ACADEMIC RESEARCH IN EDUCATIONAL SCIENCES VOLUME 2 | ISSUE 8 | 2021
ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

THE ELECTRICAL COMPONENTS ARE MADE FROM LOCAL RAW MATERIALS

Golibjon Alisherovich Doliev
PhD, Namangan State University

Sobir Bokiyevich Mamazhanov
candidate of chemical sciences, dotsent, Namangan State University

Olimjon Gulyamjanovich Abdullaev
candidate of chemical sciences, dotsent, Namangan State University

Abdurahim Botirjon ugli Abdulhaev
teacher, Namangan State University

ABSTRACT

The article is devoted to the creation of components of a welding electrode of rutile, titanium (II) oxide, ferromagnets, marmalade powder, ferrotitanium, mica, boron, starch, feldspar and cellulose based on entirely local raw materials.

Key words: electrode, hydrogen, oxygen, sulfur, weld, component, quartz, sand, dolomite, kaolin, rutile, titanium (II) oxide, ferromagents, marmalade powder, ferrotitanium, mica, boron, starch, feldspar, cellulose.

INTRODUCTION

The range of welding electrodes currently in production is expanding, and the demand for its quality in the world market is growing day by day. One of the most important tasks is to ensure their supplies, increase the durability of structures and equipment. Extensive research aimed at developing energy and resource-saving welding technologies in the world is being carried out by the world's leading research centers and higher education institutions.

Establishing the production of import-substituting products on the basis of local raw materials, filling our markets with the necessary products, ensuring the full operation of production capacity, saving and rational use of money resources is the most important source and factor of economic growth and structural transformation of the economy.

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

At present, the main raw materials for electrode coatings produced at the enterprises of the republic - rutile, titanium (II) oxide, ferromanganese, marble powder, ferrotitane, mica, boron, starch, feldspar and cellulose are being completely imported from other countries for foreign currency. This leads to an increase in the true cost of production. In addition, it has a negative impact on the continuous operation of the plant making products.

In carrying out this task, all electrode components, which are imported raw materials, are replaced by local raw materials; localization of import substitution, reduction of production costs and reduction of production costs with the use of ferromargens, marmalade powder, ferrotitanium, mica, boron, starch, feldspar and cellulose is one of the urgent problems.

Uzbekistan is a country with huge mineral resources and promising deposits. The products made from it serve to meet the diverse needs of people. It is known that mineral raw materials are widely used in the production of various metals, fuels, construction materials, chemicals, fertilizers and others. The total mineral potential of the country is about $ 3.5 trillion [1]. At present, there are more than 1,717 promising mineral deposits in the country, including more than 235 oil, gas and condensate deposits, 65 deposits of precious metals, 57 deposits of non-ferrous and radioactive metals, 3 coal deposits, 42 mineral deposits, 26 chemical deposits, 30 deposits of raw materials, more than 615 construction materials for various purposes, and 617 fresh and mineral groundwater deposits were explored. Currently, 45% of them are involved in production [2].

Due to the lack of research on the complex use of mineral resources and the formation of weld metal with high physical and mechanical properties, the cost of coated electrodes for arc welding is increasing and the production of coated electrodes using local mineral raw materials is limited. This, in turn, increases the need to develop a technology for obtaining finished and semi-finished products, as well as a scientific basis for the selection of components of the shale, to ensure the integrated use of local raw materials.

Today, the number of industries related to metal processing is growing in our country. 30,000 tons of electrodes used for welding are imported to China from China alone. As a result of the implementation of electrode production technology and the launch of production, a new type of product will be produced on the basis of local raw materials. This, in turn, leads to the production of import-substituting products and savings in foreign exchange reserves. In addition, 98% of the raw materials used for the planned production are available in the fields of the Republic.

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

Research methods and objects. In the research laboratory, the composition of the coatings required for the electrode and the appropriate norms of them were determined. The drying process of the coatings in different proportions was checked within the temperature range from 90°C to 180°C using a special reactor. All the matters were measured with high accuracy on electronic analytical scales [3].

