

ISSN 2181-8622

Manufacturing technology problems



Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX  COPERNICUS
INTERNATIONAL

**Volume 8
Issue 4
2023**



SLIB.UZ
Scientific library of Uzbekistan

NamMTI ILMIY-TEXNIKA JURNALI

Tahrir hay'ati a'zolari:

Paxtani dastlabki ishlash, to'qimachilik va yengil sanoat

1. Axmadxodjayev X.T., t.f.d., prof. - NamMTI
2. Muradov R.M., t.f.d., prof. - NamMTI
3. Jumaniyozov Q., t.f.d., prof. - "Paxtasanoat ilmiy markazi" OAJ
4. Eshmatov A.B., t.f.d., prof. - Tojikiston Milliy Texnologiyalar Universiteti
5. Xoliqov Q., t.f.d., prof. - NamMTI
6. Ergashev J.S., t.f.d., dots - NamMTI
7. Obidov A.A., t.f.d., dots. - NamMTI

Qishloq xo'jaligi mahsulotlarini yetishtirish, saqlash, qayta ishlash va oziq-ovqat texnologiyalari

1. Toshev A., t.f.d., prof., akad. - Janubiy Ural davlat universiteti, Rossiya
2. Banu Yucel., q.x.f.d., prof. - Ege Universiteti, Turkiya
3. Alimov U., t.f.d. - O'zR FA UNKI
4. Xudayberdiyev A.A., t.f.d., prof. - NamMTI
5. Sherquziyev D.Sh., t.f.d., prof. - NamMTI
6. Merganov A., q.x.f.d., prof. - NamMTI
7. Mamatov Sh., t.f.d., prof. - Webster Universiteti

Kimyo va kimyoviy texnologiyalar

1. Namazov Sh.S., t.f.d., prof., akad. - O'zR FA UNKI
2. Botirov E.X., k.f.d., prof. - O'zR FA O'MKI
3. Akbarov H.I., k.f.d., prof. - O'zMU
4. Boymirzayev A., k.f.d., prof. - NamMTI
5. Nurmonov S.E., t.f.d., prof. - O'zMU
6. Salihanova D.S., t.f.d., prof. - O'zR FA UNKI
7. Kattayev N.T., k.f.d., prof. - O'zMU

Mexanika va mashinasozlik

1. Zaynobiddinov S., f.m.f.d., prof., akad. - ADU
2. Mardonov B., f.m.f.d., prof. - TTYSI
3. Usmanov P., f.m.f.d., dots. - NamMTI
4. Matkarimov P.J., t.f.d., prof. - NamMTI
5. Sharibayev N., f.m.f.d., prof. - NamMTI
6. Erkaboyev U.I., f.m.f.d., dots. - NamMTI
7. Musoyev S.S., t.f.n., prof. - BuxMTI

Ta'limda ilg'or pedagogik texnologiyalar

1. Goncharenko I.I., f.m.f.d., prof. - BMTU, Belorussiya
2. Hüseyin Kamal, t.f.d., prof. - Ege Universiteti, Turkiya
3. Ergashev Sh.T., t.f.n., dots. - NamMQI
4. Musayev J.P., p.f.d., prof. - IRV
5. Xoshimova D., f.f.d., prof. - NamMTI
6. Maxkamov A.M., t.f.d. - NamMTI

Iqtisodiyot

1. Maniki Tiagi, i.f.d. - KIET, Xindiston
2. Malcolm Ng Cher Herh., t.f.d. - INTI IUC, Malaysia
3. Soliyev A., i.f.d., prof. - NamMTI
4. Saidboyev Sh., i.f.d., prof. - NamMTI
5. Matkarimov K., i.f.n., prof. - NamMTI
6. Kadirova X.T., i.f.d., dots. - NamMTI
7. Bustonov M.M., i.f.d., dots. - NamMTI

