawdust, *DSP*), corn (roots and part of the stem). Binders and materials necessary for their modification were selected taking into account the data of local resources: bitumens, polyethylene, oil sludge, heavy oil, bituminous rocks, clays. Their location and stocks were determined. The secondary raw materials map of Georgia was compiled.

From the carbonaceous wastes bulk piles of coal, wood sawdust and wood chippings were used. A mixture of two fine-grained fractions was prepared as briquetting compositions. As a binding material the oil sludge was selected from local, cheap and available organic compounds, and fuel various clays - from inorganic compounds. Urotropin and other compounds were used as combustion activators. As modifiers were used tar, foam, geological material containing magnesium, magnesite, calcium carbonate and others.

A high-calorific, alternative briquette fuel based on the utilization of secondary carbon-bearing wastes has been developed and studied. Three bio and four coal-residue-containing fuel briquettes were produced. The obtained samples correspond to the standard requirements both from the economic and ecological point of view. By using of fuel briquettes it is possible to obtain additional thermal energy, which ensures the saving of traditional energy resources. This will make a certain contribution to the development of briquette production in Georgia

1. The synthesis of prolonged fertilizer is carried out in the pores of a natural sorbent, as well as without the use of a sorbent, with a polycon developed: by carrying out the process both in alloy and in solution. 3. The initial components, the reaction medium, the concentration of the initial components, the catalyst, the nature of the solvent and other factors on the course of the reaction were studied. Optimal reaction conditions have been established. 4. A high-molecular nitrogen fertilizer with a linear structure of prolonged action has been synthesized both in alloy and in solution. 5. The molar ratios of the initial components are established. The molar ratio of th initial components - carbamide and aldehyde - changed to 1: 0.8-1.2, respectively. The reaction temperature varied from 60 to 95 degrees during the reaction in solution. The duration of the reaction is from 1 to 16 hours. The pH of the reaction medium is from 8 to 3. The concentration of the initial components is from 0.6 to 2 mol/l. During the reaction in the alloy, the reaction temperature varied from 70 to 155 degrees. The duration of the reaction at the initial stage was 2 hours, at 155 degrees it was 12 hours. The Optimal reaction conditions have been established. A monograph has been published as part of a grant project: G.Papava, E. Gugava, K. Ebralidze, M. Gurgenishvili, I. Chitrekashvili. Obtaining and application of Prolonged Nitrogen Fertilizers in Agriculature. Publishing house "polygraphmax" LLC. 17 Robakidze Avenue, Tbilisi, 2014

· The corn roots, chipboards and Caucasian Fir cones (briquetting material), as well as polyethylene (binding material) were used in mixed briquettes for the first time. Only local secondary raw materials were used. The obtained fuel briquettes complied with the standards.

· Comparative characterization of combustible waste raw materials, bio and mixed briquettes., determination of ecological effects, heat capacity of briquettes and the amount of electricity saved according to the thermal energy released as a result of combustion were carried out. The estimated cost of the product and the profit data were determined.

A map of the location and stocks of secondary raw materials in Georgia was drawn up

 The optimal technological scheme module for obtaining of fuel briquettes was selected.

Recommendations and recipes for their production and commercialization of briquette compositions were prepared.

· During the reporting period, 5 articles and 3 international conference theses were published. The database was compiled.

 From corn roots and chipboards were obtained combustible briquettes corresponding with the requirements of the existing standard both from the ecological and economic point of view. It is worth noting that corn roots and chipboards as a briquetting material, as well as polyethylene as a binding

material were used in mixed briquettes for the first time.

Several methods were developed for the separation of ceresins and solid paraffins from the 350-450°C fraction, from the >450°C residue and oil pipeline sludge. The possibility of obtaining lubricants and insulating materials, as well as mastics and candles by mixing solid paraffins and ceresins was studied. The luminophore (20-22%) separated from the residue >450°C is the best raw material for obtaining electrode coke, insulating materials, bitumens and

luminescent components. The patent P 2018 6831 B: "Method of efficient utilization of oil pipeline ediment" was received. It describes an environmentally safe method of efficient utilization of oil pipeline sediment, which allows high-quality, expensive products to be obtained by its rectification and molecular distillation without cracking, with minimal operations, excluding usage of adsorbents and expensive stages. For the first time in Georgia it is possible to implement an effective scheme for rational processing of oil pipeline wastes in order to obtain conference theses were published

During the operation of the oil pipeline, a considerable amount of heavy components are deposited in it in the form of a semi-solid, viscous mass The capacity of the existing in Georgia the Baku-Tbilisi-Ceykhan oil pipeline is This waste blocks the permeability of oil pipelines and causes various types of disruptions, which can lead to serious accidents and severe about 30 mln/tons per year. During the operation of the oil pipeline, the heavy oil environmental consequences. The main task of our work was the study of this residue. The main components of the residue are relatively high nents settle on the walls of the pipeline, which reduces the permeability of the molecular weight naphthenic, aromatic and other hydrocarbons and heteroatomic compounds. These compounds are present in the waste in a oil pipeline. Therefore, pipes are periodically cleaned - profilaxis, and as a result the native form, that is, its composition is very different from the oil wastes (mazut, tar). The use of these wastes compared to oil and tar is much more accumulation of residue takes place. This residue is characterized by interesting promising for obtaining deficient, low-tonnage products. It contains mechanical impurities (sand). The latter increases the interest in it from the composition and physical and chemical properties. The following products can be point of view of asphalt bitumen production. The problem is that the amount of wastes is increasing every year, and its non-use leads to obtained from the residue: broad spectrum of paraffins, various ceresin-based waxes, environmental pollution and loss of cheap raw material. Due to the high cost of natural resources and strict requirements for protection of the tent ointments, vaselines, candles, and packaging materials. A scheme for environment, it is necessary to develop new effective methods of utilization and use of oil wastes. Fractions boiling at 350-4500C and >4500C are utilization and efficient processing of oil pipeline residues has been developed, which separated by method of molecular distillation. The low values of ash, coking and resin content of these fractions indicate a high content of paraffins low-tonnage, deficient products from it. 3 articles and 4 international and local is important for obtaining of low-tonnage deficient products, and as well from and ceresins. Fractions distilled in temperature ranges of 50° were combined and four fractions were obtained: 80-1900C(1), 190-3000C(2), 300-Guram Khitiri Gabunia Madona Tsurtsumia ecological point of view 3500C(3), 350-4500C(4), their characteristic constants were determined

AR/237/10-100/12	Chelates in Agriculture
52/06	Development-Validatio of Quantitative Determination Method Volatile N-Nitrosamine and Its Removal for Tobacco Smoke by Usin Local Natural Zeolites

Development of

AR/141/3-121/11

innovation technology for

graphite class antifiction

obtaining new type copper- Applied

Shota

Applied

Research

State Grants (SRNSF)

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Imeda

The goal of the Project research is preparation of ecologically safe organo-mineral chelate fertilizers and premixes of new generation for mixed fodder for poultry and animals based on deficient, biometals and organic substances, since they realize their functions in bio-systems in the form of chelates Tasks stipulated for implementation of Project goal are

- · Determination of conditions for the synthesis of chelate compounds and the synthesis according to the general formulae: MxL1L2-nH2O, where for the I type compounds; M=Mn,Zn,Fe,Co,Cu,Mo,B. for the II type compounds
- M=Ca,Mg,Mn,Zn,Fe,Co,Cu,Se. X=1 or 2; L1=amino acid; L2=oxy acid anion Determination of their composition, individuality and some physico-chemical characteristics
- · Test of microfertilizer concentrate and working solution based on type I chelating compounds on corn culture. Creation of microfertilizer recipes of optimal composition based on research.
- · Balancing combined feed using premixes made on the basis of type II compounds and corn culture obtained from field trials. Conducting pilot and basic experiments on egg-laying and broiler birds.
- To evaluate the physiological state of the bird, conducting diges determining the biochemical and morphological composition of blood, control
- slaughter and tasting. · Comparative characterization of economic indices of premixes prepared by us and those of foreign made ones and determination of efficiency of local premixes
- compared to foreign premixes Zhorzholiani, Maia Gogaladze, · Preparation of recipes of scientifically substantiated efficient doses and optimal

Iamze Beshkenadze, Nani

Givi Begheluri, Aytandil

Vitali Sherozia Nora

Dokhturishvili, Marina

Gurgenishvili, Givi Papav

Chagelishvil

- composition premixes for mixed fodder
- Application of organo-mineral, chelate fertilizers and fodder premixes prepared

that captures volatile N-nitrosamines from tobacco smoke and to develop and

validate a method for the quantitative determination of volatile N-nitrosamines

A number of requirements for antifriction materials such as low coefficient of

friction, wear resistance, mechanical strength, thermal conductivity, corrosion

resistance, low coefficient of linear expansion, high adhesive ability, in many cases high electrical conductivity, should be well combined with the technologica

simplicity and cost of their implementation. Among the various types of antifriction

materials (metallic, non-metallic, combined, etc.) used today, graphite-based non-

metallic antifriction materials play an important role. The most interesting among

them is copper-graphite antifriction material. It has found practical application in

mechanical, thermal and electrical properties and a wide range of applications.

Achieving this goal makes it possible to produce new, improved characteristics of

machines, devices, tools and increase the service life of existing ones. Therefore, the

work to be done within the framework of this project is very important and urgent.

antifriction material is proposed. In particular, instead of a mechanical mixture of

copper and graphite powders, it is envisaged to use graphite powder pre-plastered

sliding assemblies and, accordingly, design new, higher operational properties of

To achieve the project goal, a new, innovative approach to the formation of

with copper, and then compact this powder by blowing (shock wave). This

graphite mixture in a large range (10-85%), at the dose necessary to obtain

technology will allow us to change the concentration of graphite in the copper

some areas of mechanical engineering. The ultimate goal of this project is to develop

dissolved in organic solvents and present in the smoke

The following conclusions have been made on the basis of the research work carried out within the project

Synthesis conditions have been determined and two types of chelate compounds with the general formula: MxL1L2·nH2O have been synthesized where for type I compounds M=Mg, Mn, Zn, Fe, Co, Cu, Mo, B. For type II compounds, M = Ca, Mg, Mn, Zn, Fe, Co, Cu, Se. X = 1 or 2; L1 = amino acid: L2 = oxvacid anion.

