**Research of the rubber blend**

**properties based on Butadiene-Nitrile and diene rubber**

**Mikhailov Yan Aleksandrovich, Mokhnachevsky Aysen Aleksandrovich**

**Abstract:** This works aim Development and research of frost-resistant and oil-resistant rubber products. Often rubbers do not withstand the harsh conditions of the Far North, reaching -50 ° C, and do not meet their requirements. Currently, the creation of frost-resistant and aggressive-resistant sealing materials is an important task, especially in our republic.

To achieve the required set of properties, it is necessary to conduct research using a similar method. The development of high-quality rubber products capable of working for a long time in harsh operating conditions is impossible without improving the raw material base, developing new promising types of rubbers and other components of rubber mixtures.

**Key words (5-6):** properties, butadiene-nitrile and diene rubber

**Relevance:** As we know, it is very cold in our vast republic, so often rubber does not withstand the harsh conditions of the Far North reaching -50 ° C and does not meet its requirements. To date, the creation of frost-resistant and aggressively resistant sealing materials is an important task, especially in our republic. In particular, low degrees of swelling are required in working environments of different nature (mineral and synthetic), simultaneously with acceptable physico-mechanical and low-temperature properties.

**Problem:** In order to achieve the required set of properties, by such a method, it is necessary to conduct research. The development of high-quality rubber products that can work for a long time in harsh operating conditions is impossible without improving the raw material base, developing new promising types of rubbers and other components of rubber mixtures.

**Purpose:** Development and research of frost-resistant and oil-resistant rubber products.

**Tasks:**

1. Study the literature on this topic

2.Create mixtures of rubbers based on SKI-3, SKD, BNKS

3. Get acquainted with the methods of rubber research

4. To investigate the properties of rubbers

5. Conduct a comparative analysis between rubbers

**Objects of research:**

**Rubbers:**

1. Butadiene-nitrile rubber (BNKS-18, BNKS-26)

2. Isoprene rubber (SKI-3)

3. Butadiene rubber (SKD)

**Scientific novelty:** For the first time in the RS (I), rubber was created with such a ratio of mixtures.

**Practical significance:** The use of rubber mixtures in the creation of rubbers allows you to combine different properties in one material, which allows you to use advanced materials as sealing materials.

**Preparation of rubbers and ingredients for mixing**

The rubbers and ingredients supplied to the enterprises of the rubber industry must meet the quality requirements of the regulatory and technical documentation for a certain brand of raw materials. If the conditions of their transportation and storage are violated, contamination, humidification and caking are possible. A number of ingredients arrive in a solid (plates, pieces) and viscous state. Some rubbers crystallize and have low initial plasticity.

 In laboratory conditions, the preparation is carried out on small-sized equipment, structurally no different from the production, equipped with the necessary control and measuring devices. Natural rubber and a wide range of synthetic rubbers are used for the preparation of rubber mixtures. Their behavior during processing depends on rheological properties, which are determined by the chemical nature of rubber and the regularity of the structure.

The right choice of the type of rubber allows you to get rubber mixtures with the necessary technological properties and ensures the production of high-quality products.

**The essence of the mixing process**

Preparation of rubber mixtures is one of the main and most responsible technological processes for the production of rubber products. The essence of the process consists in the uniform distribution of powdered, solid and liquid ingredients in rubber and the production of a rubber mixture homogeneous in composition, technological properties and physical and mechanical parameters as a result of multiple strains of tension, compression, shear and torsion of a multicomponent system arising during mixing. At the same time, the ingredients are crushed and their random disordered distribution occurs.

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The technological behavior of rubber compounds during processing depends on the cohesive, autohesional and adhesive properties.

 Preparation of rubber and ingredients for mixing, the accuracy of their weighing, a certain sequence of introduction of ingredients into rubber, the temperature and speed of mixing, the pressure on the mixture in the rubber mixer, the type of mixing equipment significantly affect the properties of the mixtures obtained. In the laboratory, rubber mixtures are prepared on laboratory rollers or rubber mixers.

**Experimental Part**

1. Determination of conditional tensile strength and elongation on the SHIMADZU AGS-J machine. We fastened the blades we created on a machine that holds it on two different sides and stretches it. And then we counted at what tension the tear happened.
2. Determination of the frost resistance of rubbers. The tests are carried out in accordance with «ГОСТ 13808-79». In ethyl alcohol with nitrogen at a temperature of - 50C, we immerse the rubber loaded up to 8 mm and wait 5 minutes; then we remove the load and wait 3 minutes. We observe the changes.
3. Determination of erasability on the «МИ – 2» machine. We clamped our rubber workpieces and ran the machine which is a rotating disc that erases the rubber.

**Conclusion**

Having studied the theoretical material on this topic , we came to the following conclusions:

1. Rubbers based on mixtures of rubbers (BNKS-18+SKI-3+SKD) were created.

2. Rubbers based on mixtures of rubbers with different plasticizer content (DBS, DBF) were investigated

3. It was found that rubber with DBS plasticizer has good frost resistance, but has less wear resistance than rubber with DBF content.

4. Physico-mechanical properties were better for rubber with DBF.

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