Muharrirlar guruhi

S. Yusupov, O. Kazakov, B. Xolmirzayev, A. Mirzaev,
A. Tursunov, O. R. Qodirov (mas'ul muharrir)

PHYSICAL-MECHANICAL PROPERTIES OF COMPOSITE MATERIALS BASED ON VERMICULITE, BAZALT, WOLLOSTANITE, AND POLYETHYLENE P-Y 342 AND POLYAMIDE PA-6

R.H.DUSANOV

Termiz State University

KH.KH.TURAEV

Termiz State University

P.J.TOJIEV

Termiz State University

D.A.NABIEV

Termiz State University

KH.N.ESHANKULOV

Termiz State University

Abstract: The article describes how to fill polypropylene with oligomers containing nitrogen, phosphorus, and metal to produce heat-resistant and mechanically strong thermoplastic composite materials. Polypropylene compositions, solution flow index determination, viscometric methods, bending strength determination using two-support methods, and bending, Charpy impact strength measurement methods are all discussed. The amount of filler used in the production of composite materials based on basalt mineral from polyvinyl chloride ranged from 1 mass part to 5 mass parts. The physicochemical characteristics of the developed composite materials revealed that increasing the amount of filler decreases the material's fluidity. The optimal amount of basalt-containing fillers in the composite material, according to the results, is 5 parts by mass.

Keywords: polyvinyl chloride, basalt mineral, atomic force microscopy, physical-chemical and mechanical properties.

Introduction. Obtaining nanofillers and composite materials based on them, as well as applying them in numerous domains of industry and technology, is currently of great interest to researchers [1]. Nanoadditives are applied to polymers in huge quantities, just like regular fillers [2]. Because polyethylene P-Y 342 has a high degree of crystallinity, it has higher elongation than other forms of polyethylene. It is also resistant to moisture, corrosion, and abrasion, as well as most chemicals [3]. P-Y 342 comprises dispersion vermiculite and basalt, as well as basalt fibres in high quantities, ranging from 20 to 40 mas. The effect of adding up

to% on polyethylene characteristics was investigated [4]. The properties of these fillers are shown in P-Y 342 30 mas.% was compared with the properties of boron inserted in the quantity, as provided in the literature analysis, this amount is commonly used for kinds of polyethylene suitable for pipe manufacture [5]. Furthermore, it was discovered that the P-Y 342/PEMA/TEAS/VK composition had effective qualities when compared to other types of vermiculite-based compositions [6]. The results demonstrate that the tear resistance and impact resistance of composites based on P-Y 342 are low at

high modifier concentrations. The ideal modifier concentration is 1.0 mas. is% [7].

The results are correct. However, the tensile strength varies from 21 MPa in the original polyethylene to 38 MPa to 48 MPa for P-Y 342/TEAS/VT and P-Y 342/PEMA/TEAS/VT additive composites.

Table 1 displays the established comparative properties of modified polymer composite materials based on PA-

6 and fillers. As shown in the table, the basic composition in PA-6/PEMA/TEAS/B with its impact resistance and tear strength qualities outperforms PA-6/PEMA/TEAS/VK added exhibits.

Table 1 shows that the modifier is 1.0 mas in the area of TEAS. %, the impact resistance of the compositions reaches the highest level (from 100 to 118 kJ/m²).

Table 1

Physical and mechanical properties of composite materials based on mineral fillers: vermiculite (VK), basalt (BT), wollastonite (VT), and polyamide PA-6 were compared

Compositions	Impact resistance, kDj/m ²	σ bending strength, MPa	σ tensile strength, MPa	Relative elongation, %	Relative narrowness, %
	GOST 4647-80	GOST 4648-80	GOST 1423681	GOST 1423681	GOST 1859921
PA-6	100	90	66	150	2
PA-6/VK	109	94	66	65	1,7
PA-6/TEAS/VK	112	98	68	55	1,8
ПА-6/PEMA/TEAS/VK	116	100	73	55	1,5
PA-6/BT	110	95	67	66	1,7
PA-6/TEAS/BT	115	98	69	58	1,8
PA-6/PEMA/TEAS/BT	118	102	75	57	1,8
PA-6/VT	108	94	66	70	1,8
PA-6/TEAS/VT	110	96	68	64	1,7
PA-6/PEMA/TEAS/VT	112	100	73	62	1,6
PA-6/Bur	106	92	66	60	2,4

The modifier TEAS is included in the compositions at a concentration of 1.0% by mass in respect to the mass of the filler.