- The composition, individuality and some physico-chemical characteristics of both types of gels have been studi
- · Microfertilizer concentrate and working solution prepared on the basis of type I chelate compounds were tested on corn culture
- · Experimental and basic tests on broiler and egg-laying birds have been conducted using microfertilizer-grown corn culture and premixes based on type II compounds. Effective doses and optimal composition of premixes have been established.
- · The comparative characterization of the economic index of premixes created by us and foreign production is given. The efficiency of local premix mpared to foreign premix is determined
- The use of organo-mineral chelate fertilizer and feed additive made according to the recipes provided
- · Increase in the quantitative and qualitative index of corn yield.
- · Increase in absorption of macroelements (N. P. K).
- Improving the plant's physiological state and metabolic processes.
- Prolonged effect of fertilizer · Soil enrichment and structure improvement
- Maximum reduction of bird dropping
- · Increase in broiler live mass (10-12%) and improvement of meat quality.
- Increasing the strength, consistency and quality of the egg shell.
- · Keeping the physiological and biochemical parameters of the bird within the limits of the permissible norm
- · Increasing the nutritional value and qualitative index of food due to the use of corn grown with microfertilizers and chelating additives in premixes

The aim of this work was the quantitative estimation of some volatile N-nitrosamines in tobacco smoke of local cigarette different brands using an efficient, rapid and sensitive GC-MS method. The chromatographic system suitability was tested by using the following characteristics. The RSD, % Chemistry. 2014, 9(12), 79-91; 3. I. Rubashvili, V. Tsitsishvili. Quantitative of peak areas (five replicate injections) was < 2.0 %; The RSD, % of retention times < 1.0 %; the number of theoretical plates was > 2000; the tailing Estimation of volatile N-nitrosamines in Tobacco Smoke Using Validated GCfactor < 2.0; the resolution between the two nearest peaks > 2.0 for all N-nitrosamines. The calibration curve was linear over a concentration range

MS Method and its Uncertainty Evaluation, Illustrated by determination of N-0.5-100 µg mL-1 with a correlation coefficient > 0.99. The limit of detection and limit of quantitation were 0.25 and 0.5 µg mL-1, respectively. The determined quantities of some volatile N-nitrosamines e.g., N-nitrosodimethylamine, N-nitrosomethylethylamine and N-nitrosodiethylamine in tobacco smoke vary 190-320, 87-119 and 99-166 ng/cigarette, respectively. The present research has been shown the possibility of use of Georgian natural zeolites - mordenite and clinoptilolite modified H-forms for removal of nine volatile N-nitrosamines (VNA) and two tobacco-specific Nnitrosamines (TSNA) from tobacco mainstream smoke. Previously, adsorption properties of the above-mentioned zeolites modified H-forms were investigated towards genotoxic compounds as sorbates - nine volatile N-nitrosamines namely N-nitrosodimethylamine - NDMA, Nnitrosomethylethylamine - NMEA, N-nitrosodiethylamine - NDEA, N-nitrosodipropylamine - DPNA, N-nitrosodibutylamine - NDBA, Nnitrosopiperidine - NPIP, N-nitrosopyrrolidine - NPYR, N-nitrosopyrrolidine - NPYR, N-nitrosopiperidine - NPAPA, N-nitrosodiphenylamine - NDPA and two tobacco-specific Determination of Some Volatile N-nitrosomines in Cigarette Smoke Using N-nitrosamines 4-(methylnitrosamino)-1-(3- pyridyl)-1-butanone (NNK) and N'-nitrosamornicotine (NNN). It was specially constructed dynamic type laboratory equipment for adsorption study of N-nitrosamines on zeolites modified H-forms which was composed of the following parts: 1. Quartz tube for burning tobacco; 2. Specially made glassware with bubbler on glacial bath for n-nitrosamine absorption; 3. Vacuum pump. The smoke from tobacco burning in quartz tube was conducted through organic solvent which absorbs all N-nitrosamine compounds without any loses. possibility of natural Mordenite use for removal of volatile N-nitrosamines A new, rapid and effective analytical GC-MS method of quantitative determination of N-nitrosamines was developed and validated to control the concentrations of the above-mentioned toxic compounds in test solutions obtained from tobacco smoke. Analytical data has been shown that The aim of this study was to develop a model of a cigarette containing a zeolite filter studied mordenite modified H-form's adsorptive capability is better than clinoptilolite H-form more precisely; mordenite H-form decreases the content of volatile N-nitrosamines in tobacco smoke to 74 % and clinoptilolite H-form decreases to 63 %; mordenite H-form decreases the content of tobacco-specific N-nitrosamines in tobacco smoke to 95 % and clinoptilolite H-form decreases to 89 %. This phenomenon gives the perspective of creation "ant-nitrosamine" cigarette.

1 ne ultimate goal of this project is to develop a simple technology for producing copper-graphite antifriction materials with nigher mechanical,

thermophysical and electrical properties than existing ones and a wide range of applications. To achieve this goal, instead of a mechanical mixture of copper and graphite powders, it is planned to use graphite powder pre-clad with copper, and then compaction of this powder by explosion (shock 20 w.1% (5.3 vol.%) Cu coating. It is determined that at this time the coating wave). To solve the task set in the project, such a method of graphite cladding with copper was chosen, the last stage of which is the restoration process. The coating surface obtained at this time is activated and easily processed into a monolith of any quality. The chemical transformation of a opper-containing compound-copper sulfate refers to this: $CuSO_4 \rightarrow Cu(OH)_2 \rightarrow CuO \rightarrow Cu$. The transformation takes place in stages: 1. $CuSO_4 \rightarrow CuO \rightarrow Cu$. Do powders by a shock wave has been studied. It is shown that the porosity of the CAPACH — CLI(OH)₂ - Na₂O₆ 2. Cu(OH)₂ — CuO + H₂O; 3. CuO + H₂ — Cu + H₃O. A methodology for carrying out each of these stages compacted samples depends on the thickness of the coating. When it decreases, has been developed. The results are obtained. The optimal conditions for the process were established: CuSO 4-12% by weight, NaOH - 28% by weight, temperature - 600C (stage I), optimal conversion temperature Cu(OH)2 in CuO under heating conditions is 180 ° C (stage II), and in a hydrogen medium the conversion temperature of CuO to Cu is 185-210 °C (stage III). The conversion time at any stage depends on the thickness of with a dispersion of less than 10 microns is less than that of compacted 20-40 the coating. A method for determining the thickness of the coating has been developed. The phase composition of the coating was monitored by microns of powder containing the same amount of copper. 4. Studies have radio structural analysis. Based on these data, graphite powders with a dispersion of 20-40 microns and less than 10 microns were clad with 80 wt.% shown that the porosity of samples during shock wave compaction and, (53.3 vol.%) Cu. 50 wt.% (19 vol.%) Cu and 20 wt.% (5.3 vol.%) Cu coating. It is determined that at this time the coating thickness on powders with accordingly, the density significantly depend not only on the thickness of the a simple technology for producing copper-graphite antifriction materials with higher a dispersion of 20-40 microns is 7-10 microns, 4-6 microns, respectively. The process of compaction of such powders by a shock copper-clad powder, but also on the degree of preliminary hardening of the wave was studied. For this purpose, the material of the ampoule for the explosion and its geometric dimensions, as well as the explosive material and powder (p). 5. As a result of the conducted research, it is recommended to the technological scheme of the explosion were selected. It is shown that the porosity of the compacted samples depends on the thickness of the blade. With its decrease, the porosity increases. Experiments have shown that the density of samples obtained by compacting (pressing) graphite powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than that of pressed 20-40 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than that of pressed 20-40 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than that of pressed 20-40 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than that of pressed 20-40 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than 10 microns is less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns is less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 microns powder containing 80 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion of less than 10 wt.% (53.3 vol.%) Cu with a dispersion the same amount of copper. The same trend is observed for powders containing 50 wt. % and 20 wt. % copper. Accordingly, the porosity is high.Studies have shown that when compacted by a shock wave the porosity and consequently, the density of samples significantly depend not only on mm) 6. An additional experiment established the possibility of obtaining the thickness of the copper-clad powder, but also on the degree of preliminary solidification of the powder. The degree of compaction of 95-97% can be achieved in the presence of 80 wt. % (53.3 vol. %) Cu in the entire mass of the powder and under conditions p c > 0.45 p h. As the copper coating in the powder decreases, the degree of compaction decreases and at 50 wt.% (19 vol.%) Cu and 20 wt.% (5.3 vol.%) Cu is (88-91)% and (80-explosion and by hot pressing methods showed that graphite is evenly 83%, respectively. Their mechanical strength is also reduced. This is probably due to the low deformability of such powders and, consequently, the difficulty of creating a common graphite crystal boundary, or it is possible that brittle graphite grains are destroyed under the influence of high density, electrical resistance, mechanical strength and coefficient of friction of pulse pressure. As a result of the conducted research, it is recommended that graphite powders clad with copper be compacted by explosion. An

2. I. Rubashvili. Quantitative estimation of some volatile N-nitrosamines in tobacco smoke using validated GC-MS method. Eurasian Journal of Analytical nitrosomethylethylamine. The Bulletin of the Georgian National Academy of Sciences. 2015, 9(1), 85-92; 4. I. Rubashvili, T. Kordzakhia. Quantitative estimation of some volatile N-nitrosamines in tobacco smoke using validated GC-MS method. Asian Journal of Chemistry, 2015, 27(10), 3704-3710; 5. I. Rubashvili Validation of GS-MS method for quantitative determination of volatile N-nitrosamines. International Conference "Analytical Research Forum 2014". 7 July, 2014, London, The United Kingdom; 6. I. Rubashvili. Validated GC-MS Method, 18th Annual Meeting of the Israel Analytical Chemistry Society, Conference and Exhibition. 2015, 14-15 January, Tel-Aviv, Israel; 7. I. Rubashvili, L. Eprikashvili, T. Kordzakhia, M. Zautashvili. The from tobacco smoke (in Russian). II All-Russian Symposium with participation of foreigner scientists "Actual Problems of Adsorption Theory, Porosity and Adsorption selectivity " 2015, Moscow, 13-17 April, Russia: 8. I. Rubashvili, T. Kordzakhia, L. Eprikashvili. Determination of N nitrosodimethylamine in tobacco smoke and its removal possibility by using natural zeolites. 5th International Scientific conference "Applied Natural 1. Graphite powders with a dispersion of 20-40 microns and less than 10 microns were coated with 80 wt.% (53.3 vol.%) Cu. 50 wt.% (19 vol.%) Cu and thickness on powders with a dispersion of 20-40 microns is 7-10 microns, 4-6

microns and 0.5-2 microns, respectively, 2. The process of compacting such

the porosity increases. 3. Experiments have shown that the density of samples

obtained by compacting graphite powder containing 80 wt.% (53.3 vol.%) Cu

compact copper-clad graphite powders by explosion under the following

conditions: Preliminary solidification of the powder - p ≥0.45 p theoretical; explosive - 50% amonate #6ZHV +50% ammonium nitrate Pressure on the

walls of the ampoule - 5-6 GPa (with a wall thickness of the ampoule 1.6-2.0

samples with higher density characteristics by hot pressing from a powder with

a low coating. Metallographic analysis of compacted samples obtained both by

the samples depend on the composition and vary in a certain range. Published

1 Patent: 5 Scientific papers (2 foreign journal: 3 local journals)

 Rubashvili. V. Tsitsishvili. The possibility of volatile N-nitrosamin emoving using local natural zeolites. Proceedings of the Georgian National Academy of Sciences Chemical Series 2014, 40(4), 271-277:

