Development and Implementation of Composition on the Basis of Disposed Polymer Waste

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ABSTRACT

Every year, the amount of polymer products used in the country in our country is constantly growing, and these products, after use, turn into waste and cause environmental damage to our flora and fauna. The emissions of polymers used in technology are increasing year by year with the same intensity. The recycling of non-biodegradable polymer wastes is of both environmental and economic importance. However, the incomplete study of recycling methods limits the use of these valuable raw material sources. The article shows the reasons for the decommissioning of polymeric materials and analyzes the methods of recycling. Polymeric materials do not rot, do not corrode, etc. Their recycling is not only an economic problem, but also an environmental problem that needs to be addressed

KEY WORDS: WASTE, POLYMER PRODUCTS, RECYCLING, ECOLOGY, MODIFICATION, PROCESSING, BITUMEN. DESTRUCTION, POLYMER WASTE, POLYMER-BITUMEN COMPOSITION, PHYSICAL AND MECHANICAL PROPERTIES.

INTRODUCTION

Recycling of polymer waste from domestic sources is a very difficult task. It is almost impossible to organize the collection of this waste. Even if collected, there are difficulties in sorting, cleaning, shredding, washing and drying the waste. Despite all these difficulties, the recycling of polymer waste is of great environmental importance. If the structures remain and are not destroyed, it is much easier to recycle polymers of the same composition. Of course, the process of destruction is such that significant changes can occur in the macromolecule and morphology of the polymer. As a result of these changes, all the physical properties of the polymer deteriorate.

Therefore, the use of mechanical methods in the recycling of polymer waste does not give the desired results. Because during mechanical processing, macromolecules become more destructive and lose their physical and mechanical properties.

RESULTS

Taking into account the fact that there are 40-50 thousand tons of polyethylene and polystyrene waste in the republic every year, we determined that the method of their utilization is in the modification of road petroleum bitumen.

PS destruction occurs mainly as a result of high temperatures. As a result of destruction, the molecular weight of PS decreases. This can be seen more clearly in Figure -1. Polystyrene recycling and utilization methods. The reprocessing of homogeneous polymers is very simple if their structures are not destroyed. If the structure of the polymer is destroyed, then its molecular weight decreases and the physical and mechanical properties of the polymer deteriorate. If the polystyrene waste retains its original physical and mechanical properties,

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it can be used only for special purposes. Polystyrene is used in many different fields. Polystyrene is the main raw material in the production of packaging materials, coatings, electrical and electronic structures, toys and other products.

Figure 1: PS destruction in oxygenated and non-oxygenated environments 1-oxygenated, 2-oxygen-free.

DISCUSSION

The article used the polystyrene waste shown in Table 1 to obtain a polymer-bitumen composition. 1-oxygenated, 2-oxygen-free. The joint use of PS and polyethylene waste is also of great environmental and economic importance. "Baku" brand bitumen was modified with polymer waste. The physical and mechanical properties of the obtained polymer-bitumen binder were studied by 2 modern research methods and the obtained results are given in Tables 1., 2., 3. and 4.

3.1 Polymer-bitumen binder: Polymer-bitumen binder (PBA) is the most important element of the asphalt-concrete pavement of modern roads. The life of the road built on the basis of polymer asphalt-concrete mixture prepared using PBE is at least 7-8 years longer. Disposal to produce PBA.; Xm ;. We recommend the use of Pokr; .kaia waste.

Table 1. Physical and mechanical properties of polymer-bitumen composition obtained with "Baku" brand petroleum bitumen modified with polystyrene waste

the name of the indicator	DÜİST 52 056203 requirements for.	Bakı bitumu « 85/25 »	2,5 mass fraction polymer bitumen composition modified with polystyrene waste
The depth of penetration of the needle into the sample, 0.1 mm at 25 ° C 25°C-	60 32	74 25	62 27
Length, cm 25°C- 0°C-	25 11	140 3,5	103 23
, softening tem °C	54	42	68
elasticity % 25°C- 0°C-də	80 70	4 3	89 70
sand and stone adhesion		sticks well	
135°C- kinematic viscosity	455	-	1159
60°C- dynamic viscosity	270	-	931
after testing by the method ASTM P 1734			
Volume change, blunt. by%	-	0,3	0,21
softening tem, °C	-	604	1608

