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Contents of dissertation abstract of doctor of philosophy (PhD) on technical sciences

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Abralov Muzaffar Mahmudovich

Improvement on composition of coatings and technologies of production of acidic type welding electrodes of enhanced quality based on local raw materials..... 31

List of published works í . 35

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(www.ziyonet.uz) (www.tdtu.uz) «Ziyonet» ()

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DS Sc.28.02.2018.T.03.04. 2019 «7» 14⁰⁰ : 100095, : (99871)227-10-32, e-mail: tadqiqotchi@tdtu.uz

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2019 «23» (2019 «23» 121-).

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Ramine De Rissone G. Glaussen

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(Ca, Mg, Ti, Al, Si)

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8610%

CaO-SiO₂-TiO₂

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8-

10%

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6-8%

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10-12%

CaO-SiO₂-TiO₂

2019. 01-320/03-12-8610%
19. (320/03-12-8610%)
;

2019. 01-320/03-12-668%
19. (320/03-12-668%)
;

2019. 01-320/03-12-10612%
19. (320/03-12-10612%)
2019.

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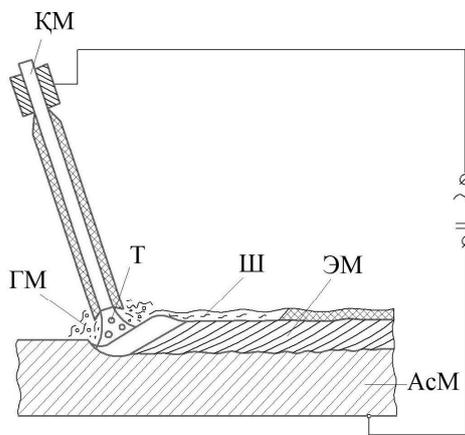
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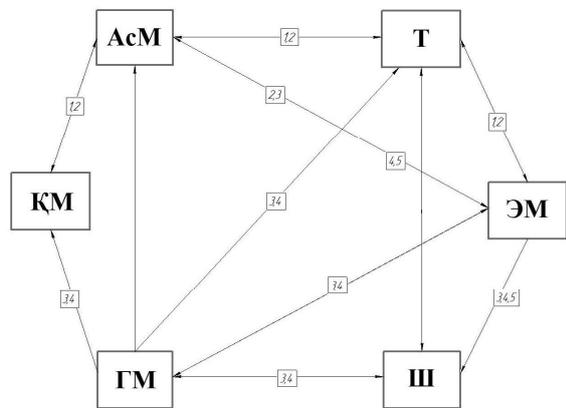
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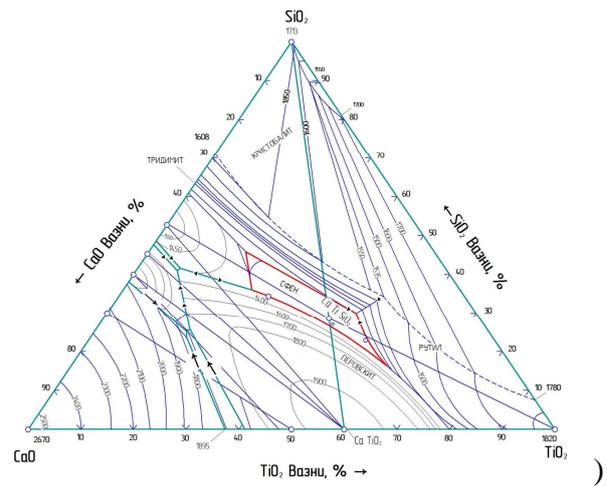
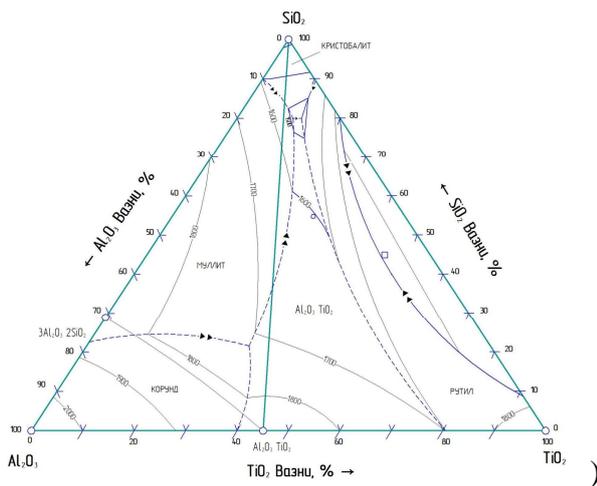
ó 2370 ° Ca ó MgO
 ()
 ó 1475 ° Ca () ó TiO₂ (),
 ó 1400 ° Ca () ó Al₂O₃ (,),
 ó 2020 ° MgO () ó Al₂O₃
 (,), ó 1705 °
 Al₂O₃ (,) ó TiO₂ (),
 ó 1595 ° Al₂O₃ ó SiO₂ (,)