#5 4 61	New generation premixes containing bio-metals and natural zeolite		Science and Technology Center in Ukraine STCU	123 300 J EUR	02.12.11- 02.11.14	Spartak Urotadze	Spartak Urotadze, Iamze Beshkenadze, Apolon Kozmanishvili, Nani Zhorzholiani, Maia Gogaladze, Givi Begheluri, Nana Osipova, Tamar Kvernadze, Nino Burkiashvili, Victoria Enukidze	metals and organic substances and their combinations with Natural zeolite. They provide production of finespensive, ecologically safe, wasteless, antibacterial antiseptic additives. Tasks to reach the goal: 'Synthesis of coordination compounds containing essential bio-metals and organic substances (amino acids, oxo-acids and etc.); preparation of the optimal compositions on the bases of synthesized compounds and natural zeolites (clinoptiloitie, laumonitie and etc.); Preparation of the scientifically proved recipes for the inexpensive, ecologically safe, wasteless, additives containing effective dozes and optimal composition of essential bio-metals, organic substances and zeolite. Application of the prepared composites will provide: Prolonged insides of the nutrients by pourlay and animals;	The fallowing conclusions are made on the bases of of the works done within the scope of the project "Generation Premixes C and Natural Zeolites. The conditions for the synthesis are established and the following types of coordination compounds are synthesized: M.1.1.2 Me.Mn, Zn, Fc, Co, Co. 1.1 a mino acid (glutamic acid or methionine), 1.2° anion of citric acid no-0.6 Composition of the synthesized compounds, their individuality, solubility and stablity in water, type of the metal-ligand bon stability have been studied. The test trials of the premixes created on the basis of mixing the synthesized compounds and nature carried out on broiler, egg laying chickens and rabbits. The optimal recipes have been proposed on their bases taking into accordinations of the local zones. Application of the premixes prepared according the recipes provides: Prolonged intake of nutrients by pountry and animals *Maximal decrease in fall Increase in the live mass by 10-12% Improvement of meat quality *Keeping of physiological and biochemical indices within the limits of the norms *Avoiding of different diseases Decrease in mutrient expenses while its intake because of the increace in its effectiveness *Decrease in the prime cost of the nutrient
GNSF/ ST 09-153- 7 104 .	New Type Hybrid Porous Polymeric Insulation Material	State scientific grants	Georgian National Science Foundaiton	150 000 GEL	01.04.2010- 01.04.2013	Givi Papava		The Project pursues obtaining of new type hybrid porous polymers on the base of amide type oligomers and winemaking wastes (husk), which will have high sound-and heat-insulation properties, as well as high sorption capacity. Technology of obtaining the offered porous polymer materials is developed for the first time and it will enable one to solve the above listed problems. The offered project will enable one to organize wide scale enterprise for production of highly efficient protous polymers as well as their application for the provision of sound and heat insulation of buildings and communications, their application in environment protection from pollution due to oil products. Practical value of the Project is that well obtain new type highly efficient protour by high sound-and heat-insulation properties as well as by high sorption properties, fire-resistance, by capacity to vary properties in wide range, according to the structure and ratto intial components, by cheapness. The Project will be implemented by participation of scientists and specialists, highly experienced in the sphere of the submitted them. The submitted Project provides also thermal modification of natural insurasions obselvents, will develop technology of rendering hydrophobic natural mineral sorbents. We'll develop technology of rendering hydrophobic natural mineral sorbents, which is necessary for granting them selectivity. The Project provides	The project provided for the development and research of innovative technology for obtaining new types of heat and sound in polymer materials. To obtain porous insulating materials proposed by the authors of the project, the main components are an a carbamide, formaldehyde and waste from the processing of grapes - chachs. Laboratory studies have studied the process of four and a prorus polymer material, in influence of various factors on its course. Hybrid prorus plastic materials based on synthetic from the production of wine - chacha were obtained. Work was carried out to identify one of the main components - chacha groups were identified in the samples. To obtain hybrid porous polymer materials, theath was hydrophobized and sorption propus propus proving the production of protus materials are amide and mixed oligomers. An innovative technology has be basis of which porous polymers are obtained both in powder form and in the form of granules. Work has been carried out to detechnological process have been studied. Perlite-containing porous polymers have been synthesized in a pair with a cup. A che sorbent can also be included in the composition of protus polymers, which will significantly reduce the cost of products and a increase its fire resistance. For this purpose, you can use a natural mineral - perlite. Granulometric analysis and fractionation were carried out to illustrative control of the control of

reaches upper strata of the atmosphere it results its destruction and heavy ecological

conditions for the population and fauna, it conditions various type heavy diseases.

Therefore it becomes extremely urgent and actual to develop ecologically safe and

mineral nitrogenous fertilizers by means of drastic decrease of its solubility in soil.

structuring. Simultaneously these pores create favorable medium for propagation of

according to need, by means of buffer effect of chemical reactions, taking place in

soil. Resolution of the below listed objectives is necessary for implementation of the

profitable technology, which will enable to reduce significantly application of

multi-component pellet compositions, which contain structured nitrogenous

fertilizer and zeolite in the pores of which nitrogenous fertilizer undergoes

bacteria. In this way we achieve the prolongation effect of the structured

Gavashelidze Eter, Maisuradze Project 1. Isolation and propagation of cultures corresponding to uro-bacteria 2.

Nunu, Gelashvili Nazi, Papava Development of a method of defining the rate of degradation of structured

Ketevan, Lipartelianu Riva

nitrogenous fertilizers and it enables us to decrease the norm of nitrogenous

Development of a nev

compositions containing

nitrogenous fertilizers in

order to increase the yield

of grain crops and protect State

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l insulation porous cha. Various functional to determine the main intent of chacha on the cheap natural mineral nd at the same time on of modified perlite olymers were carried polymers can be used the proportion of the organizations, oil

The process of urea structuring in zeolite pores has been studied. Natural unmodified analcime was used for this purpose. The grain size was 0.5-1 greatest ecological and economic importance. 1. Urobacteria strains were mm. Analcime was saturated with a mixture of carbamide and aldehyde components. Ammonium nitrate and ammonium chloride were used as catalysts. The content of carbamide in the secondary pores of analcime varied from 10 to 15%. The structuring process was studied at 1500C. It was which will be used to degrade structured urea, convert it into a form found that during the process without a catalyst, low-molecular oligomers are formed, which, when treated with water, are completely washed out assimilated by plants, and then to carry out ion exchange processes of ratios, to The submitted Project pursues creation of such technology by means of creation of of the pores of the analcime. When using catalysts, a structured product is formed. The reaction takes place in two stages. At the first stage, oligomers are formed, which subsequently undergo structuring. As a result of the reaction, macromolecules are formed that cannot be extracted from the pores of the analcime. In this way, the effect of a chemical bond between analcime and structured carbamide molecules is created. Structured carbamide can be extracted from the pores of analcime only in the form of breaking chemical bonds and the formation of fragments of small molecules. When using structured urea as a chemical fertilizer, its gradual degradation occurs under the action of urease enzymes. In the initial mixture, the molar ratio of carbamide and aldehyde was 1:1.2 and 1:1.5, respectively. At a temperature of 1500C, with a duration of 1.5 fertilizers per ha to 50%. Thanks to this technology nutrients are delivered to plants hours, the process of structuring carbamide in the allow was studied. The molar ratio of carbamide and aldehyde was 1:1 and 1:2, respectively. The temperature is 1350C and 1500C, the reaction duration is 2 hours. At a ratio of 1:1, linear molecules are formed, which are characterized by a prolonging effect. In this case, urease enzymes easily penetrate into the polymer mass, and degradation proceeds quickly. At a ratio of 1:2, a polymer respectively. The temperature is 1350C and 1500C, the reaction duration is 2 with a high degree of crosslinking is formed. In this case, the penetration of enzymes into the polymer mass and the breaking of chemical bonds is hours. 5. The influence of the molar ratio, the duration of the process and the difficult, and degradation requires a long time. Chemical fertilizer with the effect of prolonged action - structured carbamide, 200 g each, was nitrogenous fertilizers by uro-bacteria. 3. Development of a technology of obtaining produced for use in laboratory vegetation tests

2 Patents; 10 Scientific articles (2-high-ranking journals, 2-thesis, 1 foreign journal; 5 local journals) Hybrid porous plastic materials based on synthetic polymer and waste from

the production of wine - chacha were obtained. 2. Work was carried out to identify one of the main components - chacha. Various functional groups were identified in the samples. 3. Hydrophobization of chacha was carried out and an amide-type monomer . sorption properties were studied. 4. An innovative technology has been formation of an oligomer developed, on the basis of which porous polymers are obtained, both in the thetic polymer and waste form of powder and in the form of granules. 5. Work has been carried out to determine the main technological parameters of the process. 6. The curing properties were studied. process of the polymer composition and the effect of changes in the content of been developed, on the chacha on the technological process have been studied. 7. Porous polymers containing perlite paired with a cup have been synthesized. 8. Studies have been conducted to study the process of modification of perlite. Perlite is a rock of volcanic origin. It is not a fibrous material, does not burn or rot, is biostable and chemically inert (pH = 6.5), 9.Optimal conditions for modification of perlite 950-1200°C have been determined. 10. The sorption properties of hydrophobized perlite were studied, in particular, the efficiency of removing oil from the water surface. 11. Sorption properties of hydrophobized chacha were studied. 12. Optimal conditions for the synthesis of homogeneous and mixed ne fact that hybrid porous oligomers were established. 13 to The influence of the chemical structure of the porous plastic material amine component on the properties of the porous polymer was established, 14. nd other properties. The ... The properties of porous polymers were studied. The proposed project made it possible to obtain highly efficient porous hybrid polymers. The use of such polymers is possible for sound and thermal insulation, as well as for cleaning ce with a special regime oil-contaminated waters and soil. The new technology will reduce the ased on them provides it proportion of the amide oligomer in the polymer composition by using chacha up to 50 wt. %. The uniqueness of the project results lies in the fact that hybrid To obtain a structured prolonged fertilizer for the purpose of introducing carbamide into the pores of zeolite, a sample containing natural, unmodified zeolite-clinoptilolite of various deposits was selected. For chemical, X-ray phase and infrared spectral studies. In order to clarify the safety of structured urea for soil microflora, the effect of polymers on the qualitative and quantitative composition of some types of (brown-carbonate, brackish) microflora was studied. For the first time, multicomponent graded encapsulated fertilizer compositions for grain crops (wheat, rye, barley, triticale) were developed. When using the resulting prolonged fertilizer, the hectare rate of nitrogen fertilizers is reduced by 50%, and along with an increase in yield, it is given the isolated from soils, active, new selective forms were obtained by their selection convert insoluble calcium phosphate into a soluble form. The described process is carried out in the soil. 2. The selected strains were tested on polymer nitrogen fertilizers and the presence of intermediate oligomers in them was checked. Samples containing natural, unmodified zeolite-clinoptilolite from various deposits were selected. 3. The process of urea structuring in zeolite nores has been studied. Natural unmodified analcime was used for this nurnose The grain size was 0.5 - 1 mm, 4. The process of structuring carbamide in the alloy was studied. The molar ratio of carbamide and aldehyde was 1:1 and 1:2, temperature of the initial components on the structuring process of carbamide and aldehyde components has been studied. 6. A chemical fertilizer with the