Fillers were added to 1.0 mas of modifier TEAS to PA-6. When it is applied in % amount, its impact resistance is boosted when compared to compositions without modifier.

When maleated polyethylene and TEAS are combined to a PA-6-based composition, the impact resistance increases dramatically. 1.0 mas.% TEAS

and 30 mas.% vermiculite and basalt compositions significantly increase impact resistance.

As a result, the impact resistance has a maximum value and ranges from 100 for the original PA-6 to 112 and 116 kJ/m² for the PA-6/TEAS/VK and PA-6/PEMA/TEAS/VK compositions, respectively, as well as PA-6/PEMA/TEAS/VK compositions. It rises to 115 and 118 kJ/m² for TEAS/BT and PA-

6/PEMA/TEAS/BT composites, respectively.

The addition of fillers containing the modifier TEAS to PA-6 raises the impact resistance of composite materials from 100 to 115 kJ/m², while the addition of the compatibilizer PEMA raises the impact resistance from -100 to 118 kJ/m².

Modifiers are crucial in modifying the properties of composites based on them. This is possible due to their interfacial contact with the polymer basis.

The addition of modifiers to the composition of composites has the effect of enhancing tear resistance.

The results reveal that the modifiers have an effect on improving the physical and mechanical properties of the nanoparticle-filled composite materials.

Because of their enormous relative surface area, nanoparticles adhere well to the polymer base, and some agglomerations are seen. Tear resistance is greatest in the PA-6/PEMA/TEAS/BT combination.

According to the results, a relatively high value of tear resistance (75 MPa) is

observed in the composition based on PA-6, the amount of modifier TEAS is 1.0 mas.%, and it is observed when the filling level of basalt reaches 30 wt.%.

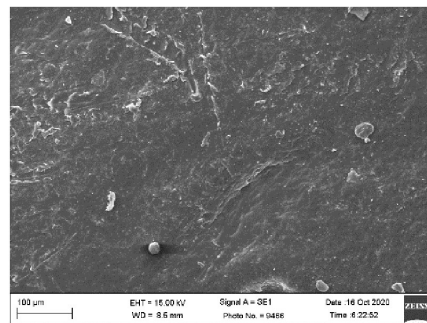
Flexural strength increases as a function of modifier concentration in composites filled with fillers, although less than impact and tensile strength.

As a result, the concentration of the modifier is 1.0 mas.% amount is adequate for the optimal characteristics of the physical-mechanical properties of the composition based on PA-6.

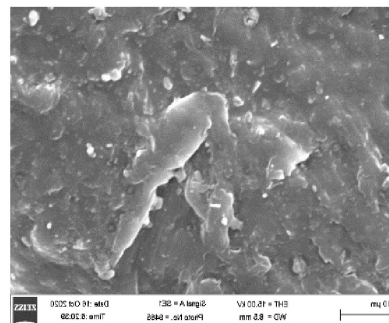
The addition of modifiers to the formulation of composite materials increased the mechanical properties of PA-6 and, as a result, improved nanoparticle dispersion.

It is worth noting that the bending strength is 30 mas. % is significantly higher in composite materials with modified fillers than in composite materials with unmodified fillers. As a result, 1.0 mas. Flexural strength is greatest in maleinated PA-6 composite materials with% TEAS.

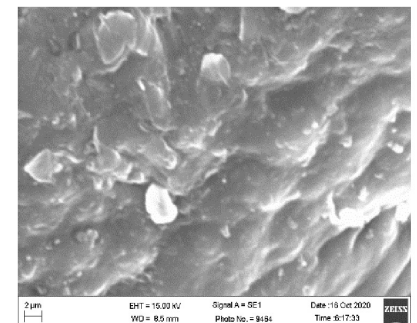
Figure 1 depicts SEM pictures of composite materials.