: Al₂O₃-SiO₂-TiO₂, CaO-SiO₂-TiO₂

1350 °
(2-).
CaO-SiO₂-TiO₂

~ 30-40% CaO, 35-55% TiO₂ 20-35% SiO₂

(2, -).



2-

) Al₂O₃-SiO₂-TiO₂) CaO-SiO₂-TiO₂

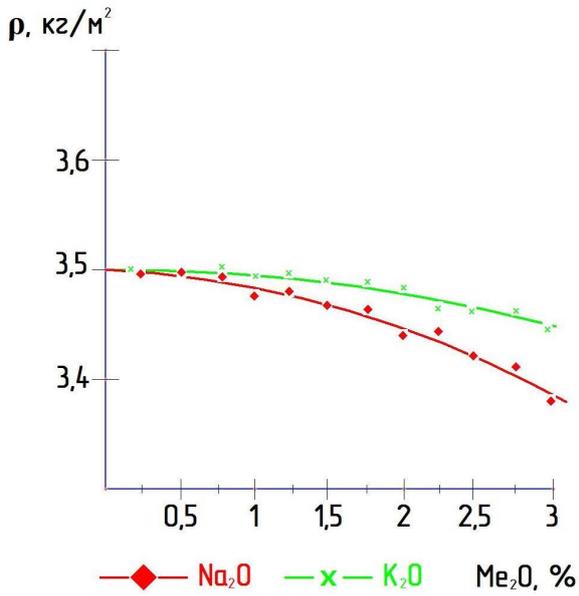
NaO₂
(3-)
SiO₂-TiO₂

K₂O
(4-)
(4-)

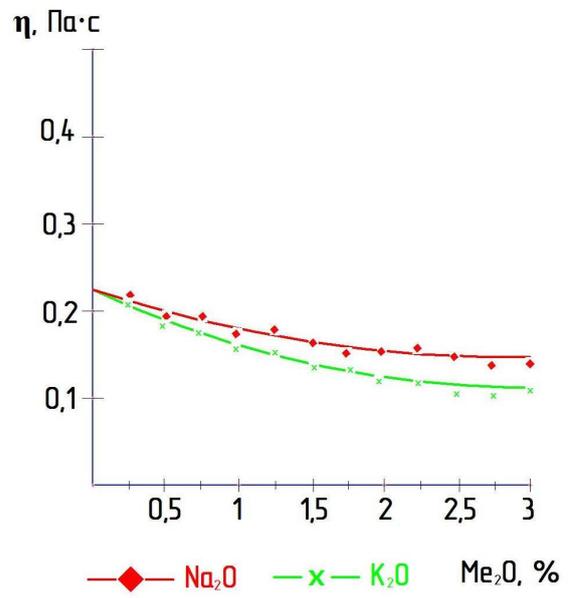
CaO-

(5-)