directed on the development of efficient methods of removing of these substances from the polluted surface are of primary importance. There are numerous known water together with absorbed products. This causes intensive pollution of the lake. sea, ocean bottoms. The proposed project aims to develop high-filled, high sorption ability foam-polymers of a new type on the basis of various classes of polymers and natural modified non-organic sorbents. Their removal from the water surface is possible in mechanical way, together with absorbed oil products. The proposed technology of foam-polymers generation is being developed for the first time and it large-scale production of highly efficient sorbetns and their exploitation for nment. The practical value of the project includes the followi the new type of highly efficient foam-polymers of different configurations will be will be distinguished with high sorption properties, fire resistance, the property variability in wide interval, dependence on base material structure and relativity The project will be implemented by the scientists and specialist, which have large Preparation research and State National Nazi Golashvili Kotovan experience on the topic of the proposal. The present project provides thermal and GNSF/ST09-152-5- application of new types of scientific Science 150 000 01 04 2010- Zaza Papava, Vitali Sherozia, Natela chemical modification of natural sorbents. Technology of hydrophobization of Molodinashvili Khetsuriani GEL 01.04.2013 sorbents will be developed, which is necessary for granting selectivity to sorbents. hybrid porous polymers grants Foundaiton Intensive growth of the population makes urgent the problem of increase of cereals production. Increase of urban population and industry result in the decrease of arable lands. Therefore, the practically only means of problem resolution is application of intensive technologies, which is connected with the necessity of increasing agrotechnical norms of mineral fertilizers, especially those of nitrogenous fertilizers. But due to extremely high solubility of nitrogenous fertilizers its significant part (approximately 50%) is lost because of its washing down and evaporation. Alongside with the great economic losses, it conditions total contamination of environment - water reservoirs, rivers, wells, lakes, etc. When it conditions for the population and fauna, it contributes to various type heavy diseases. Therefore it becomes extremely urgent and actual to develop ecologically safe and profitable technology, which will enable to decrease significantly Development of new nous fertilizer undergoes structuring. Simultaneously it creates technologies for cereals with the purpose of of the structured nitrogenous fertilizers and application of nitrogen-fixing bacteria decrease of the norm of nitrogenous fertilizers per ha and environmen Eldar Gugava, Ia cording to need, by means of buffer effect of chemical reactions, taking place in Georgia protection from pollution. State National Chitrekashvili, Nora GNSF/ST09-229-8- by the use of nitrogen-01 04 2010-Dokhturishvili, Zaza scientific Science 150 000 Marina and propagation of active cultures; 2. Development of technology of obtaining fixing organisms ntense population growth requires increased food production. By contrast, farmlands are gradually disappearing due to growing urbanization and sification of industry. One solution to this problem of a decreasing food supply is the use of intensive agricultural technologies such as chemical fertilizers, especially those containing nitrogen. However, due to the especially high solubility of nitrogen fertilizers, a large proportion of their application (at about 100 million tons) is lost to leaching and evaporation. This economic loss is accompanied by total ntal pollution, and by pollution of upper layers of the atmosphere where evaporated substances destroy the ozone layer, thus creating dangerous ecological conditions for human beings and fauna. The development of ecologically harmless Maisuradze Nunu such a technology by creating multi-component compositions consi Dokhturishvili Nora nitrogen-fixing bacteria. Such a fertilizer would decrease significantly (by 50-60%) Golachvili Nazi Panava the amount of nitrogen fertilizers required for optimal plant growth. The proposed Ketevan, Gurgenishvili nitrogen fertilizer would have a prolonged action and contain a natural sorbent Marina, Andronikashvili (zeolite, diatomite) where nitrogen can be sequestered in mineral pores, thereby simultaneously creating a favorable medium for the propagation of bacteria. Main Teimuraz, Eprikashvili Luba, Kordzaxia Teimuraz nutritive substances (NPK) for plants are released via ion-exchange reactions, in Lomtatidae Zaur, Gasvian which the exchangers (previously exchanged natural zeolites) containing Nodar, Gugava Eldar, ammonium and ptassium cations are mixed with phosphate rock. Calcium ions Gavashelidze Eter, travel from phosphate rock through the soil solutions and exchange with nutrient Molodinashvili Zaza cations held in the zeolite, thus releasing potassium and ammonium. To implement Ramishvili Mzia, the Project the following tasks will be resolved: -obtaining and propagation of atrollable releaseed fertilizers on the basis ion-Technology Chitrekashvili Ia. Tahukashvili cultures of nitrogen-fixing bacteria: -development of technology for obtaining 197 408 01.02, 2009 Zurab, Liparteliani Riva. structured nitrogen fertilizers of prolonged action: -realization of step-wise Center in exchanging and polymeric Ukraine STCU USD adaptation of microorganisms possessing ureasive activity - to polymers;

The purpose of the project is the development and studying of new organic and mineral hybrid foam-polymers on the basis of various classes of polymers and natural modified sorbents with high sorption ability and physical-mechanical

properties. Every year all over the world the scales of oil extraction and processing

ncreases, which causes a danger of environment pollution. Therefore, the measu

methods applied for removal of oil and oil products from the water surface. The most Studies were conducted on the selection of natural mineral sorbents. Natural sorbents have advantages over synthetic sorbents: cheapness widely spread among them is an absorption method. Non-organic sobrents sink into accessibility. However, in terms of efficiency, purity, and uniformity, natural sorbents lag behind synthetic sorbents. At the initial stage, a natural sorbent was chosen - zeolite, which is resistant to aggressive media (acids) and at the same time is thermally stable, which is an important factor in relation to export parameters. Research work was carried out to study the conditions of chemical modification of natural zeolites and to determine optimal conditions. Chemical modification was carried out to increase and activate the size of the zeolite pores. Optimal conditions of chemical nodification of zeolite (temperature, time, concentration of solutions and ratio of components) were determined. Various methods of chemical modification have been established - in particular, with the help of acids, ammonium chloride (NH4Cl), potassium chloride (KCl) and other substances. Experiments on thermal modification of diatomite were carried out. To obtain polymer compositions, mixed oligomers of urea will enable us to solve the above-mentioned problems. The proposed project enables formaldehyde, melamine-formaldehyde and urea-melamine-formaldehyde were synthesized, which are promising materials for their use as matrices in compositions. It was found that the properties of the formed porous hybrid polymer are greatly influenced by the ratio of the amide er to the diatomite and the reaction area. Studies show that porous composites have much higher sorption properties than natural and modified diatomites. Porous hybrid polymers based on a carbamide-formaldehyde oligomer and a natural sorbent perlite have been synthesized. The polymer, the regulation of which allows obtaining materials with specified created. These polymers will have floatability together with absorbed substances and influence of the zeolite mass fraction, temperature, air flow intensity, p reaction and oligomer concentration on the formation of a porous hybrid polymer has been studied. The content of natural sorbent in the polymer composition improves the thermal insulation properties of the resulting hybrid porous polymers. The sorption process of mixed porous amide-type polymers and the effect of the content of natural sorbents on their ties have been studied. The study showed that the degree of sorption of the obtained new types of porous hybrid materials is quite high (the degree of sorption within 5 hours in some cases exceeds 80%). The uniqueness of the results lies in the fact that for the first time it became possible to use natural sorbents to obtain new types of porous hybrid polymer materials, which are characterized by cheapness, high physico-mechanical and dielectric properties, selectivity, high sorption capacity, heat and sound insulation properties. Natural unmodified clinoptilolite was used to study the process of structuring carbamide in zeolite pores. According to the grain size, six fractions were identified, from which one fraction with a grain size of 2 mm was selected. The secondary pores of clinoptilolite were saturated with carbamide, the content of which in the pores was 5, 10, 15, 20 and 22%. To study the process of urea structuring in zeolite pores, a sample containing 22% urea was selected. It was found that urea is completely washed out of the pores when treated with water from saturated zeolite. The degree of crosslinking of polymer molecules is low, or macromolecules are not structuring of urea in the pores was carried out by heat treatment without a catalyst and its use. Polymerized aldehyde-paraform was used as the second component. Their molar ratio was 1:0.8; 1:1; 1:1,2; 1:1,5; 1:1,8 and 1:2 respectively. When carrying out the structuring process without a catalyst, the degree of polycondensation of urea is very low. Under these conditions, there is practically no structuring of urea and when samples are treated with water, the urea is almost completely washed out of the pores. With the same ratio of the initial comp catalyst, the polycondensation process proceeds energetically, with a ratio of the initial components from 1:0.8 to 1:1, low-molecular oligomers are reaches upper strata of the atmosphere it results its destruction and heavy ecological formed, which are almost completely washed out of the pores during water treatment. With an increase in the molar fraction of the aldehyde nent in the initial mixture at the first stage, the resulting oligomers undergo further transformation and a structured carbamide is obtained The higher the content of the aldehyde component in the initial mixture, the higher the quality of structuring. With a low content of the aldehyde ent, the formed macromolecules are interconnected by rare bonds and practically form linear macromolecules. With an increase in the application of mineral nitrogenous fertilizers into soil by means of drastic decrease of aldehyde content, the degree of crosslinking of macromolecules increases, and when the molar fraction of the aldehyde component is 1.5 – 2 moles, the linear structure of urea is studied at the following molar ratio of the initial is solubility in soil. The submitted Project pursues creation of such technology by a structured product is formed that practically does not dissolve in water. Under the action of various enzymes in the soil, they gradually turn into a components - urea and aldehydes - the main components: 1.0.8; 1.0.9; 1:1; 1:1,1 means of creation of multi-component pellet compositions, which contain nitrogen-soluble form, assimilated by the plant, which causes the prolonged effect of the fertilizer. Due to the large size of the resulting macromolecules, fixing bacteria and structured nitrogenous fertilizer, as well as zeolite, in the pores of structured urea cannot be washed out of the pores under the action of water, which is a necessary factor to achieve the prolongation effect Structuring is carried out under conditions 135–1550C, the reaction duration is 1 - 1.5 hours. The structuring of carbamide in the alloy was carried in an alloy during the interaction of urea and an aldehyde component favorable medium for propagation of bacteria. Thus we achieve prolongation effect out. When the molar ratio of the carbamide and aldehyde components in the initial mixture is 1: 1.2 - 1.5, its structuring occurs as a result of heat paraform is studied. The molar ratio of the carbamide and the aldehyde treatment. When it exceeds 1.5 mol, the degree of crosslinking of macromolecules is very high, which makes it difficult for various enzymes to jointly with this effect, will enable us to decrease the norm of nitrogenous fertilizers penetrate, and the degradation of the structured polymer requires a long time, which significantly exceeds the growing season of the plant. The use per ha by 50% and more. Thanks to this technology nutrients are delivered to plants of such a long-acting fertilizer is impractical for grain crops. A number of strains of free-living nitrogen-fixing microorganisms have been isolated from the soil. A laboratory technology for producing dry biomass from them has been developed. The amount of structural urea, which is optimal soil. For Project implementation it is necessary to resolve the below listed objectives: for the immobilization of the dried biomass of nitrogen-fixing microorganisms, was revealed, and their optimal ratio in the complex of structured 1. Isolation of nitrogen-fixing bacteria from the medium of various culture, selection urea and nitrogen-fixing bacteria was determined. Field tests were conducted in the conditions of Mukhran-saguramo, according to a scheme of nine variants with a four-fold repetition. The tests were carried out on winter wheat of the ufho-1 variety. The phases of plant development have Increases in agricultural production and the maintenance of high crop yields are possible only through the applications of fertilizers. In such technologies, soluble fertilizers (mostly nitrogen-based) are applied in large concentrations, significant proportions of which are lost to the ment through leaching. Such pollution adversely affects ecosystems, including the health of humans and animals, and wastes re Therefore fertilizers technologies need to be developed that are environmentally friendly and conservative. Our objective is to develop fertilizers that contain natural sorbents (zeolites) and polymerized nitrogen (carbamide) that will release nutrients to plants in a controlled manner, thereby preventing losses due to leaching. This project proposes to develop a new type fertilizer that does not pollute because it is not readily soluble. In this that of structuring in zeolite pores will be developed for the first time: fertilizers technology, nutrients are made available to plants as they are required by plants through the buffering effect of a chemical reaction that occurs in the soil. The major plants nutrients (NPK) are released through an jon exchange reactions in which an ammonium- and potassium-containing exchanger (natural zeolite) is mixed with phosphate rock. Calcium ions from the phosphate rock travel through soil solutions and are sequestered in been selected and described for obtaining of exchangeable fertilizers; 4. The zeolite exchange sites, thereby releasing potassium and ammonium cations from the zeolite, and phosphate from the phosphate rock, for uptake by introduction of carbamide into secondary pores of the zeolite was carried out and profitable fertilizers is crucial to our livelihood. The present Project will develope plants. As these NPK nutrients are used by plants, more are released to the soil solutions through the buffering reactions. Because the exchange capacity of zeolite is limited to about 2,5% nitrogen by weight, additional slow-release nitrogen is added to the system by sequestering nitrogen rs (variously polymerized carbamide) in zeolite rock pores. The different natural zeolites of sedimentation origin have been obtained. The chemical, X-ray and IR analysis has been done. The method of ionic modification of natural zeolites has been developed. The degree of substitution of exchangeable ions of zeolite (Na. K and Ca) by modified ions (NH4+) has been determined. The introduction of carbamide into second notes of NH4-form of zeolites (Clinoptilolite, analcime and laomonite) has been studied. The saturation of pores of zeolite was carried out with a mixture sisting of carbamide and paraform at the different ratio. The structuring process was carrying out at different temperatures and during different time. After expiration of the proper time the structuring process was interrupted by the rapid cooling of reactionary mass. After treatment of satterns with water carbamide was washed from the pores of zeolite. In this case, the amount of the taken aldehyde component is sufficient for formation of the structured product with comparatively rare cross-links. The plant (wheat) development was studied in laboratory and fields conditions, at application of exchange fertilizer, consisting of Ka-substituted zeolites, unstructured carbamide and phosphate of calcium in soil. At the same time an exchange fertilizer on the basis of structured carbamide was inserted in soil. The study showed that the unstructured carbamide was not found in the soil after 14 days. This fact indicates that unstructured carbamide is washed from the soil and a plant has no time to assimilate it. For the receipt of multi-component drop the synthetic oligomer (aminoaldehyde type) - carbamide-formaldehyde oligomer was used. It was obtained at initial ratio: 1:2 of components - carbamide and formaldehyde. Influence of amount of oligomer has been studied and the optimum terms of drop formation have been set. We continue study for the receipt of multi-components compositions, containing in zeolite framework

