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STUDY OF MODIFICATION OF BUTADIENE NITRILE POLYMER WITH COMMODE

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ABSTRACT
By preparing binary mixtures of butadiene-nitrile rubber with wood resin in different mass ratios, the volume consumption of these systems at temperatures of 100, 120, 150, 165 ℃ and under the influence of loads of 160-190 kg was studied. studies have shown that at 108 ℃, when the polymer has 5 mass parts commode, it acts as a modifier. as a result of odification, the technological properties of BNK, mainly chemical stability, increase one time compared to standard pezins. A recipe was drawn up on the basis of butadiene-nitrile polymer, and the obtained rubber mixture was vulcanized and the main properties of the vulcanizate were determined. As a result of the research, it was found that the wear coefficient of the obtained rubber increased by 19.6%, and the relative elongation increased by 44.4%.
Keywords: Wood resin, modification, physical-mechanical property, aggressive environment, resistance to ozone.

Introduction

Butadiene nitrile polymers occupy the leading place among the most widely used elastomers in the industry. The presence of nitrile groups in this rubber increases the resistance to oil and gasoline of the rubber obtained from it. The literature review showed that the field of use of butadiene nitrile polymers is wide, and it is the most relevant to buy new compositions based on it today is seen as a problem[1-5].

However, in addition to the positive aspects of butadiene nitrile polymers, they also have a number of missing properties, which do not allow the use of this very valuable elastomer for more important purposes. This work was carried out in order to improve some of the negative properties of butadiene nitrile polymers. we have works dedicated to improving some properties of this elastomer[6-8].

Butadiene-nitrile rubber resistance to ozone has not been studied to date. The large-scale application of this elastomer requires the purchase of ozone-resistant resins[11-12].

Method

A rubber mixture based on BNR and resin was prepared on a laboratory scale. For this purpose, in the laboratory, we first added elastomer, plasticizer, resin to the space between the rods, and mixed it for 5-6 minutes at a temperature of 45-60℃ until a homogeneous system was obtained. At this time, we made the possible space between the shafts more than 0.2-0.3 mm, and

by repeating this process several times, we slightly increased the available distance and made it possible for the rubber on the front shaft to fully match with the other camponets. The obtained composition was vulcanized at a temperature of 155℃ and for 25 minutes, and the physical and mechanical properties of the vulcanizate were determined on a grinding machine.

Results and Discussions

The recipe obtained using tree resin is given in table 1.

Table 1. The composition of the compensation received under BNR

№	Indicators	1	2	3	4	5	6	7
1	BNR	100	100	100	100	100	100	100
2	Tree resin	-	1	3	4	6	8	9
3	Rubraks	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	Captax	0.9	0.9	0.9	0.9	0.9	0.9	0.9
5	Sulfenamide BT	0.3	0.3	0.3	0.3	0.9	0.9	0.9
6	Zinc oxide	4.0	4.0	4.0	4.0	4.0	4.0	4.0
7	Technical carbon M414	45	45	45	45	45	45	45
8	Sulphur	2.3	2.3	2.3	2.3	2.3	23	2.3
	Total	170.4	172.1	1731	174.3	175.1	176.3	179.3

The rheological properties of the binary systems obtained by using the BNR mixture with different mass fractions of wood resin were studied at different loads and at different temperature intervals, and the obtained results are shown in Figures 1 and 2.

11.75 of BNR-40/commode bed mixture at 100 ℃ temperature; 20.85; 26.1; Analyzing the dependence curves of the volume consumption on the mass fraction of the commode in the mixture under the pressure created by 32.6 kg loads, we came to the conclusion that when the system contains 4 mass parts of wood resin, the amount of volume consumption increases by a large jump. This indicates that 3-4 mass parts of wood resin in the mixture when the center of gravity of the mixture is shifted by a jump. This means that 4 parts by mass of wood resin act as an elastomeric modifier.

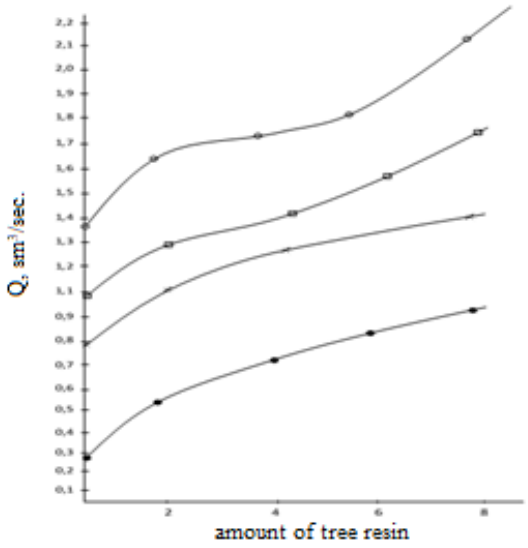

Fig.1. Dependence of volume consumption of BNR 40/camod binary mixtures alloys at 106˚C on the amount of wood resin.

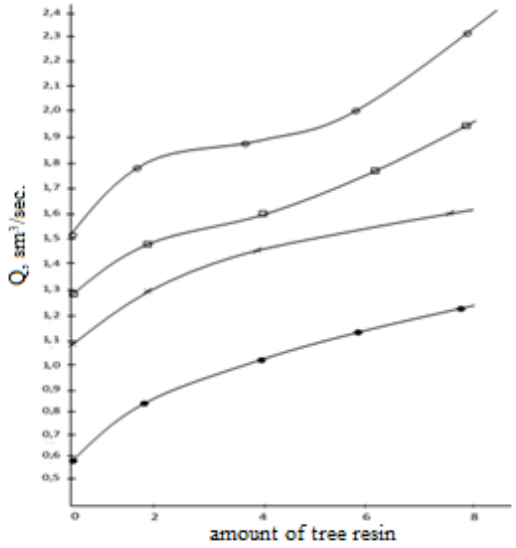

Fig .2. Dependence of volume consumption of BNR 40/camod binary mixtures alloys at 140˚C on the amount of wood resin.