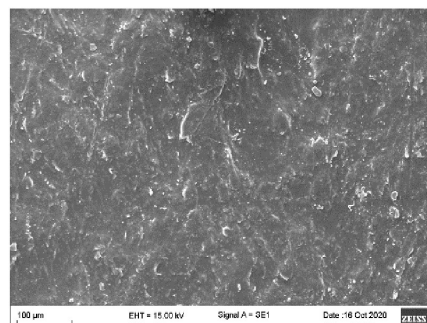
1) a



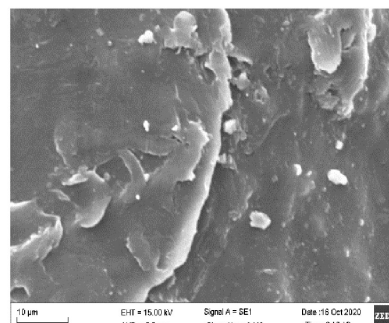
1) b



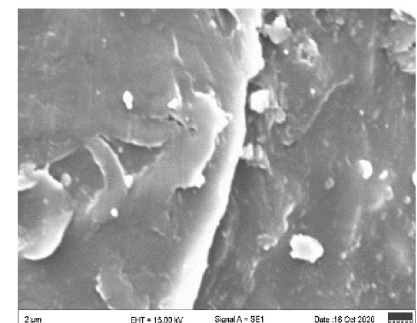
1) c



2) a



2) b



2) c

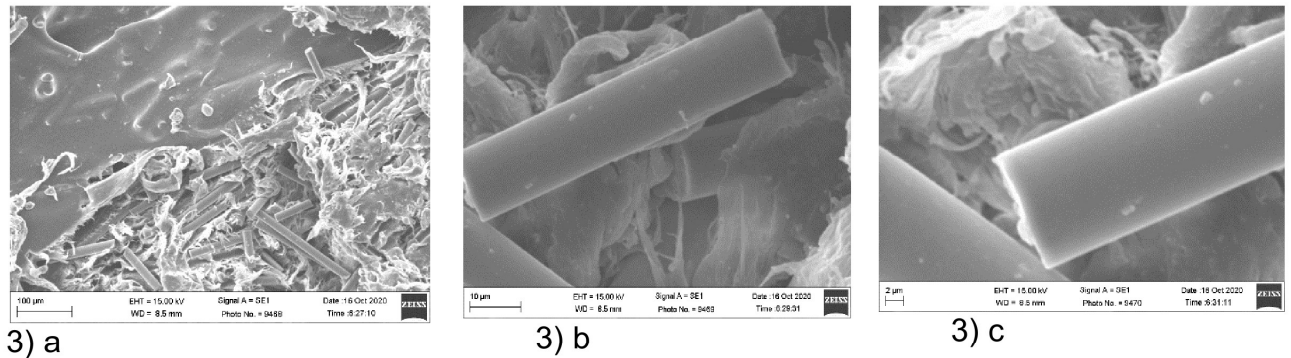


Figure 1: SEM pictures of mineral-based composite materials: vermiculite (VK), basalt (BT), wollastonite (VT), and polyamide. PA-6 at various scales (a-100m, b-10m, v-2m) 1) PA-6, PEMA, TEAS, and VK 2)PA-6/PEMA/TEAS/BT 3) PA-6, PEMA, TEAS, and BV

Figure 1 shows that the fillers are equally dispersed in the polymer matrix with the same size in all of the composites. The photographs were obtained at a size of 2 m to 100 m, showing that the composites are nanoscale.

Conclusion. As a consequence of the research on the rheological properties of composite materials based on polymers and fillers, 30% mass was added to the composition. The amount of filler injected

drastically reduced the value of SOC when compared to the initial polymers. The composition comprises 1.0 mas. The addition of modifier TEAS in the amount of % caused a decrease in fluidity and an increase in viscosity in the studied temperature range, and the study of the rheological properties of composite materials based on PA-6 and P-Y 342 can be the basis for establishing optimal processing conditions.