The results obtained and their discussion. Electrode components are rutile, titanium (II) oxide, ferromanganese, marble powder, ferrotitane, mica, boron, starch, feldspar and cellulose.

The best option was determined by conducting 10 experiments on the basis of local raw materials in the laboratory. The results of the experiment are shown in table 1.

Table 1

Composition of local products coated for one electrode,%

Local raw material name	**Experimental images, %**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Rutile	11	12	13	14	**15**	17	18	19	20	21
Titanium (ll) – oxide	5	5	4	4	**3**	3	2	2	1	1
Ferromargens	5	6	7	8	**9**	10	11	12	13	14
Mica	2	3	4	5	**6**	7	8	9	10	11
Maromar kukuni	5	5	7	7	**8**	9	7	5	4	1
Ferrotitan	36	34	32	30	**28**	27	26	25	24	23
Bor	8	9	10	11	**8**	4	5	6	7	8
Starch	12	11	10	10	**9**	8	7	6	5	4
feldspar	10	10	9	8	**11**	12	13	14	15	16
Cellulose	6	5	4	3	**3**	3	3	2	1	1

The electrode containing rutile (15%), titanium (II) - oxide (3%), ferromanganese (9%), marble powder (8%), ferrotitane (28%), mica (6%), boron (8%), starch (9%), feldspar (11%), and cellulose (3%) was proven to be more effective than the other electrodes with different components.

Each electrode component has a specific function (Figure 1). Drying the compounds on a metal rod plays an important role in the formation of the electrode. The coating drying section consists of blocks. Six experiments were performed on heating ovens. Accordingly, in experiments 3 and 6, electrode drying was found to be effective. Temperature standards are an important factor in improving the quality of electrodes during the drying process. Therefore, the drying process was carried out at different temperature ranges. The results obtained are presented in table 2.

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

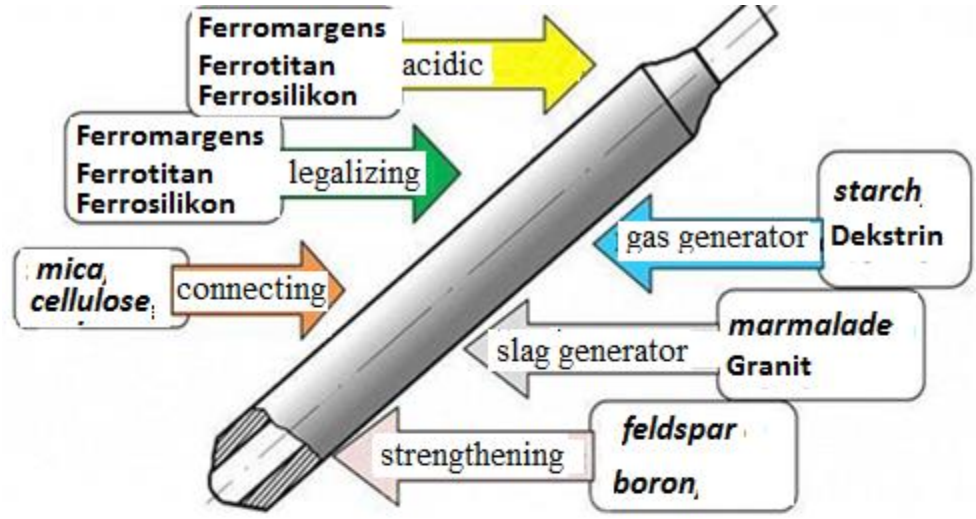

Figure 1. Electrode components and their functions

Table 2

Table of temperature changes of heating ovens

Sequence number	Experimental samples 273K					
	1	**2**	**3**	**4**	**5**	**6**
1	10	20	**20**	10	20	**40**
2	40	40	**40**	15	35	**50**
3	70	60	**65**	20	50	**60**
4	100	80	**95**	25	65	**70**
5	130	100	**125**	30	80	**80**
6	160	120	**150**	35	95	**90**
7	190	140	**170**	40	110	**100**
8	220	160	**180**	45	125	**110**
9	180	150	**170**	50	140	**120**
10	160	130	**135**	55	155	**130**
11	130	110	**107**	60	170	**140**
12	100	90	**80**	65	185	**150**
13	70	70	**50**	70	200	**160**
14	40	60	**30**	75	215	**170**
15	10	40	**10**	80	230	**180**