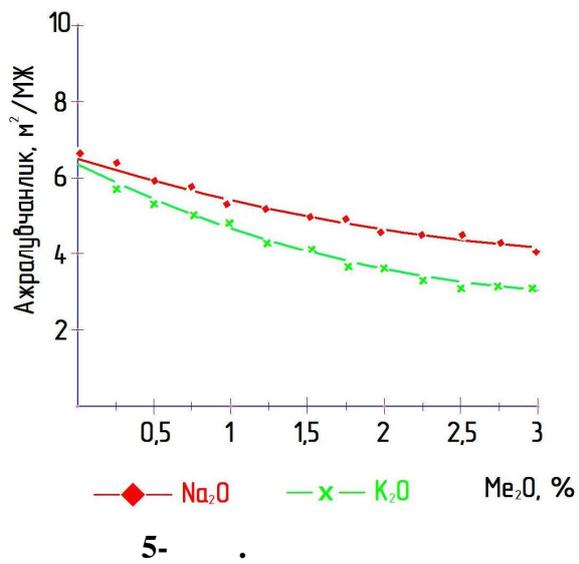
, K₂O NaO₂



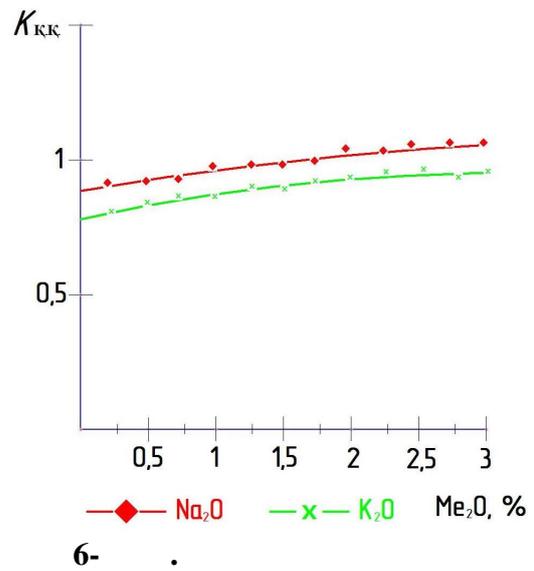
3-



4-



5-



6-

MgCO₃, Na₂CO₃, K₂CO₃

400° 1200°

CaCO₃,

SiO₂

TiO₂
75%



6-8%

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1 ó J422 (ö
 2 ó . %: () ó 21-24;
 () ó 13-15; () ó 2-4; ó 32-35;
 ó 20-23; ó 5-6.
 3 ó . %: () ó 21-24; ()
) ó 13-15; () ó 2-4; ó 32-35;
 ó 20-23; ó 5-6.
 4 ó . %: () ó 21-24; ()
) ó 13-15; () ó 2-4; ó 32-35;
 ó 20-23; ó 5-6.

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175-185°

J422

2-4

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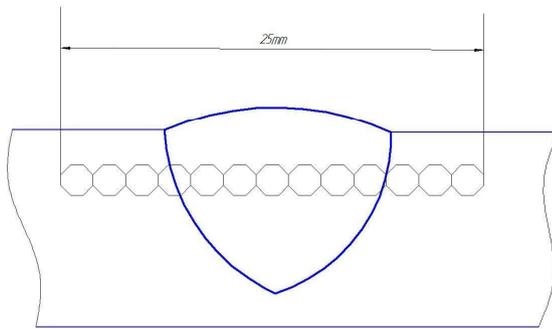
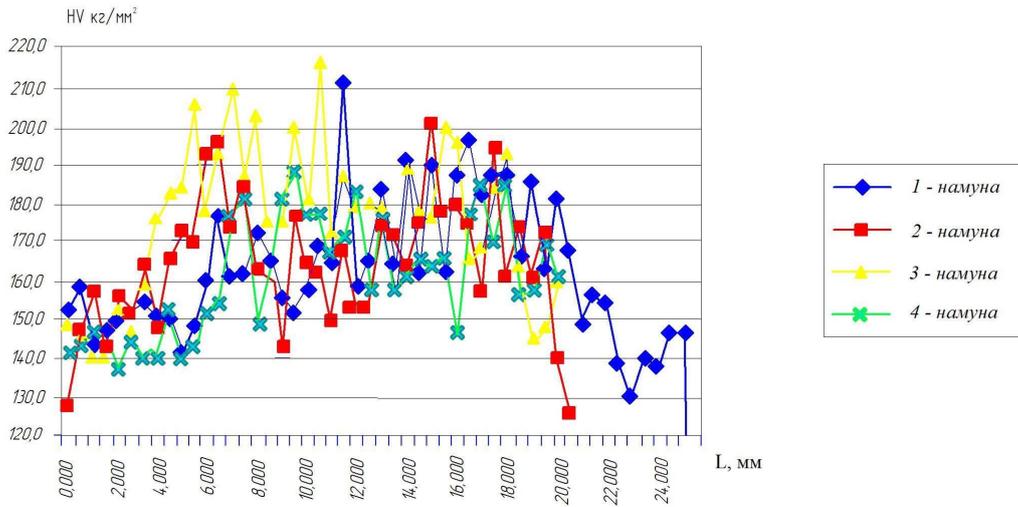
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20-25