Results: 1. It has been established that thermally (heating 7000C) and chemically (organosilicon compounds) modified perlite in a polymer composition significantly improves the properties of a porous polymer density, buoyancy, sorption properties, etc. 2. Experiments on thermal modification of diatomite were carried out: thermal modification of diatomite occurs within 3 hours 250, 300, 400, 450, 500, 550, 600, 700 and 10000C. 3. To obtain polymer compositions, mixed oligomers of urea-formaldehyd melamine-formaldehyde and urea-melamine-formaldehyde were synthesized which are promising materials for their use as matrices in compositions. The synthesis of oligomers is mainly carried out in an aqueous solution based on an amide component and formaldehyde, 3. Amide oligomers are also obtained by polycondensation in nalgobe, the components of the solution in the molar ratio (carbamide: aldehyde) 1:1, respectively, at 1000C, the reaction duration is 1 hour. 4. The obtained results allow us to conclude that the optimal mass ratio of diatomite and amidoaldehyde oligomer to obtain an effective material is 0.3:0.7, respectively, 5. The influence of pH on the formation of a hybrid properties, has been studied. 6. Composite porous polymers with different percentages of both natural and modified perlite were obtained. It is estimated that the optimal percentage of perlite content is 30-40%. 7. Sorption properties of samples of porous polymers of mixed amide type are investigated. 8. Samples of porous polymer were obtained with different percentages of diatomite - 20 25, 30 and 40%. The best option is the diatomite content of 25%. 9. The desorption process has been studied on the example of oil fractions. 1. The process of structuring/structuring/ carbannue in the pores of zeome (lomontite) has been studied. In order to facilitate the penetration of various enzymes into polymerized urea, linear polymers were synthesized in which the ompletely crosslinking. A high effect can be achieved with a certain molar ratio of the initial components. 2. The structuring of urea in the pores was carried out by heat treatment without a catalyst and its use. Polymerized aldehyde-paraform was used as the second component. The higher the content of the aldehyde component in the initial mixture, the higher the quality of structuring. With a low content of the aldehyde component, the resulting macromolecules are interconnected by rare bonds and practically form linea macromolecules. Structuring is carried out under conditions 135-155°C, the reaction duration is 1 - 1.5 hours, 3. The process of formation of a polymer of and 1:1.2, respectively. The duration of the process is from 0.5 to 6 hours. The reaction temperature is 60, 70, 80, 90, 100°C. 4. The process of structuring urea component is as follows: 1:0,5; 1:0,6; 1:0,8; 1:1; 1:1,2, accordingly. When the molar ratio of the carbamide and aldehyde component in the initial mixture i 1: 1.2 - 1.5, it undergoes structuring as a result of heat treatment. When it is above 1.5 mol, the degree of crosslinking of macromolecules is very high, which makes it difficult for various enzymes to penetrate, and the degradation of the structured polymer requires a long time, which significantly exceeds the growing season of the plant. 5. Lysimetric studies were carried out, the conten Scientific results: 1. Nitrogen-fixing bacteria will be used for the first time in multi-component compositions. 2. Natural sorbents -zeolites will be used in compositions for the first time. Three types of natural zeolites: clinoptilolite analcime and laumontite - have been selected and described for obtaining of exchangeable fertilizers; Technology of incorporation of nitrogen fertilizers and acting according to the prolonged/controlled mechanism will be prepared. 3. Three types of natural zeolites: clinoptilolite, analcime and laumontite - have for the first time. It was established that 20-25% of carbamide can bring in the pores of the zeolite: 5. The process of interaction between carbamide an aldehyde component in the melt and the regularities of this interaction wa study; 6. The regularities of the reaction of structuring of oligomers were studied. The influence of various factors - temperature, duration, ratio of initia components, catalyst, etc. were studied; 7. The main kinetic parameters of the process of structuring of oligomers were determined. The IR spectroscopic study of conversion of oligomers was carried out. 8. The mechanism of reaction of formation and structuring of oligomers was established; 9. The pelleting of multi-component composition of the exchange fertilizer of prolonged action consisting of a structured carbamide, potash fertilizers, non modified natural phosphate (apatite) and trace elements was carry out and the influence on the formation of drops of different factors: pressure, endurance, weight and content of the composition was investigated: 10. The optimal mode of getting of pelleting compositions containing pills in the wheat grain was established; 11. Prepared and planted winter wheat region, to study the

Extraction of oil and Georgian antioxidants from wine M.Tsitsagi, M.Chkhaidze National Giorgi grape seeds using scientific Science 1.03.2009 I.Jinikashvili, M.Khachidze, GNSF/ST08/5-434 supercritical fluids 94746 GEL 31.03.2011 Kvatskhava K.Ebralidze, B.Arziani mites and scale insects. Arrangements Against of Main Pests and Diseases of Georgian Vine, Their Testing and Fundamental National A Dolidze, I. Tskhvedadze Field Employment in Research Science 01.03.2009 -I.Mikadze, L.Shubitidze, CNSF/STO8/8-516 Georgia 97 650 CFI 01 03 2011 Dolidze State Grants Foundaiton O Lomtadae I Taralashvili

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Protection of Atmospheric scientific

Ontimal conditions of supercritical fluid exaction of oil and analysis, extraction of polyphenolic compounds and analysis from 4 Georgian wine grape seeds and skin (Rkatsiteli, Saperavi, Aladasturi, Isabela)have been studed within the framework of

According to the World Health Organization, up to a million tons of 900 types of pesticides are consumed annually in the world. This is followed by their accumulation in the environment, changes in the chemical composition of the $biosphere\ and\ other\ environmentally\ dangerous\ changes.\ Unfortunately,\ Georgia\ is \quad decreased.$ no exception in this respect. Thus, it is essential to develop and use environment friendly or less dangerous insecticidal and fungicidal agents to protect strategically important crops for Georgia, in particular grapes, from pests and diseases At the same time, our country has raw materials of plant origin - essential oils, the components of which can be used for the synthesis of various biologically active substances, including environmentally friendly and cost-effective pheromones Pheromones make it possible to drastically reduce the amount and volume of spraying with pesticides, as well as the environmental burden on the environm At the same time, resistance to the action of these drugs does not develop and its effectiveness does not decrease over the years. The main pests of vineyards in Georgia are mites and scale insects. Against them, a

combination of commercially available preparations (Neoron, Envidor, etc.) with turpentine oil (a product of processing resin and needles pine) which causes activation and prolongation of the insect-acaricidal action of compositions against

Premature leaf pigmentation is also a problem for the growth and development of the grape vine, which is probably caused by unbalanced plant nutrition, in particular, a lack of trace elements, including magnesium and iron. That is why it is a preparations with micronutrients into the root system that strengthens the made on the basis of peat or charcoal.

environment and raises a question of sanitary condition of atmosphere in big cities and surrounding territories of large industrial centers. Amount of harmful exhausts in the atmosphere is increasing constantly and concentrations of certain components in the atmosphere greatly exceed their thresholds. In spite of the fact that there are a lot of methods of exhaust gases purification from 6 - Cleaning of gases emitted from objects by means of a selected sample. harmful components, choosing a rational method is getting more and more actual. Natural sorbents, zeolites, are less studied for this purpose. They are characterized by relatively high selectivity against air pollutants. The above sorbents are highly acid-resisted and thermo-stable substances, that enables us to purify gases containing such aggressive admixtures as CO2, H2S, SO2, NH3, NxOy and others. According from the above, we consider it reasonable to study adsorptive properties of natural zeolites of Georgian origin and their modified forms towards nitrogen, sulfur, carbon oxides and other air pollutants.