Initially, as the temperature rises, the gas-forming substances in the electrode components melt. As a result, the substances on the surface of the electrode stick to the wire rod (Fig. 2). When the heating process is raised to 180°C, the hardeners ensure that all the components adhere firmly to the metal rod. The temperature is then lowered during the process so that the components gradually solidify.

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

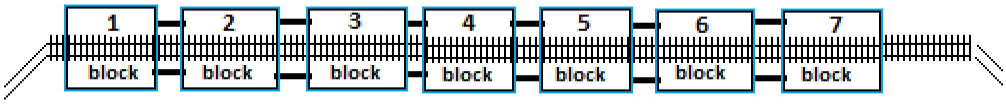

Figure 2. Description of the drying process.

It has been experimentally proven that carrying out the process at constant high or low temperatures has negative consequences (Fig. 3). Conducting the heating process at a constant temperature of 180°C has been shown to adversely affect the brittleness of the electrode components and the activity of the slag-forming substances. For example, the above situation was observed in experiments 1 and 5.

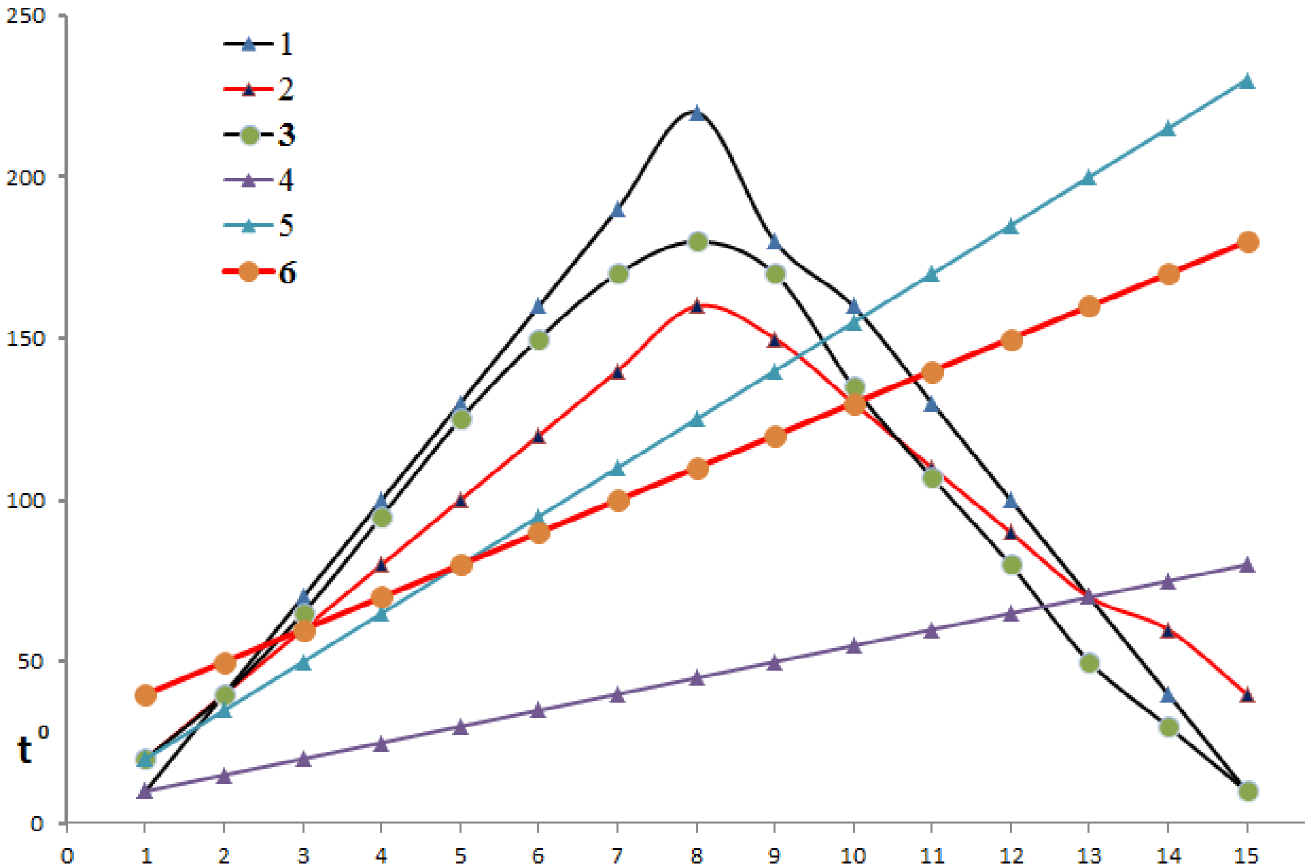

Diagram of temperature change of heating columns t^0

If the heating process is carried out at a constant temperature below 180°C, it leads to a destruction of the function of gas-forming and stabilizing substances (experiments 2 and 4). As a result, the components on the surface of the metal rod became brittle. As a result, the electrode components begin to disintegrate, unable to withstand weak mechanical action. During welding, the electrode life is reduced and the casting continuity is lost. Experiments 1-6 show that in experiments 3 and 6, the

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

composition of the electrode components did not change. But it takes 3-4 hours to cool the electrodes from the 6th experiment. The drying section produces finished product after the third experiment. The electrode obtained in this experiment is strong in all respects. Its welding continuity and casting time fully meet international standards.