J422
130

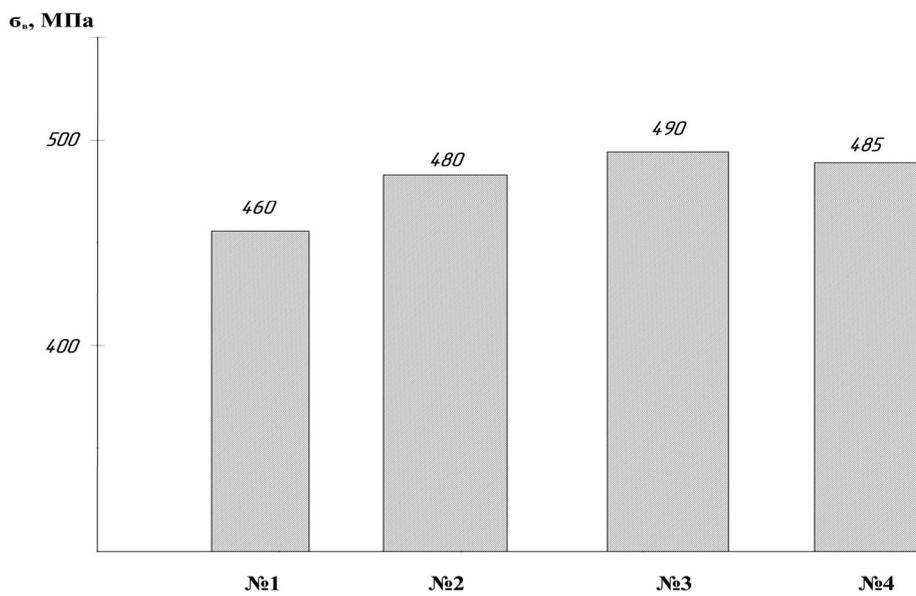
215 HV



7-

8-10%

(8-)



8- . 1-4

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1.

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2.

NaO₂

K₂O

CaO-SiO₂-

TiO₂

3.

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4.

CaO-SiO₂-TiO₂

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5.

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8-10%

6.

6-8%

10-12%

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B2019.2.PhD/T1126.

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«7» 2019 14⁰⁰ DSc.28.02.2018.T.03.04. (: 100095, , 2. / : (99871)227-10-32, e-mail: tadqiqotchi@tdtu.uz)

(: 100095, , 2. : (99871) 227-10-32.) «23» 2019 (121 «23» 2019).

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« Ó » - -2018-32 «
» (2018-2019).

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(Ca, Mg, Ti, Al, Si)

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-SiO₂-TiO₂,
8-10%;

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8-10%

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6-8%

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(%): SiO₂ ó 50-75; Al₂O₃ ó 17-34; Fe₂O₃ ó 0,2-2,5; TiO₂ ó 0,2-2,0; CaO ó 0,1-1,0; MgO ó 0,1-0,5; K₂O ó 0,3-8,5; Na ó 0,1-1,0.

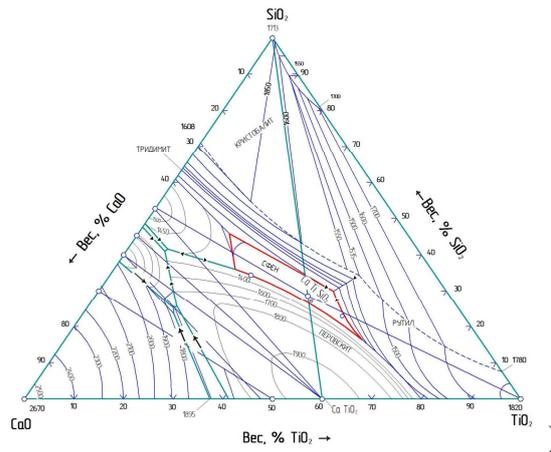
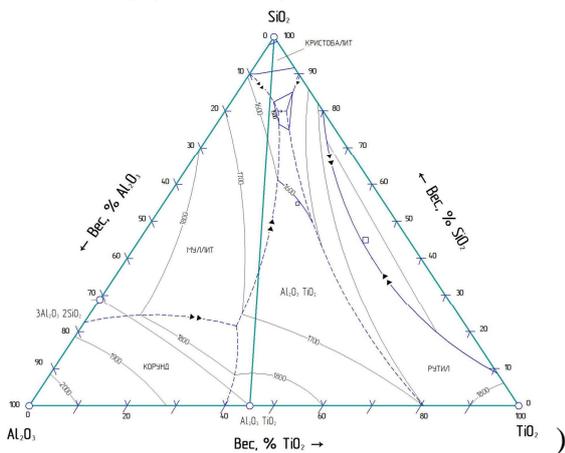
MgO (), 2370° , TiO_2 (), 1475° , I_2O_3 (), 1400° , Mg () I_2O_3 (), 2020° , I_2O_3 (), TiO_2 (), 1705° , I_2O_3 SiO_2 (), 1595° ,

