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METHODS OF USING STEARATE SALTS IN THE PROCESSING OF METALS

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Abstract. Dry lubricant obtained on the basis of local raw materials is used for processing and stretching metals prepared from the following components: sodium soap, sodium sulphate Na_2SO_4 5.0-20.0; borax $Na_2B_4O_7 \cdot 10H_2O$ 0.1-5.0 and talc. At present, the pilot-test work was carried out at a private company "DAVR METALL" in Namangan.
Key words: borax, sodium sulfate, sodium tripolyphosphate, sodium carbonate, stearic acid, calcium stearate, magnesium.

METALLARNI QAYTA QILISHDA STEARAT TUZLARDAN FOYDALANISH USULLARI

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Annotatsiya. Mahalliy xomashyolar asosida olingan quruq surkov kompozitlari metallarni qayta ishlash va cho’zish uchun ishlatiladi va quyidagi tarkibiy qismlardan tayyorlanadi: natriy strearat, natriy sulfat Na2SO4 5,0-20,0; bura $Na_2B_4O_7 \cdot 10H_2O$ 0,1-5,0 va talk. Ayni paytda Namangan shahridagi “DAVR METALL” xususiy korxonasida tajriba-sinov ishlari olib borildi.
Kalit so'zlar: bura, natriy sulfat, natriy tripolifosfat, natriy karbonat, stearin kislota, kaltsiy stearat, magnezium.

ПОСОБЫ ИСПОЛЬЗОВАНИЯ СТЕАРАТНЫХ СОЛЕЙ ПРИ ПЕРЕРАБОТКЕ МЕТАЛЛОВ

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Аннотация. Сухая смазка, полученная на основе местного сырья, применяется для обработки и вытяжки металлов, приготовленных из следующих компонентов: натриевое мыло, сульфат натрия Na_2SO_4 5,0-20,0; бура $Na_2B_4O_7 \cdot 10H_2O$ 0,1-5,0 и тальк. В настоящее время опытно-промышленные работы проводятся на частной компании «ДАВР МЕТАЛЛ» в Намангане.

Ключевые слова: бура, сульфат натрия, триполифосфат натрия, карбонат натрия, стеариновая кислота, стеарат кальция, магний.

By the second half of the twentieth century, wires were stretched using the first methods in metal processing (ferrous metallurgy, electrical engineering, cables, mechanical engineering). The first method of stretching steel wires is based on passing them through a conical hole in the device. Wire production was available in almost all ferrous and non-ferrous metal plants in the former Soviet Union, as well as in machine shops of various specialties. The number of such devices and plots has exceeded 100. In the first method, strong friction occurred despite the use of dry lubricants to stretch the wires. Soap granules were used, in order to lengthen thin and thin wires (less than 1mm in size) oil and emulsion were used . The first method implemented a push mode called limit mode.

Prior to the invention of new technologies for stretching steel and copper wires, the first method of stretching wires was used in all enterprises in the Commonwealth of Independent States (CIS). Nowadays, new technologies have been developed in the processing of metals, using dry lubricant composites of various compositions to stretch wires.

In particular, dry lubricants with the following composition were developed for elongation of welding wires, e.g.%: five molecules of aqueous boron (pentahydrate) $Na_2B_4O_7 \cdot 5H_2O$ - 60.0-90.0; sodium tripolyphosphate $Na_5P_3O_{10}$ - 8.0-12.0; sodium phosphate Na_3PO_4 - 8.0-12.0; sodium sulphate Na_2SO_4 - 13.0-35.0; sodium carbonate Na_2CO_3 - 3.0-11.2; bone glue - 0,01-1,0; the rest is water (Patent RU 2197560, S23S 22/00, V21S 9/00, publ. 2003.01.27). The disadvantage of this composite is that it is expensive, requires the use of soap for additional lubrication, and can not be used in the manufacture of wire from mechanically cleaned rods. There is a dry lubricant composite used to stretch the wires, for example:%: calcined soda Na_2CO_3 5.0-20.0; sodium nitrite $NaNO_2$ 0.5-7.0; sodium sulphate Na_2SO_4 5.0-20.0; borax $Na_2B_4O_7$ $10H_2O$ 0,1-5,0; magnesium (activated) MgO 1.0-5.0; boron nitride BN 0.05-3.0; the other part is stearic acid $C_{17}H_{35}COOH$ - o (Patent RU 2190693, S23S 22/00, V21S 9/02, publ. 2002.10.10). The disadvantage of this well-known dry soda composite is that it can only be applied by phosphating and cannot be used in the process of stretching wires after mechanical cleaning of rods from mill scale. Analysis of the literature shows that despite the large number of lubricant composites used in metal processing, they have various shortcomings. [1-5] The availability of raw materials for the production of dry-lubricating compositions in the country leads to the possibility of producing a variety of chemical reagents, the independence of raw materials, the utilization of local by-products and, consequently, the production of low-cost products. The proposed dry-lubricating compositions ensure that the quality of the metal does not deteriorate during the elongation process, and that the elongation is smooth.