References

1. Tojiev P.J., "Development of technology for producing highly filled polyolefins based on local raw materials" Dissertation for the degree of Doctor of Philosophy (PhD) in technical sciences. Termez 2019.
2. Tojiev P.J., Dusanov R.Kh., Turaev Kh.Kh., Djalilov A.T. Study of the thermal resistance of composites based on polyamide filled with basalt fiber // Journal "Composite Materials" -2018. -№1.- P.285-287.
3. Tojiev P.J., Dusanov R.Kh., Turaev Kh.Kh., Djalilov A.T. Structure and properties of polyamide-6 filled with vermiculite // Universum: chemistry and biology: electron. scientific magazine. -2020. -№8(74).-P.49-52
4. Dusanov R.Kh., Tojiev P.J., Turaev Kh.Kh., Alikulova D.A. The influence of modifiers on the physical and mechanical properties of composite materials based on polyamide-6 // Universum: chemistry and biology: electron. scientific magazine. -2020. -№8(74).-P.40-44.
5. Dusanov R.Kh., Tojiev P.J., Turaev Kh.Kh. The influence of basalt from various deposits on the properties of polyamide // Scientific Bulletin of SamSU. - 2020. -No. 3 - P.43-47.
6. Dusanov R.Kh., Tojiev P.J., Turaev Kh.Kh. Preparation of highly filled polymer composite materials and their research // Scientific bulletin AnDU. -2020.- #3(47). -S 102-111.

7. Tojiev P.J “Разработка технологии получения высоконаполненных полиолефинов на основе местного сырья” Диссертация на соискание ученой степени доктора философии (PhD) по техническим наукам. Термез 2019г.

8. Tojiev P.J, Dusanov R.Kh., Turaev Kh.Kh., Jalilov A.T. Изучение термостойкости композитов на основе полиамида, наполненного базальтовым волокном // Журнал «Композиционные материалы» -2018. -№1.- P.285-287.

9. Tojiev P.J, Dusanov R.Kh., Turaev Kh.Kh., Djililov A.T. Структура и свойства полиамида-6 наполненных вермикулитом // Universum: химия и биология: электрон. науч. журнал. -2020. -№8(74).-С.49-52

10. Dusanov R.Kh , Tojiev P.J, Turaev Kh.Kh., Preparation of highly filled polymer composite materials and their research // Scientific bulletin AnDU. -2020.- #3(47). -S 102-111.

11. Dusanov R.Kh , Tojiev P.J, Turaev Kh.Kh., Alikulova D.A. Влияние модификаторов на физико-механические свойства композиционных материалов на основе полиамида-6 // Universum: химия и биология: электрон. науч. журнал. -2020. -№8(74).-С.40-44.

12. Dusanov R.Kh , Tojiev P.J, Turaev Kh.Kh , Влияние базальта различных месторождений на свойства полиамида // Научный вестник СамГУ. - 2020 . -№3 - С.43-47.

BENTONITE AND PHOSPHORITE PRODUCTION OF ORGANOMINERAL FERTILIZERS BASED ON RAW MATERIALS AND NITROGEN-FIXING MICROORGANISMS ((CD:B:NFM=100:5:(0-4)), (CD:B:PF:NFM=100:5:5:(0-4)))

VOQQOSOV ZUXRIDDIN

Senior teacher of Namangan Institute of Engineering and Technology
E-mail.: voqqosov_zukhriddin@rambler.ru, phone.: (+99899) 973 94-30

IKROMOVA MAFTUNA

Doctoral student of Namangan Institute of Engineering and Technology
E-mail.: ikromovamaftuna@gmail.com, phone.: (+99893) 272 19-00

Abstract:

Objective. This article deals with production of organomineral fertilizers based on local raw materials cattle dung (cattle). local ores (Kyzilkum phosphorite flour (PF) and Navbahor bentonite) and nitrogen-fixing microorganisms. Based on the experiments. the following results were obtained. During 60 days. the raw materials selected for the experiment were used in optimal proportions: cattle dung: bentonite: nitrogen-fixing microorganisms solution (NFM) (100:5:0-4) and the main chemistry of organomineral fertilizers obtained on the basis of cattle dung. bentonite. phosphorite flour and nitrogen-fixing microorganisms. Composition (CD:B:PF:NFM=100:5:5:(0-4)) was analyzed.