The welding electrodes consist of a metal rod with a coating on the top. Occasionally there are uncoated electrodes on the top. Metal rods or welding wire is a actually molten electrode. Welding wires used in the manufacture of electrodes are produced with a diameter of 1 - 12 mm and a length of 450 mm [4].

A single electrode with a diameter of 4.0 mm weighs 51.3 grams and 5 mm 78.1 grams. There are a number of parameters to consider when optimizing welding work. In addition to the most important parameters that directly affect the physicochemical properties of the result of the work - the type of electrode coating, the weight of the electrode should be taken into account, depending on the type of surface.

The electrodes are coated with diameters from 2.5 mm to 4 mm. Often, to determine the need for electrodes, the person in charge calculates the consumption of electrodes per 1 p / m of suture. This method allows you to control the individual consumption of electrodes. It is known that the weight of the electrode is affected by diameter, length, type of coating and other factors.

We compare the weight, diameter and length of the new electrode with the Swedish KO 53.7 electrode and the Japanese LB-52U electrode.

Swedish KO 53.7 and Japanese LB-52U electrode specific gravity with new electrode

Table 3

Samples	Physical properties				
	Diameter (mm)	Length (mm)	Package weight (kg)	Single electrode weight (g)	Number of electrodes in the package (pieces))
SHved KO 53,7 elektrodi	2,5	350	4,5	18,8	240
	3,2	350	4,7	30,7	153
	4	450	6	63,2	95
YAponiya LB-52U	2,6	350	5	20	250
	3,2	350	5	31	161

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

	4	400	5	53	94
	5	400	5	82	61
YAngi elektrod	2,4	450	5	20,8	240
	3,0	450	5	31,3	160