$\text{I}_2\text{O}_3\text{-SiO}_2\text{-TiO}_2$, $\text{-SiO}_2\text{-TiO}_2$
 1350° ,
 (. 2).

$\text{-SiO}_2\text{-TiO}_2$

~30-40% , 35-55% TiO_2 20-

35% SiO_2 (. 2,)



. 2.

$\text{I}_2\text{O}_3\text{-SiO}_2\text{-TiO}_2$, $\text{-SiO}_2\text{-TiO}_2$

(. 3)

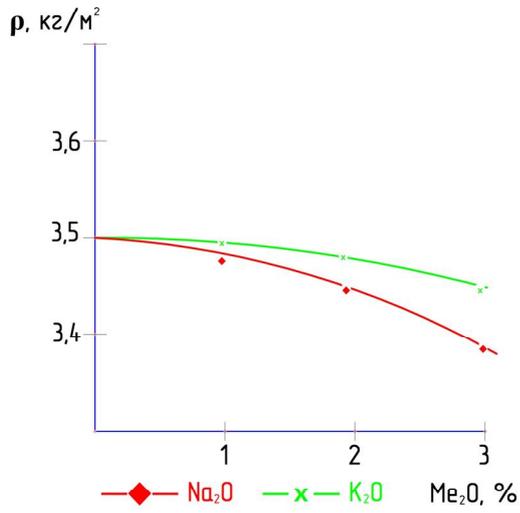
(. 4),

(. 5)

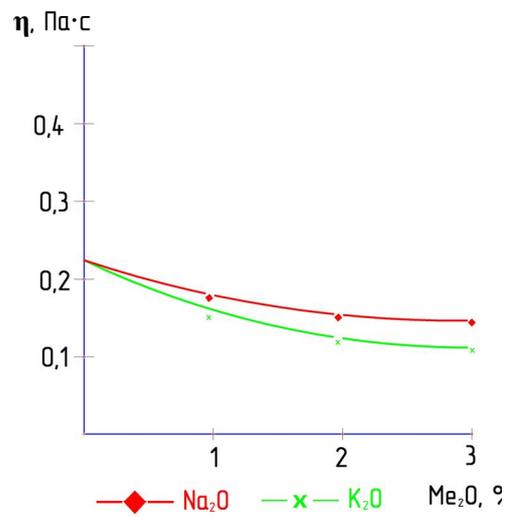
Na_2O
 $\text{SiO}_2\text{-TiO}_2$

K_2O
 (. 4)