Methods. The obtained results from our side were first studied the quantities of organomineral fertilizers based on cattle dung. bentonite and nitrogen-fixing microorganisms. Cattle dung. bentonite and nitrogen-fixing microorganisms of the type Azotobacterium were used for laboratory research. For this. cattle dung: bentonite ratios were taken in the range of 100:(2.5-5) and the resulting mixture was processed with nitrogen-fixing microorganisms (NFM) grown in Fedorov medium in the ratio of 100:(2.5-5):(0.5-4.0).

Results Physico-chemical and commercial properties of the obtained new type of organomineral fertilizers. It is known that physico-chemical (dispersibility. natural slope angle. etc.) and commodity properties (hygroscopic point. grain strength. etc.) are important properties of solid and powder fertilizers

C O N T E N T S

PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY	
N.Usmanova, M.Abdukarimova, Sh.Mahsudov	
Information modules for automation of the process of forming the structure of industrial collection of women's clothing.....	3
O.Turdiyeva, A.Khojiyev	
Research analysis of transformation new assortment development.....	10
M.Rasulova, Sh.Mamasoliyeva, G.Norboyeva	
Evaluation of heat conductivity of special clothing.....	15
D.Rayimberdiyeva, N.Nabidjanova, N.Ismailov	
Mathematical model of the influence of a gymnast's strength on clothing fabric.....	22
G.Gulyaeva	
Modeling of strength reliability and transformation of a knitted loop at the limit state of the structure.....	26
H.Diyorov	
Experimental determination of the cleaning efficiency of the fiber in the pipe..	31
S.Khashimov, R.Muradov	
Problems in cleaning cotton-seed and their solution.....	35
GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES	
N.Kurbanov, S.Bozorov	
Development prospects of the oil production industry in the republic of Uzbekistan and foreign countries.....	41
Sh.Rasulov, Kh.Djuraev, A.Usmanov, M.Khalikov	
Kinetics of drying process of tomato fruit.....	45
M.Sobirova, J.Farmonov	
Oil extraction studies from flax seeds.....	52
M.Meliboyev, G.Makhmudova, N.Muydinova	
Importance of potato powder extraction technology in production and industry.....	56
CHEMICAL TECHNOLOGIES	
E.Panoev, Kh.Dustov, J.Jamolov	
Research of corrosion and foaming processes in gas absorption purification and technology of their protection in inhibitors.....	61
U.Odamov, M.Komilov	
Assessment of the degradation process of solar photovoltaic plants in the climatic conditions of Uzbekistan.....	69
R.Dusanov, Kh.Turaev, P.Tojiev, D.Nabiev, KH.Eshankulov	
Physical-mechanical properties of composite materials based on vermiculite, bazalt, wollostanite, and polyethylene P-Y 342 and polyamide PA-6.....	77
Z.Voqqosov, M.Ikromova	
Bentonite and phosphorite production of organomineral fertilizers based on raw materials and nitrogen-fixing microorganisms ((CD:B:NFM=100:5:(0-4)), (CD:B:PF:NFM=100:5:5:(0-4))).....	81
D.Abdirashidov, Kh.Turaev, P.Tajiyev	