Today, such dry lubricant compositions are not produced in Uzbekistan, so they are imported from foreign countries such as China, Russia and Ukraine. As a result of the implementation of this 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, 86% of the raw materials used in the production of dry lubricant composition are available in the country.

The product is environmentally friendly and no less effective than its analogues. Optimal conditions for the production of dry lubricant compositions used in the processing of non-ferrous and ferrous metals on the basis of local secondary raw materials have been

developed. Their production is carried out in simple typical reactors. This, in turn, indicates that the process is not complicated.

The uniqueness of the project is that a new technological line producing new valuable products from cheap raw materials and using less sophisticated, conventional chemical industry equipment will be created and launched for the country.

The introduction of the proposed technology will result in the production of new products for the metalworking industry. As a result, the economic performance of the manufacturing enterprise grows. In the steel wire industry, wires with a larger diameter are made by stretching a larger diameter steel wire. The process is based on passing a large diameter wire through a hole with a smaller diameter, i.e. a filler.

Modification of all types of lubricant composites is possible. This is done by changing the basic parameters of lubricant composites or by adding special additional components. The technology and composition of the above 4 types of lubricant composites produced in the Republic of Belarus are kept strictly secret by the manufacturer. [4]

Lubricant composites with a certain composition fully meet the requirements of physical, mechanical, environmental and fire safety. [6-13]

However, there is a limit to the length of time they can be used. Lubricant composites adhered to the surface of steel wire in a thin layer have a certain elongation limit. If this limit is exceeded the quality of the product may not meet the requirements (Figure 1-2).

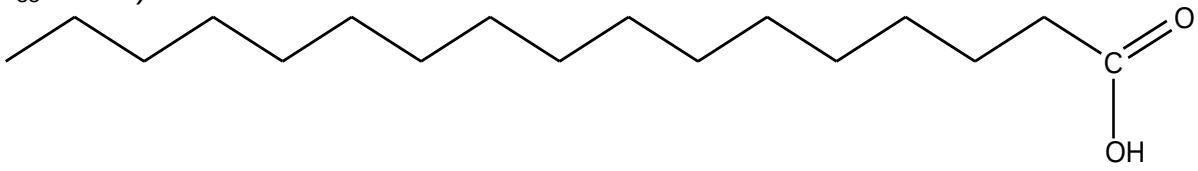
Such steel or other metals are considered unsuitable for similar consumption. If we look at it in magnification, it can be as follows.

Figure 1. Lubricant composite is not used

If the stretching process is carried out with the use of lubricant composite, then the enlarged appearance of the product can be as follows. [9]

Figure 2. The state in which Lubricant's composite is used

Stearic acid is a saturated monobasic fatty acid containing S3- (S2) 16-COOH ($C_{17}H_{35}COOH$).



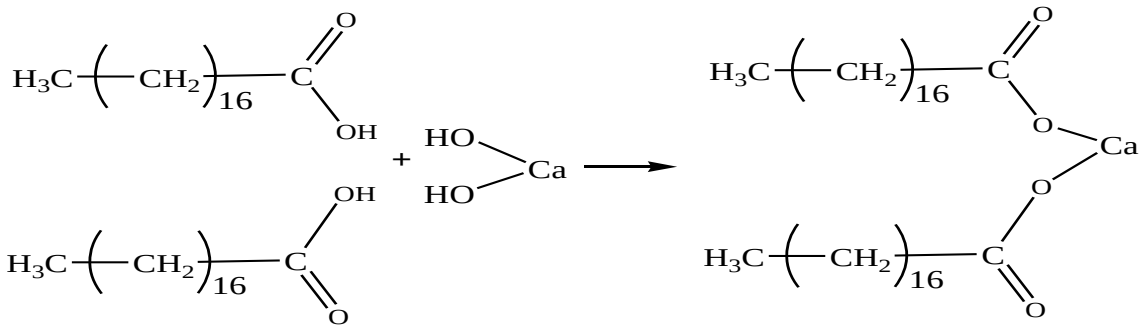
Stearic acid is mainly obtained by hydrolysis of fats in industry. Stearic acid is oily, solid at room temperature.

We hydrolyzed the stearic acid in the laboratory under acidic conditions. The stearic acid rises to the surface of the solution and is removed with a filter paper. The resulting acid is dehydrated in a drying oven without reaching the melting point.

The resulting stearic acid was extracted and dried again. It was found that its water content is 28%. When thawed, re-hardened, and pulled at temperatures above 100 ° C, we found that the mass was reduced by 5%. It turns out that the resulting stearic acid contains 28 + 5 = 33% moisture.