The experiments will be carried out in the dynamic conditions on the specially Rubashvili Imeda, Zautashvili designed device. The following methods of analyses, chromatographic, X-ray

To establish the maximum possible yield of oil from Georgian grape seeds, control experiments were carried out by the Soxhlet and SC-CO2 During the SC-CO2 extraction, the temperature varied within 40-70oC, the equilibrium pressure from 150 to 300 atmospheres, the time from 15 to 60 minutes, the dynamic pressure from 250 to 300 atmospheres, and the time from 120 to 240 minutes. The maximum oil yield occurs at a dynamic pressure of 300 atmospheres

The highest content of oil is revealed for seeds of red grapes of the Saperavi variety, the lowest - for the seeds of red grapes of the Aladasturi variety The obtained oil has a greenish-yellow color and a pleasant aroma. d20=928±1 kg/m3 The refractive index nd20 measured at λ=589 nm and standard temperature varies from 1.4723 and 1.4726, and is typical for vegetable oils. Aladasturi variety has the largest iodine (up to 144 g/100g) and acid (up to 4.1 mg/g) numbers, other samples are typical for vegetable oils indicators of unsaturation (126 - 131 g/100g) and the num carboxylic acid groups (1.67 - 1.91 mg/g). According to the saponification value as a measure of the average molecular weight, the oil isolated from grape seeds of the Rkatsiteli variety is characterized by long chain fatty acids

The extraction of phenolic antioxidants from the seeds of Georgian red grape varieties Saperavi and Aladasturi was performed using methanol. ethanol and mixture of ethanol to water 1:1 as solvents and under various conditions. SFE was carried out using CO2 - ethanol - water mixtures as solvents. The highest phenol yields (mg/g GAE) obtained under the one hour static extraction at 60-65oC and 150 atm, followed by 300 atm at a flow rate 2 mL/min during 2 hr. The method is effective for samples with a relatively low content of phenols.

In another series of experiments the recovery of polyphenols from the Saperavi SC-CO2-deoiled grape seeds was carried out using SC-CO2 modified with ethanol-water mixture (40%), varying temperature and extraction time. The maximum polyphenol yield, 285 mg/g GAE, was reached at the ethanol/water ratio 2:1, extraction time of 60 minute and temperature of 80oC.

The effect of pressure on the recovery of anthocyanins at a constant temperature is a function of amount of SC-CO2. The solubility of target analytes increased with increase of pressure. The content of total antocyanins decreases at the higher extraction temperature at a constant pressure also the recovery of target compounds increases with increase of the extraction time at a constant temperature as well. The use of co-solvent ethanol/water (50:50 v/v) at pH 4 increases the recovery of antocyanins

As a result of the combined use of biological and chemical means of pest control, and specifically, the use of chemicals, according to the data of trapping grape moth butterflies with pheromone traps (in the areas of Dedoflistskaro, Telavi, Sagarejo, Kvareli, Gurjaani, Akhmeta, Tetritskaro, Mtskhetia, Gori and Zestafoni), the number the pest has been significantly reduced. As a result, the spread of grape rot has also significantly

entally In early spring, at the experimental base of the Institute of Viticulture and Winemaking (Vachevi village, Zestaponi district), before the start of the growing season, the grapes were sprayed and washed with the vines of the Tsitska and Tsolikouri varieties with an oil-emulsion preparation of a new prescription composition against the wintering stage of pseudo scale insects (powdery and cushion). Trinol-2, introduced into production, was taken as a standard. The result is satisfactory: the overwintered phase is destroyed by 98-99%, the new oil-emulsion preparation did not show phytotoxicity on the vines. The mortality rate of false scale insects on the standard was 90-92%.

At the Vachevi experimental base, the Antipest insect-acaricidal preparation, developed at the Institute of Physical and Organic Chemistry, was also tested against false scales in the periodvegetation of grapes (varieties Tsolikouri and Tsitska) and the fungicide "Zinc dihydrogen phosphate" against gray and black rot (variety Krakhuna). According to the accounting carried out by variants, in the case of "Antipest", the mortality in the perimental variant is 80.0 - 82.0%, while in the control variant, mortality was not observed. In the case of "Zinc Dihydrogen Phosphate" - the spread of black rot in the variants of the experiment is 3.8-4.3%; gray rot - 3.4-5.7%; And on the control spread of black rot - 22.8-38.5%, gray rot 17.4-20.6%. Phytotoxicity on the plant after the application of the test preparations was not observed.

counting and monitoring data carried out at the Akura experimental base (Telavsky district) showed that the use of humic liquid fertilize "Humafid", enriched with microelements, significantly contributed to the growth and development of grapes and increased resistance to diseases (powdery mildew, ash). It should be noted that after treatment with liquid fertilizers, the drought resistance of the vines increased, despite the rolonged drought and high temperature (38 - 40 ° C) in the summer of 2010, the experimental vines looked better compared to the control, there was no wilting of the leaves, drying out and wilting of the grains. It should be noted that the use of "Humafid" in the preparation of combined nixtures (Envidor + Gumafid), (Humafid + Antipest) in preparations against pests and diseases, the mutual compatibility of liquid fertilizers and insect-acaricides did not cause their separation, heterogeneity of the working solution and phytotoxicity (burning) green organs of grapes. Spraying, and Organic Chemistry. Petre Melikishvili can be used to develop a rational necessary to strengthen overwintered and therefore weakened vines by introducing with combined mixtures made it possible to reduce the cost of plant protection operations.

The results of laboratory analyzes show that the plant protection products used do not adversely affect the chemical composition of grape juice and become a real prerequisite for harvesting a high-quality grape harvest and, une system and helps increase the yield. Such chelating type preparations can be wine materials, which is important. In addition, there are no traces of used preraats in grape juice and wine materials

The aim of the project was to study the adsorption-absorption properties of some natural zeolites and their modified forms in relation to nitrogen

The following tasks were set for the implementation of the project:

- 1 Natural zeolites of Georgia: Analcim (Kutaisi, Gelati); Clinoptilolite (K. Kaspi, Khandak); Phillipsit (city Lanchkhuti, Shukhuti): Mordenite (city Bolnisi, Ratevan) search, determination of their zeolitic phase content, mineralogical and chemical composition, approximate composition of the elementary cell; Preparation of modified forms of the mentioned natural zeolites with Na, K, Ca, H and Cu cations. Determination of their cationic
- 2 reception of polluting aggressive gases and graduated mixture; Study of the sorption properties of natural zeolites and their modified forms on Nowadays, mankind is justly concerned about the process of global pollution of the the example of model mixtures of aggressive gases using the gas-adsorption chromatography method.
 - 3 Development of quantitative chromatographic analysis methodology for controlling the concentration of aggressive gases
 - 4 study of the adsorption properties of natural zeolites and their modified forms on a specially constructed laboratory flow type dynamic device;
 - Study of the effect of grain size and adsorption temperature of selected zeolite samples on the example of model mixtures under dynamic conditions.
 - 5 selection of conditions and method of regeneration of zeolites saturated with aggressive gases.
 - The achieved results are:
 - 1) mordenite was selected from the natural zeolites of Georgia to perform the works envisaged by the grant based on the study of their sorption
 - 2) to study the sorption properties of zeolites by the chromatographic method, a graduated model mixture of aggressive gases was prepared by a relatively simple static method;
 - 3) the method of quantitative chromatographic analysis was developed to control the concentration of aggressive gases;
 - 4) The possibility of using hydrogen form of natural mordenite in the process of cleaning air containing a mixture of nitrogen oxides (N2O or NO2) on a laboratory flow-type device under dynamic conditions was studied. The prospective and cost-effectiveness of using the mentioned zeolite in the cleaning processes of nitrous gases from the dispersed gases has been determined (it does not lose its sorption activity during repeated use in dsorption-desorption processes)
 - tural, thermogravimetrical, chemical and others will be used to implement the 5) on the basis of the work carried out and the obtained results, the project staff proposes an approximate principle scheme of the technological process of cleaning nitrogen oxides scattered in the air;

2 Article, Laboratory regulation

Pheromones of grape pests (grape worm, oriental codling moth), prepared according to a new synthesis scheme, pheromone traps for insects of a new design, insect-acaricidal, fungicidal and nutritional compositions, environmentally safe and with a low environmental load ("Antipest", "Zinc dihydrophosphate", "Humafid") obtained and made at the Institute of Physical scheme for an integrated pest and disease control system for grapes, which will accordingly, for the production of wine materials that meet international etandarde

Approximate principle scheme of the technological process of purification of nitrogen oxides dispersed in the air; 2 Scientific Articles

Modern intensive agriculture uses enhanced dozes of chemical fertilizers containing. Modern intensive agriculture uses enhanced dozes of chemical fertilizers containing soluble and concentrated plant nutrients. Regular applications. 1.The technology was developed for production of polymerized carbamide of soluble and concentrated plant nutrients. Regular applications of such fertilizers may have long-term, adverse impacts in soil and environment. They may induce imbalances in nutrients supplied to plants, thereby badly affecting the health of humans and animals. Increase of costs for non-renewable energy have also led to to solve these problems by the further development of a radically different type of fertilizer named "exchange fertilizer". The following works were carried out within the grant project:1. Study of carbamide's structuring process under temperature 90 100 110 120 125 130 135 140 145 150 1550C and duration of process 1,2,3,5,7,9,12,15 and 20 min, 2. Study of carbamide's structuring process under temperature 90.100, 110, 120, 125, 130, 135, 140, 145, 150, 1550C and duration of process 1,2,3,5,7,9,12,15 and 20 min. 3. Study of the influence of the degree of urea structuring on the ability and rate of dissolution in the soil. 4. Elaboration of technology for production of pelleted-capsulated compositions of structured carbamide and wheat seeding materials in laboratorial pelleting machine under Dokhturishvili Nora different percentage content of structured carbamide and other components, 5 Maisuradze Nunu, Gelashvili Investigation and synthesis of fixatores for pelleting. Elaboration of one stage pelleting process and composition encapsulating. Cold setting of a pellet under Nazi Panaya Giyi Panaya Ketevan, Gavashelidze Eter various catalysts (AI CI3, SnCI2, NH4CI, NH4NO3, H3PO4 Approbation of Razmadze Giuli, Gugava Eldar, molasses, starch (2,5, 5, 7, 10% solutions). 6. Development of technology for New Generation of Liparteliani Riva, Ebralidze production of a composite of the prolonged action containing structured nitric and prolonged action Internationa Ketevan Khotenashvili composite fertilizers for Science and Napuli Tabukashvili Zurab protection of environmen Technology 170 730 01.10.2008- Marina Molodinashvili Zaza. structured carbamide formation. 7. Development of complex multi-component rom pollution Center ISTC USD Gurgenishvili Chitrekashvili Ia The increase in agricultural productivity is still carried out using intensiv pollution of the environment (soil, water, atmosphere). At present, real and sium (NPK) in the melt, the alternative system proposed by us and the Majeuradze Nunu possibility of its targeted management ensure the extension of the fertilizer Dokhturishvili Nora USA Civil Gogaladze Maia. Chitrekashvili Ia, Gavashelidze the way they are applied, practically eliminates the possibility of fertilizer leaching Research Research and GEX - 1004020 trollable prolonge 01 04 2006 Eter, Ebralidze Ketevan, Papaya Shalya significantly increases yields ction fortilizer Centre 35 000 USD 31 03 2007 Givi Papaya New generation hydrophosphate N Jahishvili N Klarieishvili composition of Fe(II). State National I.Karalashvili, I.Javashvili Ca(II), Mg(II)against the scientific S.Urotadze, N.Endeladze Science fungi diseases of plant 80 000 GEL 09.03.2012 In connection with the country's independence and the transition to a market