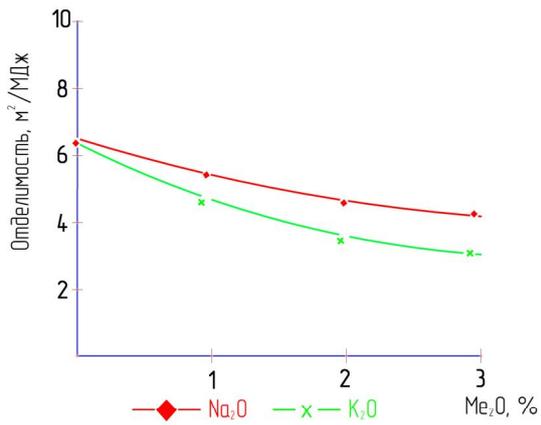
K_2O Na_2O



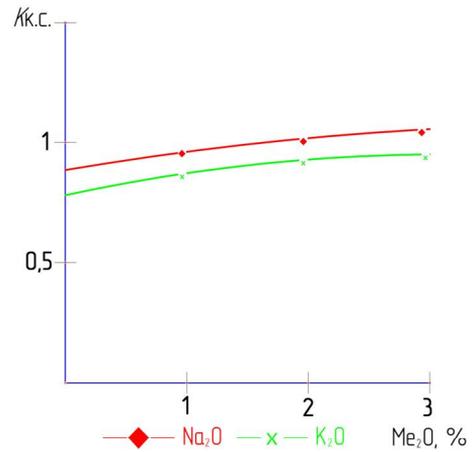
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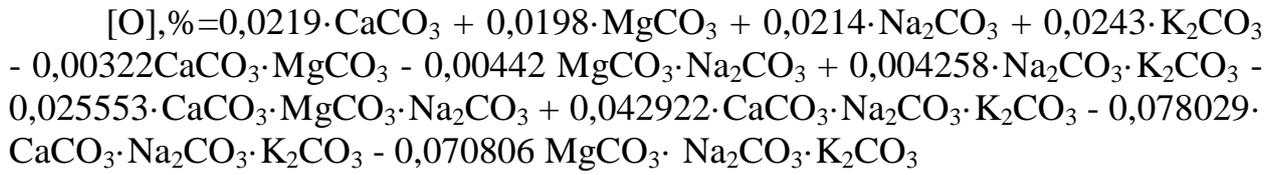
K_2CO_3 ,
400°

1200°

CO_3 , gCO_3 , Na_2CO_3 ,

TiO₂ SiO₂

75 %.



6-8%.

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- 1 ó J422 (ð) - 21-24;
 2 ó . %: () - 13-15; () - 20-23;
 () - 2-4; - 32-35;
 - 5-6.
- 3 ó . %: () - 21-24;
 () - 13-15; () - 20-23;
 () - 2-4; - 32-35;
 - 5-6.
- 4 ó . %: () - 21-24;
 () - 13-15; () - 20-23;
 () - 2-4; - 32-35;
 - 5-6.

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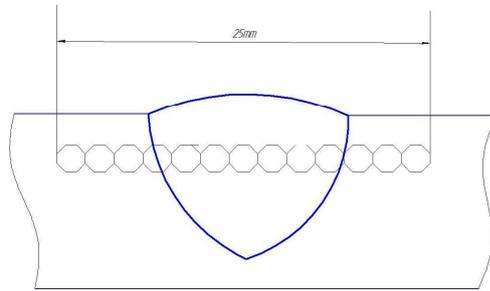
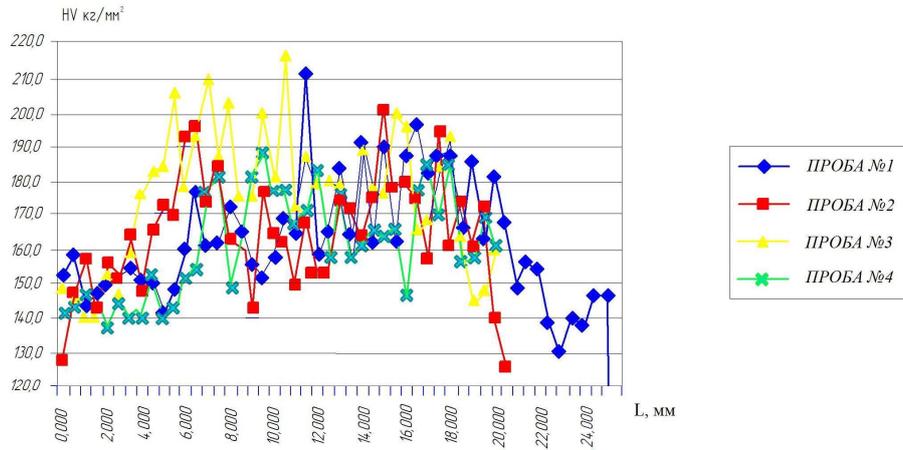
175-185 ° .