Confirmation that the properties of the vulcanizates obtained by structuring BNK are modified by the presence of the resin and vulcanization agents in the recipe is proved by the increase in the physical-mechanical properties of the vulcanizates given in table 2.

As mentioned, in addition to the functional groups in the commode, the use of octahedral sulfur has led to an increase in the physico-mechanical indicators of vulcanizates.

We observed that compounds in wood resin with high functionality caused a significant increase in the degree of structuring of the composition based on BNR. With the direct participation of the structural agent in the formation of cross-links, the interaction of the activated

BNR molecules with each other has created the possibility of direct participation in the formation of C-C-links.

The prepared BNR was vulcanized at a temperature of 155±1℃ for 25 minutes and the obtained results are given in table 2.

Table 2. Physico-mechanical properties of compositions based on butadiene-nitrile rubber modified with commode

№	Code of compositions / Indicators of Compositions	K1	K2	K3	K4	K5
1	Breaking strength limit, Mpa	15,5	16.4	18.1	14.9	14.0
2	Relative elongation, %	328	328	331	341	348
3	Relative residual deformation, %	11.6	12.9	13,9	13.5	13.7
4	Tear resistance, kN/m	63.7	64.1	66.2	67.0	69.1
5	Friction, sm^3/kwt·hour	59.1	57.3	55.1	54.9	52.8
6	Metal contact strength, MPa Steel-3 Brass	 6.0 6.9	 5.9 7.9	 6.1 8,1	 6.8 8.7	 5,9 8.0
7	Embrittlement temperature, ℃	258	259	255	254	252
8	Strength on TM-2 , conventional unit	79	79	81	80.1	80.2
9	Swelling rate at a temperature of 25ºC for 25 hours, % Isooctane-toluene- (70:30) Gasoline-benzene- (3:1)	 11.2 21.4	 11.8 22.0	 11.9 21.1	 10.1 19.9	 11.3 19.8
10	Heat wear coefficient at 106 ºC k temperature for 49 hours tp Ep	 0.78 0.61	 0.83 0.62	 0.86 0.63	 0.87 0.64	 0.88 0.65
11	Rebound elasticity, %	9.8	10.6	10.9	10.3	10.1
12	Frost wear coefficient tp Ep at -18ºC for 12 hours	0.72 0.53	0.77 0.56	0.84 0.66	0.88 0.74	0.0 0.90

Conclusion

1. Based on butadiene-nitrile elastomer, in order to obtain rubbers that can work against ozone and, most importantly, in aggressive environments, the goal set was solved by modifying these rubber trees with wood resin called komod.

2. It is advised to use the products purchased on the basis of BNR in aggressive environments.

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ИССЛЕДОВАНИЕ МОДИФИКАЦИИ БУТАДИЕН НИТРИЛЬНОГО КАУЧУКА С ДЕРЕВЬЯМИ КАМНЕМ

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РЕЗЮМЕ

Путем приготовления бинарных смесей бутадиен-нитрильного каучука с древесной смолой в различных массовых соотношениях изучен объемный расход этих систем при температурах 100, 120, 150, 165 ℃ и под действием нагрузок 160-190 кг. исследования показали, что при 108 ℃, когда полимер имеет 5 массовых частей, он действует как модификатор. в результате модификации технологические свойства БНК, главным образом химическая стабильность, повышаются в разы по сравнению со стандартными резинами.

Составлена рецептура на основе бутадиен-нитрильного каучука, полученная резиновая смесь вулканизирована и определены основные свойства вулканизата. В результате исследований установлено, что коэффициент износа полученной резины увеличился на 19,6 %, а относительное удлинение увеличилось на 44,4 %.
Ключевые слова: древесная смола, модификация, физико-механические свойства, агрессивная среда, стойкость к озону.

BUTADİEN NİTRİL KAUÇUKUNUN AĞAC SAQQIZI İLƏ MODİFİKASİYASININ TƏDQİQİ

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XÜLASƏ

Butadien-nitril kauçukunun ağac qatranı ilə müxtəlif kütlə nisbətində binar qarışıqları hazırlanaraq, bu sistemlərin 100, 120, 150, 165 ℃ temperaturlarda və 160-190 kq yüklərin təsiri altında həcm sərfi öyrənilmişdir. Tədqiqatlar göstərdi ki, 108 ℃ temperaturda polimer 5 kütlə hissəyə malik olduqda, o, dəyişdirici kimi çıxış edir. modifikasiya nəticəsində BNK-nın texnoloji xassələri, əsasən kimyəvi dayanıqlığı standart pezinlərlə müqayisədə bir dəfə artır. Butadien-nitril kauçuku əsasında reseptura tərtib edilmiş və alınmış rezin qarışığı vulkanizasiya edilmış və vulkanizatın əsas xassələri müəyyən edilmişdir. Aparılan tədqiqatlar nəticəsində məlum olmuşdur ki, alınan rezinlərin aşınma əmsalı 19,6%, nisbi uzadılması isə 44,4% artmışdır.
Açar sözlər: Ağac qatranı, modifikasiya, fiziki-mexaniki xüsusiyyət, aqressiv mühit, ozona davamlılıq.