A good knowledge of the properties of the above products allows us to increase the required efficiency of the welding electrode and reduce the consumption of the electrode. The electrodes are also divided into thin-coated and thick-coated electrodes. Thin-coated electrodes make the wire more stable. The thin coating makes the wire more stable. The most common coatings are chalk and liquid glass coatings. Therefore, high-quality welding is not accomplished with thin-layer coating. Therefore, thick-coated electrodes are often used. Welding electrodes are required for the construction of metal structures, the connection and repair of various metal parts. The welding electrodes form a weld that is a strong "bridge" between the connected elements. Welding electrodes are used in both home construction and mass industrial facilities, there are more than 200 types of welding, about half of which are specially designed for manual welding. The following can be done with a welding electrode: joining two metal parts, welding of cracks, cutting of individual parts of metals and metal devices; Welding electrodes are also used to liquefy various metal parts that have changed their natural geometric dimensions and become obsolete during operation. As the amount of nitrogen and oxygen in the weld metal increases, the metal becomes less brittle and more brittle. Therefore, when creating a coating for welding electrodes, all the requirements that allow to reduce the amount of oxygen and nitrogen in the molten metal are met.

It is also important to pay attention to the properties of welding electrodes of different coating thicknesses. For example, thin-walled welding electrodes allow welding with a more stable welding wire, but this feature of thin-walled electrodes affects the quality of the resulting weld. When welding with this type of electrode, the weld seams are less durable, so such an electrode is rarely used.

Instead of thin-walled welding electrodes, it is advisable to use thick-coated electrodes, which allow for high-quality welding and make it more convenient. This is because the thick coating of the welding electrode contains oxidizing and slag-forming substances.

The presence of large amounts of slag allows the weld to be protected from environmental factors, so these electrodes are an excellent choice for welding critical

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

structures. Using thick-walled welding electrodes, it is possible to weld important metal structures without compromising quality.

Electrodes used in the welding of metal alloys must provide high mechanical properties of the weld and high performance when joining parts by welding.

The components coated on the surface of the electrode are coated with a coating that prevents the absorption of oxygen and nitrogen from the molten metal during welding. An increase in the amount of oxygen and nitrogen in the coating dramatically reduces the plastic properties of the metal. First, a drop of iron oxide forms on the surface of the molten metal and dissolves immediately. When pouring a drop of metal during welding, iron oxide is neutralized with carbon, manganese, silicon: with the addition of welding wire or electrodes. From the electrode coating, the alloying elements partially burn, pass into the weld metal, and the weld has mechanical properties close to those of the metal. Electrodes are used in the welding of stainless and heat-resistant steels, the electrode tube of which is chemically identical to the weld metal.

CONCLUSION

Instead of thin-walled welding electrodes, it is advisable to use thick-coated electrodes, which allow for high-quality welding and make it more convenient. This is because the thick coating of the welding electrode contains oxidizing and slag-forming substances.

The presence of large amounts of slag allows the weld to be protected from environmental factors, so these electrodes are an excellent choice for welding critical structures. Most deposits contain elements such as silicon, manganese, sulfur, phosphorus, and carbon. Using thick-walled welding electrodes, it is possible to weld important metal structures without compromising quality.

REFERENCES

1. L.M.Toshpulatova. Socio-economic potential of the region. - T .: TDIU, 2004. - 123 p.

2. Turamuratov I.B. Integration of science and practice as a mechanism of effective geological development of the Republic of Uzbekistan / Mat-ly. mejdunar. nauch.-techn. konf. 2014. S. 7-9.

3. Dunyashin N.S. Abstract, Tashkent, 2019

ISSN: 2181-1385
Scientific Journal Impact Factor (SJIF) 2021: 5.723
Directory Indexing of International Research Journals-CiteFactor 2020-21: 0.89
DOI: 10.24412/2181-1385-2021-8-244-252

4. Abstract. Technology of preparation of electrode coatings using local raw materials to improve the characteristics of welds. News of the National University of Uzbekistan, 2019.
5. Abstract. Welding of metals, Injection. 2014y.
6. uz.wikipedia.org ›wiki› Elek ...
7. pro-men.ru ›types-of-electro ...
8. srcyrl.dayangwelding.cc ›info
9. srcyrl.alloyconsumables.net ›...