J422 ,

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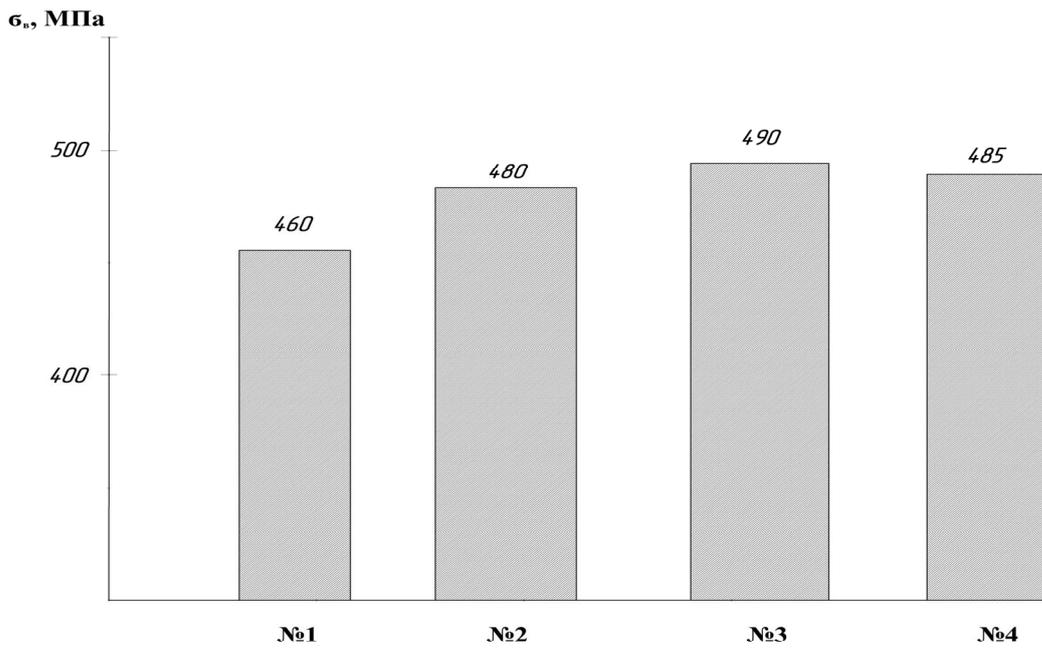
20-25 ,

215 HV



. 7.

8-10% (. 8)



. 8.

1-4

(PhD)

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1.

2.

Na₂O

K₂O

-SiO₂-TiO₂,

3.

4.

-SiO₂-TiO₂.

8-10%.

5.

6.

6-8%.

10-12%.

**SCIENTIFIC COUNCIL DSc.28.02.2018.T.03.04 ON THE ADMISSION OF
SCIENTIFIC DEGREES AT THE TASHKENT STATE TECHNICAL
UNIVERSITY AND THE NATIONAL UNIVERSITY OF UZBEKISTAN**

TASHKENT STATE TECHNICAL UNIVERSITY

ABRALOV MUZAFFAR MAHMUDOVICH

**IMPROVEMENT ON COMPOSITION OF COATINGS AND
TECHNOLOGIES OF PRODUCTION OF ACIDIC TYPE WELDING
ELECTRODES OF ENHANCED QUALITY BASED ON LOCAL RAW
MATERIALS**

**05.02.01 - Materials Science in Mechanical Engineering. Foundry. Heat treatment and
treatment of metals by pressure. Metallurgy of ferrous, non-ferrous and rare metals
(foundry production and heat treatment metals science)**

**ABSTRACT
of thesis of Doctor of Philosophy (PhD) in Technical Sciences**

Tashkent - 2019

The theme of the Ph.D. in technical sciences is registered in the Higher Attestation Commission under the Cabinet of Ministers of the Republic of Uzbekistan for B2019.2.PhD/T1126.

The thesis was performed at the Tashkent State Technical University.

The abstract of the thesis in two languages (Uzbek, Russian and English (summary)) is available on the website (www.tdtu.uz) and the information and educational portal "Ziyonet" (www.ziyonet.uz).

| | |
|-------------------------------|---|
| Scientific supervisor: | Dunyashin Nikolay Sergeevich candidate of technical sciences, associate professor |
| Official opponents: | Norxudjaev Fayzulla Ramazonovich doctor of technical sciences, professor Xudoyorov Suleyman Rashidovich candidate of technical sciences, associate professor |
| Lead organization: | Tashkent Institute of Railway Transport Engineers |

Defense of the thesis will be held «7» december 2019 at 14⁰⁰ hours at a meeting of the Scientific Council DSc.28.02.2018.T.03.04. at the Tashkent State Technical University and the National University of Uzbekistan. (Address: 100095, Tashkent, Universitet str., 2. Tel./fax: (99871) 227-10-32, e-mail: tadqiqotchi@tdtu.uz)

The thesis is available at the Information and Resource Center of the Tashkent State Technical University (registered under No. 121). (Address: 100095, Tashkent, Universitet St., 2. Phone: (99871) 227-10-32.)