Studying the structure and properties of polypropylene filled with nitrogen, phosphorus, metal-containing oligomers.....	90
M.Khoshimkhodjaev, M.Khuramova	
Optimization of the method for instrumental neutron activation analysis (inaa) of natural objects.....	100
F.Rakhmatkariyeva, M.Koxxarov, Kh.Bakhronov	
Isotherm of ammonia adsorption in zeolite CaA (M-22).....	105
R.Kurbaniyazov, A.Reymov, B.Pirnazarov, Sh.Namazov, O.Badalova, B.Beglov	
Rheological properties of ammophosphate pulps obtained using phosphorite powder of the khodjakul deposit.....	111
F.Eshkurbonov, A.Rakhimov, J.Rakhmonkulov, E.Safarova, A.Ashurova, N.Izzatillayev, M.Bobokulova	
Investigation of the chemical-mineralogical composition of bentonite of the khaudag deposit and synthesis of wine fining agents based on its.....	117
J.Shukurov	
Modeling the production of dimethyl ether from natural gas.....	126
D.Makhkamova, Z.Turaev, M.Dedaboyeva	
Study of interaction of components in $ZnSO_4 - NH_4H_2PO_4 - H_2O$ system....	137
D.Akhunov	
Study of the problems of atmospheric waste water collection and green field irrigation.....	142
D.Jumaeva, R.Akhrorova, S.Barnoeva, O.Kodirov, U.Raximov	
Study of adsorption isotherms of polar and non-polar molecules on silica adsorbents.....	146
MECHANICS AND ENGINEERING	
E.Abdullaev, V.Zakirov	
Using parallel service techniques to control system load.....	154
E.Aliyev, A.Mamaxonov	
Development of efficient chain transmission construction based on analysis of constructive characteristics of chain drives of technological machines.....	161
S.Utaev, A.Turaev	
Results of a study of the influence of oil contamination on wear of the working surface of diesel cylinder lines.....	171
L.Tilloev, Kh.Dustov	
Separation of the polymer mass from the waste of the alkaline cleaning process of pyrogas by the extraction method.....	177
A.Mirzaalimov	
Effect of temperature on photoelectric parameters of three-way illuminated solar cells.....	183
Sh.Mamajanov, A.Qakhharov, Sh.Isaboyev	
On training of competitive personnel - on the basis of creating a new generation of teaching literature in the educational process (in the example of mechanical science).....	193
K.Ismanova	
Mathematical model and analytical solutions of the process of physics-chemical hydrodynamics.....	197
N.Sharibayev, B.Nasirdinov, G.Rasulova	

Microcontroller-based mechatronic system with heating and humidity sensor for silkworm eggs incubation.....	205
M.Rasulmuhamedov, K.Tashmetov, T.Tashmetov	
Methods of determining transport flows.....	210
J.Izzatillaev, U.Khudoyberdiev, X.Mamadiev	
Prospects for the application of vertical axis wind turbines in the Jizzakh region.....	218
Y.Asatillaev, N.Israilov	
Problems and possibilities of laser synthesis of metal powders in additive technologies.....	230
U.Meliboev, D.Atambaev	
Determination of acceptable values of the main factors affecting the production of twisted thread.....	237
N.Adilov	
Assessment of the technical condition of the weight checking wagon type 640-VPV-271.....	242
ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION	
M.Ikromova	
Programming as one of the main approaches in the development of children's komputational thinking.....	247
A.Yuldashev	
Developing activities, the academy of public administration under president of the republic of Uzbekistan.....	253
B.Kholhodjaev, B.Kuralov, K.Daminov	
Block diagram and mathematical model of an invariant system.....	259
B.Mamadaliyeva	
Improving students speaking skills in practical lessons.....	267
G.Rasulova	
A lexical-semantic study of terms related to agricultural technology in Uzbek and English languages.....	273
ECONOMICAL SCIENCES	
M.Bustonov	
Digital economy and employment.....	279
M.Bustonov	
Econometric analysis of the activities of multi-sectoral farms.....	285
M.Rahimova	
Prospects for the development of small and medium business in Namangan region.....	292
A.Abdullayev, H.Djamalov	
Organizational structure of the internal control service for the fulfillment of tax obligations of enterprises.....	297
H.Djamalov, A.Abdullayev	
Issues of organizing internal control of fulfillment of tax obligations of enterprises.....	307
Sh.Maripova	
Specific features of management in small business enterprises.....	316
N.Abdieva, R.Abdullayeva, U.Rajabov	
The constituent elements and the need for state regulation of small business and private entrepreneurship.....	324