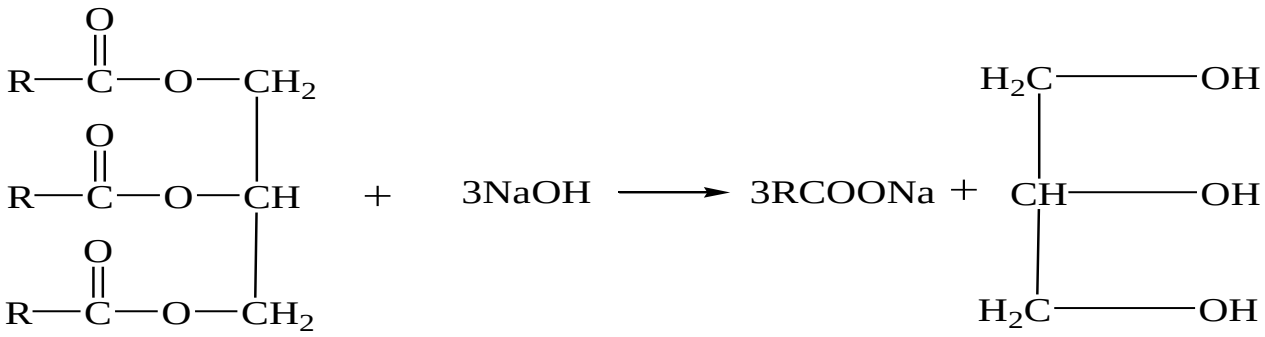
Synthesis of calcium stearate: 32 grams of stearic acid obtained from the above experiment, the mass of calcium hydroxide required to convert this acid to calcium stearate is determined by the reaction equation (Figure 3).

To carry out the saponification reaction, the synthesized stearic acid was added to a heat-resistant vessel, melted and heated to about 120-140 ° C until liquefied.



The heated saturated fatty acid was sprinkled with alkali and stirred vigorously, taking small precautions. The resulting calcium soap, due to its higher melting point than fatty acids, solidifies and begins to separate. As the container is tilted, the calcium stearate is collected at the top of the container and the alkali is added to the liquid fatty acid at the bottom. The process continues in this way. When the process is complete, the calcium soap is collected and weighed.

Soap is a salt of fatty acids formed by metals, which is obtained by the saponification reaction. In this process, fats are alkalinely hydrolyzed.



when R-radicals of fatty acids.

Soap is mainly used in dry lubricant composites used to stretch steel wires.

Figure 3 Calcium stearate

All dry lubricant composites proposed in this study include household soaps containing 65-70% fatty acids. Soap is a surfactant as well as the most suitable component for lubricant composite. This was also mentioned in the literature review. Calcium stearate and sodium soaps are also added to motor oils. For this purpose, they serve as a lubricant composite for engine pistons.

To prepare the composite, Lubricant first selected high-quality household soap and scraped it using a special scraper. The shavings contain a large amount (15-30%) of water, and it is advisable to use a drying cabinet to partially get rid of it. If drying is not possible in the oven, it is also possible to dry in the open air in the sun.

Figure 4. Dried Soap Scrap

This dried mass contains a certain amount of water, which is completely eliminated during the thawing process.

400g of soap scrap were obtained for the experiment. The scales were weighed and weighed 328 g. It can be seen that the soap used contains 18% moisture (Figure 4). When the soap was diluted and weighed again, it weighed 312g. It can be seen that the soap has a

moisture content of 400-312 = 88, 88/400 = 0.22 by mass. The bottom line is that the soap contained 22% water.

The quantitative composition of the substances was obtained in the following percentages relative to the mass. Calcium stearate is obtained by 20%, soap by 23%, borax by 4%, talc by 5%, kaolin by 5%, iron (III) oxide by 5%, lime powder (CaO) by 20%, and potassium fluoride by 8% Calcium stearate was added to the sand bath and heated slowly. In this process, it is important to ensure that the temperature does not exceed 190 ° C.

When the calcium stearate is completely dissolved, add soap powder and dissolve it completely. The remaining additives were then added one by one to the mass and mixed vigorously. The additional components were mixed with a completely oily liquid to form a homogeneous system for 120 minutes.

The product cooled and began to solidify into a monolith. The resulting monolithic product was ground in a porcelain mortar and pulverized.

The most important parameter of Lubricant composite is its adhesion to the surface of steel wire. To test this, a powder-coated steel wire was placed on the lubricant composite. The powder was then applied to the surface of the steel wire in a thin layer.

Increasing the amount of talc magnesite and kaolin in the composition, preparing the fraction in the size of 300-400 microns and less accelerates the adhesion of the product to the metal wire, improves the adhesion of the product to the metal wire, prevents metal corrosion and improves the quality of elongated wire. Lubricant composite does not boil at high melting temperatures, does not decompose, and does not crumble during elongation.

The proposed product serves as a dry lubricant composition in the process of stretching various types of steel wires. Product wiring does not adversely affect the quality of the metal during the elongation process and ensures a smooth elongation. In addition, stretching wires brings great economic benefits to the company while reducing the cost.

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