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Parasitic mites and their

GNST/ST07/R-272 control in Georgia

of such fertilizers may have long-term, adverse impacts in soil and environment. They may induce imbalances in nutrients supplied to plants, thereby badly affecting the health of humans and animals. Increase of costs for non-renewable energy have also led to concern about the rising cost temperatures of 65-1000C, with a molar ratio of urea and aldehyde componen of fertilizer in the modern food production. We propose to solve these problems by the further development of a radically different type of fertilizer 1: 1.1-1.3. The optimal mode of coating compositions consisting of structured named "exchange fertilizer". The following works were carried out within the grant project: 1. Study of carbamide's structuring process under concern about the rising cost of fertilizer in the modern food production. We propose temperature 90,100, 110, 120, 125, 130, 135, 140, 145, 150, 1550C, and duration of process 1,2,3,5,7,9,12,15 and 20 min, 2, Study of carbamide's structuring process under temperature 90,100, 110, 120, 125, 130, 135, 140, 145, 150, 1550C and duration of process 1,2,3,5,7,9,12,15 and 20 min. 3. Study of the influence of the degree of urea structuring on the ability and rate of dissolution in the soil. 4. Elaboration of technology for production of pelleted-capsulated compositions of structured carbamide and wheat seeding materials in laboratorial pelleting machine under different percentage content of structured carbamide and other components. 5. Investigation and synthesis of fixatores for pelleting. Elaboration of one stage pelleting process and composition encapsulating. Cold setting of a pellet under various catalysts (AI CI3, SnCI2, NH4CI, NH4NO3, H3PO4 Approbation of molasses, starch (2,5, 5, 7, 10% solutions). 6. Development of technology for production of a composite of the prolonged action containing structured nitric and potassium fertilizer. Production of composite in melt under various mass content of potassium fertilizer, under conditions of fixed optimal temperature and duration of structured carbamide formation. 7. Development of complex multi-component fertilizer of prolonged action on the base of natural phosphates, structured nitric and potassium fertilizers by joint pelleting of obtained in melt composite consisting of structured carbamide and potassium fertilizer and natural phosphate calcium, taken into account agro norms of ents (completed and reduced by 20,30,50 and 60%). 8. Laboratorial and field tests of multi-component pelleted encapsulated compo and pelleted fertilizer of the prolonged action. Study of plants phonological phase through maintaining of full agro-technical and reduced (until 70,60,50, and 30 mass.%) norms. In modern conditions, it is of particular importance to reduce the norms of nitrogen fertilizers per hectare, while maintaining high yields. The technology of grazing and encapsulation of grain crops developed by us allows to increase the yield and, mos importantly, the norm for 1 ha of nitrogen fertilizers adopted by agrotechnics is reduced by 45-56%, due to which the level of leaching and olatilization of nitrogen fertilizers sharply decreases, the coefficient of nitrogen assimilation by plants increases by 10-12%. A one-time passage potassium fertilizer. Production of composite in melt under various mass content of the unit is carried out both sowing and fertilizing the soil. No additional top dressing is required, which contributes to the preservation of the soil potassium fertilizer, under conditions of fixed optimal temperature and duration of structure. The exclusion of these operations reduces the need for labor, the consumption of fuels and lubricants is reduced, the drainedencapsulated grain is protected from the effects of excess moisture in the soil (which eliminates the rotting of grain), the negative effects of disease fertilizer of prolonged action on the base of natural phosphates, structured nitric and and the action of pests. Due to this, the field similarity indicators for wheat increase by 15.5% and barley by 13.8%. The plant is provided

Nitrogen fertilizers of prolonged action based on carbamide and zeolite are obtained by introducing carbamide and aldehyde into the pores of the

zeolite. At the first stage, on the basis of polymerization and polycondensation reactions occurring in the pores, an oligomer is formed, which is

crosslinking and solubility depend on the initial molar ratio of carbamide and aldehyde and can be regulated. Universal fertilizers containing NPK

obtaining a 2-component fertilizer consisting of structured nitrogen and potash fertilizers has been developed. Structuring of nitrogen fertilizer

carbamide was carried out at 135 and 155°C in the alloy. To obtain fertilizer composites containing potassium and nitrogen, the process is carried

prepared, which contain structured carbamide, provided for by agrotechnics full and half norms. A dragge was also made from the resulting alloy

As a result of the action of the ammonium group and the released potassium during the exchange reactions, the potassium and ammonium groups

ammonium and potassium was also used, which is also involved in exchange reactions with phosphate. The multicomponent fertilizer containing

NPK was made in the form of a dragee, which was introduced into the soil together with the grain. The mass of fertilizers necessary for grain

nutrition is 3-4 times higher than the mass of the grain itself, so it was considered advisable to introduce them into the soil simultaneously, but

The goal of the project is to obtain an environmentally friendly phosphate fungicide. To this end, the following studies were carried out within the framework of the project. Thechnological process has been developed to obtain water soluble iron, calcium and magnesium hydrophosphates . In technological processes, the Skreinemaker solubility method was used. The fungicidal and bactericidal properties of iron, calcium and magnesiun

hydrophosphates, on the basis of which a phosphate fungicide was obtained, were studied. Laboratory studies were carried out to determine the

technology of preparation, low self-cost, high efficiency to plant diseases

proven that the drug, on the skin, retains its acaricidal effect on ticks for a long time.

effect of aqueous solutions of phosphate fungicides on grape powdery mildew spores. Field tests have been carried out, according to the results of

these studies, it is possible to use phosphorus fungicides in agriculture to protect against plant diseases. Competitive advantages: Non-toxicity, similar

then structured and a product that is difficult to dissolve in water is formed. The length of the oligomer molecules, the frequency of their

are multi-component fertilizers of prolonged action, which simultaneously contain nitrogen, potassium and phosphorus. The technology of

out by heating carbamide and potassium salt. Upon completion of the structuring process, a homogeneous alloy is formed, which contains

structured urea with potassium salt dissolved in it. Optimal conditions were established and drained compositions of wheat seed material were

are replaced in the phosphate and converted into a soluble state. This process proceeds by a prolonged mechanism. Zeolite substituted with

linear structure. It is established that polymerization should be carried out at urea and trace elements is established - The influence of various factors on the formation of dragges has been studied; pressure, exposure, mass, composition of compositions. 2. The optimal concentration of the fixative – molasses for draining has been established. 3. A technology has been developed to produce multicomponent fertilizer based on a melt consisting of structured carbamide and potassium fertilizer and unmodified natural phosphate (apatite). 4. The optimal mode of draining a mixture of grain and a composition consisting of structured carbamide and trace elements has been established. 5. The optimal mode of draining a mixture of grain and a composition consisting of structured carbamide and trace elements has been established. 6. A technology has been developed for the production of multicomponent exchange fertilizers of prolonged action containing natural tri-substituted calcium phosphate, potassium sulfate, structured carbamide and trace elements, 7. The optimal mode of draining the composition is set. 8. Research work on the development of technology for obtaining a drained composition based on nitrogen fertilizer of prolonged action by compression pressing has been completed. 9. A site has been processed and prepared for field testing, for studying the phenological phase of plant development, using an exchange multicomponent fertilizer of prolonged action, 10. For the first time, the structuring of carbamide in the melt was carried out. 11. The process of interaction of carbamide and aldehyde component in the melt has been studied and the regularities of this interaction have been studied. 12. The regularities of the reaction of the formation of

New types of long-acting universal fertilizers containing nitrogen, phosphorus and potassium (NPK) have been obtained. Technologies have been developed for the production of graded encapsulated compositions of seed material of the main grain crops (wheat, barley, rye, treticale) based on natural sorbents of cellulose and structured carbamide. Based on the action of enzymes present in solution and provide dosed nutrition of seeds in accordance with the growing season and, thus, protect the environment from pollution. 1. Obtained: a)structured carbamide; b)-structured carbamide and potassium; c) - structured compounds containing carbamide, potassium and phosphorus. 2. The compositions were prepared in the form of pills, which contained half and whole norms of fertilizers provided for by agricultural technology. 3. Multicomponent compositions have been obtained, which in addition to NPK also contain other trace elements: boron, manganese, zinc and others. 4. Trace elements were introduced into the composition during the structuring of compositions of wheat, rve, barley, triticale were made in accordance with agrotechnical standards 6. Polyvinyl alcohol and technical starch were used to produce dragees, 7. In total, 120 different variants of germination in the thermostat were produced in laboratory conditions. 8. Some samples were placed in a polymer capsule, i.e. encapsulation was performed. A 5% polystyrene solution was used for encapsulation.