The thesis abstract was sent out «23» november 2019 year.

(register of the distribution protocol 121 from «23» november 2019 year).

K. .Karimov

Chairman of the Scientific Council for Awarding scientific degrees, doctor of technical sciences, professor

N.D.Turakhodjaev

The Scientific Secretary of the Scientific Council for scientific degrees, doctor of technical sciences, professor

F.S.Abdullaev

Chairman of the Scientific Seminar of the Scientific Council on awarding academic degrees, doctor of Technical Sciences, professor

INTRODUCTION (Abstract of PhD thesis)

The aim of research work are to develop a slag base and technology for the production of electrodes for manual arc welding with acidic type coating based on mineral raw materials of the Republic of Uzbekistan.

The object of the research is the mineral raw material of the Republic of Uzbekistan for the production of acidic type electrodes and the weld junction, that are formed as a result of manual arc welding with coated electrodes.

Scientific novelty of the research work are as follows:

Chemical composition of dolomite, kaolin, feldspar as potential components for the production of a coating of electrodes acidic type for manual arc welding are justified the choice and is studied;

a multivariate scheme for the interaction of all components of the phases the weld pool during the manual arc welding has been developed;

using phase equilibrium diagrams of nonmetallic systems (Ca, Mg, Ti, Al, Si oxides), electrode coating compositions based on local mineral raw materials are proposed;

the composition of the slag base for the coating of acidic type welding electrodes based on materials obtained from local ore-mineral raw materials selected on the basis of the melting diagram of the ternary CaO-SiO₂-TiO₂ system, which improves the strength properties of welds by 8-10%, is developed;

a mathematical model has been developed to determine the oxygen content in the weld metal on the amount of calcium, magnesium and potassium carbonates in the coating composition of acidic type manual arc welding electrodes, which allows optimizing the content of gas-forming components.

Implementation of research results. The results obtained from research on the development of electrode coatings from local acidic raw materials were introduced:

the developed composition of the slag base for the coating of acidic type welding electrodes based on materials obtained from local ore-mineral raw materials selected on the basis of the melting diagram of the ternary system CaO-SiO₂-TiO₂ in the JV LLC «Tashkent Pipe Plant» named after V.L. Galperin (certificate 01-320/03-12 in September 19, 2019 of JSC «Uzmontazhspetsstroy») As a result, it became possible to increase tensile strength properties of welds by 8-10%.

the optimized composition of the gas-forming components of the coating of acidic type electrodes allows, due to the use of calcium, magnesium and potassium carbonates, to protect the welding zone in the JV LLC «Tashkent Pipe Plant» named after V.L. Galperin (certificate 01-320/03-12 in September 19, 2019 of JSC «Uzmontazhspetsstroy»). As a result, it became possible to reduce the oxygen and nitrogen content in the weld metal by 6-8%;

The structure and volume of the thesis. The dissertation consists of an introduction, four chapters, conclusion, list of used literature and appendixes. The volume of the dissertation is 120 pages.

LIST OF PUBLISHED WORKS

I- (I- ; I-part)

1. Abralov M.M., Dunyashin N.S. Mineral-raw resources of the Republic of Uzbekistan for the production of acidic type of electrode coatings //India. International Journal Of Advanced Research in Science, Engineering and Technology Scientific journal, 2019. ó Vol.6, 7 (July). ó pp. 10080 ó 10083 (05.00.00. 8)

2. Abralov M.M., Dunyashin N.S. Research and development of a slag-forming base for acidic type electrode coatings//India. International Journal Of Advanced Research in Science, Engineering and Technology Scientific journal, 2019. ó Vol.6, 7 (July). ó pp. 10106 ó 10112 (05.00.00. 8)

3. //
, 2019. - 2. - .34-36 (05.00.00. 13)

4.
// , 2019. ó
- .135-140 (05.00.00. 16)

II- (II- ; II-part)

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// , 2018. - 5 (). - .41-43.

6.
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// , 2018. - 7 (). - .31-33

7.
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// Computational nanotechnology, 2019. - 6. 3
(). - .27-30

8.
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2016 , .84-88 . - , 19-21

9. Abralov M.M., Dunyashin N.S., Saidov R.M. Improving the plastic properties of the electrode coating using of rawmineral materials of the Republic of Uzbekistan//

2018 , .273-275. - : . - , 3-4

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