The technological process has been developed to obtain water soluble iron

were carried out in several villages of both zones (cattle 1809, sheep and goats - 507, dogs - 18). At the same time, the study of the quality of biting and tick bite of cattle began. Determination of the distribution area of parasites, taking into account climatic and geographical conditions. A morphological study of ticks was carried out in order to determine their species The study of the biology of parasitic mites of the Ixodidae family makes it possible to correctly determine the measures to combat them. Therefore friendly and has a much lower cost, which is very important from an economic point parasitic mites (3132 individuals, 2460 adults, 315 pupae, 357 nymphs) were collected both from animal skins and from cattle stalls (18 stalls), their environs and pastures. 9 species of parasitic mites (Haem punctata, Haem suleata, Haem otophila, H. morginatum, H. anatolicum, B. calecarotus During the implementation of the grant project, work was carried out on threemain Rh. sanguinolis, Rh. bursa, I. ricinus) from 5 genera (Hoemaphsolis, Hyalomma, Ixodidae, Rhipicepholus, Boophilis) have been identified. It was very important to study the effect of the acaricidal preparation "Agiometrin" developed by us on ticks and its distribution in tissues, organs and milk of animals, 3, 24 and 72 hours after cantamination animal skin with preparation. According to the results of the study, the accum

Two disadvantaged zones for contagious animal diseases were selected (Kakheti and Kvemo Kartli). Clinical examinations of cattle and small catt

hairline of the skin, where the amount of cypermethrin residue was 0.004±0.001 mg/kg. These data are very important for us, since it has been In different climatic and geographical zones of Georgia, taking into account the time Hematological studies conducted on rabbits showed that the activity of cholinesterase in the blood decreased slightly (by 12-18%) 3 hours after ination of the skin of rabbits with the Agiometrin preparation. There is a slight decrease in hemoglobin, a decrease in the number of erythrocytes and leukocytes. These indicators return to the original norm 72 hours after exposure to the drug on the skin, without any intoxication developed within the framework of the grant, were reviewed and approved by of the experimental animals

of the drug in the tissues and organs of the studied animals does not occur. No traces of preparations were found in milk. The exception was the

The conducted studies showed that all developed forms of anti-tick preparations (powder, lilyumant, emulsion) are characterized by an acute acaricidal effect, well-fed female ticks of the Ixodidae family died 5-7 days after exposure to the drug, hungry adults, nymphs and pupae after 42-48 hours, and in well-fed and hungry individuals, convulsive seizures began 10-20 minutes after can

the soil and the metabolic reactions occurring there, they gradually pass into which was tested in laboratory conditions. To obtain a complex fertilizer, a prototype of natural apatite - calcium phosphate was synthesized in the carbamide, the molar ratio of carbamide and aldehyde during synthesis was laboratory. Under the action of enzymes, the structured urea is transformed / transformed / during which the formation of ammonium salts occurs. 1:1.5, respectively. 5. On the basis of the obtained compositions, drained

> calcium and magnesium hydrophosphates and new generation fungicide has peen synthesized; Published 2 scientific articles in local publishing houses

The instructions for the use of the anti-tick drug "Agiometrin", which was the Veterinary Medical Scientific Council of the Agrarian University of Georgia. On the basis of an application prepared on the basis of the results of a study conducted within the framework of a grant, the National Intellectual Property Center of Georgia - "SAKPATENTI" issued a patent for the invention R 5346 "Concentrate of oil-water emulsion of acaricidal action"

technologies, which is associated with increased consumption of mineral fertilizers. This, in turn, creates harsh environmental conditions, since nitrogenous fertilizers (nitrates, carbamide, ammonia) are highly soluble in water, easily washed out by the action of groundwater and rainwater. When using intensive technologies, these losses are even higher. In addition to large economic losses, this leads to total comprehensive recommendations in practice that would provide an effective solution to this problem are unknown. The main goal of the project is to obtain long-acting nitrogen fertilizers based on a natural sorbent - zeolite and structured carbamide: The development of technology for obtaining universal fertilizers containing nitrogen (N), nitrogen-potassium (NK) and nitrogen-phosphorusapplication process in accordance with the growing season of various crops and, accordingly. The creation of a new generation of fertilizers will completely change and global environmental pollution, provides fertilizer savings (by 50% or more),

Phosphate composites of fungicidal properties were obtained the basis of iron. calcium and magnesium hydrophosphates, which can be used in agriculture-fo

economy, there have been fundamental changes in animal husbandry. Livestock has moved from the public sector to the private sector. There was a need to establish new values. Livestock technologies have changed. Appropriate veterinary drugs against ticks have not been produced in Georgia and are not being produced. We have developed the anti-tick preparation "Agiometrin" (conditional name) based on local raw materials, which, in terms of its effect on ticks in the same doses, is not inferior to similar preparations produced in other countries. It is environmentally

1. The study of vydoy and the area of distribution of ticks, their bioecological fauna in two different zones of the country

2 Creation of a competitive domestic anti-tick drugs

3.Development of anti-tick measures:

of year. After taking measures against ticks, livestock workers will have the opportunity to take measures to prevent vector-borne diseases in a timely manner Therefore, the project has both scientific and commercial significance. Having satisfied the domestic market, our country may well turn from an importer into an exporter. A commission examination of the developed measures will be carried out. temporary mailing lists and instructions with copyright patent rights approved by the Academic Council

Working out of

technology for obtaining of materials having solid

and elastic structure and

neutron emission source

absorbtion ability for

Zghenti Mikheil, Lomtadze Omar, Mikadze Irma, Tsitsagi Mzia, Zarkia Nino, Ebralidz Ketevan, Chedia Roin, Kvartskhava Giorgi, Liparit, Barbakadze Natia. 150 000

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Tsintskaladze Giorgi. Dolidze Within the framework of the project, the rehabilitation of the contaminated territories of the former Soviet military bases in the Akhalkalaki-Akhaltsikhe region Tserodze Nana, Buzariashvili and the removal of hazardous wastes from the territories of the military bases (10 Manana, Karkashadze Nino bases), their processing and rehabilitation of contaminated soils were carried out.

The G-762 project provides for the development of multicomponent polymer ions for obtaining polymer materials (highly filled) after their processing, capable of absorbing both radiation sources and attenuating the radiation neutron flux. The composition consists of a matrix and adsorbing components natural sorbents (diatomites, zeolites) and boron (and boron-containing) components. Chemo-, thermo- and heat-resistant thermoplastic (such as polyarylates, polycarbonates) and thermosetting (such as phenol- and bisphenol Sherozia Vitali, Kashia Valter, aldehyde) polymers were used as matrices. It is known from the literature that nolymers with a high content of aromatic and polycyclic (condensed) nuclei are characterized by increased resistance to radiation. Thermoplastic polymers are used Tsirekidze Nunu, Bokuchava to produce elastic materials. Thermosetting polymers are used to produce rigid Guram, Mikava Luna, Nardaia materials. In addition, thermosetting polymers make it possible to obtain plastic Iuri, Papava Givi, Maisuradze materials with high filling, which also have high physical and mechanical properties Nunu, Dokhturishvili Nora, To obtain both thermoplastic and thermosetting polymers, bisphenols containing Andronikashvili Teimuraz, carded substituents such as norbornan, adamantane, fluorene, etc. were used as Abashidze Guram, Dalakishvili monomers. The use of polymers in compositions makes it possible to manufacture Gurgenishvili Marina Panava, chean light do not corrode (which is very important in the case of burial of radiation sources in the ground), resistant to high temperature, chemical agents (acids, alkalis, concentrated salt solutions, etc.). Under irradiation conditions of 106 neutrons / cm2.sec practically does not collapse and retains the basic physical and mechanical characteristics

By the order of the international organizations, works in the field of conversion of hazardous wastes "Melanj" and "Samine" left on the territories of former military bases after the withdrawal of Soviet troops and rehabilitation of contaminated soils were conducted etical part the literature review of contemporary state of the problem has been done. It is shown that prospective trend is considered the

1.50me physical-mechanical and thermophysical properties of such natural. creation and production of light composite materials with boron and carbon additives. On the basis of theoretical investigation the possibility of enriched and thermally modificated diatomite are studied. Their chemical using zeolite (clinoptilolite with high content of calcium) as sorbent of radioactive isotopes Cs+ and Sr++ is shown. The zeolites can be also used as compositions are established. 2. Some physical properties of thermally (250 C, natural additives in polymer boron containing compositions for the absorption of helium isolated during the decay of nucleus of boron atom by the 2h) modified diatomite (with graininess of 50mm) were studied and their reaction 10B(n, α)/TLi. Physico-mechanical properties of natural sorbent - diatomite have been studied and its chemical composition in oxide form comparison with analogous parameters for natural, annealed diatomite was has been established. Using mas-spectroscopic study it is established that at heating up to 2500C as low molecular product only water is extracted, conducted. 3. More profound change takes place during chemical modification an organic part does not undergo a change. More profound changes take place during chemical modification of diatomite. Considerable decrease of of diatomite. In this case the content of SiO2 increases from 84.03 % to 96.6 %. metals content is observed and SiO2 content increases from 84% to 96.6%. Simultaneously the porosity increases from 75 to 85%. Natural sorbent - The content of harmful elements: Fe, Al, Ca, Mg etc. abruptly drops. 4. zeolite, particularly clinoptylolite has been researched. It has high thermostability, resistance to the action of corrosive media and good mechanical technological modes of chemical modification of zeolite are established. It is strength. It is distinguished with cheapness which makes it competitive as compared with synthetic molecular sieves. Spectral and X-ray structural

shown that acid treatment of zeolite affects its structure. The ammonium form study of hydrogen form of zeolite was conducted. There was developed technology of obtaining of polymeric composite on the base of natural natural aburous modified sorbents – diatomite and zeolite, boron and boron containing compounds. Composites containing 40-60 mas.% natural aburon and thermoplastic polymer the experimental samples in the form sorbent have high physico-mechanical properties at stretching and pressing. The presence of boron and its compounds also provides the formation of elastic plastic in organic solvent. Technological parameters of their obtaining of strong plastic material. For obtaining of polymeric composite there were used thermoplastic and thermoreactive polymers. During the synthesis are determined. 6. Finally it has been established that as neutron absorbing of polymers the main components determining physico-mechanical and other properties of polymers are monomers – bisphenols, especially of card components in polymeric composites B4C on the base of natural boron and type. On the base of card bisphenols thermoreactive oligomers (TRO) of resol and novolac type were synthesized. As filling and neutron absorbing elementary boron with different content of izotope 10B will be used. 7. The component there are used natural (19%10B+81%11B) and enriched (80%10B+20%11B) boron and its compounds (for example, B and B4C) and modificated natural inorganic sorbents thermally modificated diatomite (TMD) and chemically modificated zeolite CMZ). Plastic composites have been obtained by sprinkling of the solution of initial components in organic solvent. The obtained composites have increased physico-mechanical properties at bending and pressing. Studies were carried out on obtaining of neutron absorbing elastic composite materials on the base of card products of various configurations of a complex profile by processing them. They are polycarbonate (PC), polysterole (PS), sulfochlorpolyethylene (SCPE) and elastomer (EM) which consists butadiene-methylsterole rubbers. Optimal concentrations of ingredients introduced in them for capturing of neutrons were established. To determine technological parameters of explosive compacting of powders Al-B(B4C) the characteristics of a number of blasting powders (BP) have been studied. It was established that the most acceptable are BP Ammonate Nº6KB-NH4NO3. At the same time the upper admissible heating point of powders must not exceed 500°C. On the basis of experimental and semiempirical calculations the upper level of ampoule diameter and a thickness of compacted boron-containing powder

medium: dI30 mm was established. An experimental curve of the dependence: E/M (E - quantity of explosive material; M - mass of powder) -

//link enringer com/chapter/10.1007/1-4020-2381-2 9 of zeolite is thermally more stable. 5. By the use of active form of diatomite synthesis of initial bisphenols of card type and their phenyl substituted derivatives in several stages has been performed. The intermediate compounds are characterized. 8. Methyl, dichlor- and tetrachloride bisphenols with card fluorene group were synthesized. 9. The optimal conditions of bisphenol synthesis and their phenyl substituted derivatives have been determined. 10. The influence of the nature of catalyst temperature duration ratio of ketone phenol crusoe on the output of the final product- bisphenol was studied. Optimal conditions of the process were established. Bisphenol yield makes 80% from theoretical. 11. The synthesis of new not described in the literature polymers on the basis of card bisphenols and chloroanhydrides of aromati