Table 2. Polymer-bitumen modified with polyethylene waste physical and mechanical properties of the composition

the name of the indicator	DÜİST 52056-2003 according to the norm	The amount of PE in the polymer-bitumen composition, m.f.		
		2 mass.f.	4 mass.f.	6 mass.f.
the depth of penetration of the needle into the sample, 0,1 mm 25°C-də 0°C-də	40 25	74 25	43 22	41 20
stretch, sm 25°C- 0°C	15 8	20 3,5	18 10	16 9
softening temperature, °C	56	64	68	72
brittleness temperature , °C	-18	-22	-26	-40
elasticity , % 25°C-də 0°C-də	80 70	85	95	60
Change of softening temperature after heating, °C	5	3	2	1
of the ignition temperature, °C	210	300	320	350
Kinematic viscosity at 135 ° C	-	455	4768	5940

Table 3. Physicochemical properties of polyethylene waste

№ r.	characteristic	brands of polyethylene waste					
		A-1	A-2	A-3	B-1	B-2	B-3 B-4
1	primary raw materials	Məişət tullantıları, kuloklar, qablaşdırma məmulatlar, plyon-kalar			Aşağı təzyiqli polietilen tullantıları, istehsal tullantıları		
2	Density, g / cm ³	0,915	0,915	0,915	0,945	0,945	0,945
3	Axis index of the alloy: 21.17 H (2.16 kgf) at load 49.0 H (5.0 kgs) in load	0,1-10 -	0,1-10 -	0,1-10 -	- 0,1-35	- 0,1-35	- 0,1-2,0
4	Mass fraction of volatile substances, %	0,30	0,30	0,30	0,30	0,30	0,30
5	mass fraction of ash, %	5,0	5,0	7,0	5,0	5,0	0,1
6	Threshold in traction, MPa	8,0	8,0	8,0	15,0	15,0	15,0
7	Relative elongation at break, MPa	300	300	300	250	250	250
8	Compression density kg / m ³	400	400	250	400	400	400

These polymer wastes repeatedly increase the basic properties of petroleum road bitumen. These indicators include durability, water and cold resistance, resistance to cracking, durability (up to 50 ° C), resistance to displacement, etc. can be shown. Although we increase the price of asphalt concrete by 1% using PBA, its other properties are: longevity of the road, ecological cleanliness, effective use of the road surface in accordance with world standards.

According to the state program of our republic, the construction of 5,000 km of roads that can meet world standards by 2035 has become the most relevant. Polymer modification is the most effective way to ensure that the physical and mechanical properties of petroleum bitumen used in road construction meet the requirements of the standards. Rubber grind | RO | The physical and mechanical properties of the polymer-bitumen composition based on the properties of the original bitumen depend on it. Bitumen RO polymer is even 2.5% k. h. The elasticity of such a composition can be increased by more than 70% at 25 ° C. RO added to bitumen dramatically increases its viscosity. As can be seen from Table 3.6, the kinematic viscosity at 135 ° C and the dynamic viscosity at 60 ° C are blunt when Craton DT 1101CS is added with 2.5% SBS. increases by 2.4 and 3.65 times, respectively.

SBS polymer increases the ability of bitumen to deform at 0 ° C, which is 10 times higher than the deformation properties of the original bitumen. Anti-aging resistance of polymer-bitumen compositions by ASTM D 1754 method was studied. The results obtained are shown in Table 3.6. As can be seen from Table 3.5, the amount of SBS polymer in the polymer-bitumen composition is 2.5% k. h to 4.0% k. When raised to h, both the kinematic viscosity and the dynamic viscosity increase. At the same time, as can be seen from Table 3.6, the physical and mechanical properties of the composition fully meet the requirements of DUIS 52058-2003.

The high structure of the polymer-bitumen binder does not allow it to be fully studied. The amount of SBS polymer in the polymer-bitumen composition is 6%. When it reaches h, the "softening temperature" increases sharply and it becomes difficult for the needle to enter the sample. Thus, by changing the amount of SBS type polymer in the polymer-bitumen binder, it is possible to obtain any characteristic modified PBA. The dispersion modified by the SBS polymer is a system (not homogeneous), ie it does not have thermodynamic stability, so it breaks down into layers. The more similar the polymer to bitumen, the more thermodynamically stable a system can be based on them. This has been proved by our experiments. Thus, a polymer-bitumen

binder prepared in the laboratory is quickly separated into layers, while a high-efficiency mixer (Asphalt plant

with P-1) is used. If PBA is prepared in a colloid mill, its dispersion can be significantly increased. As shown in Table 3.3.

Table 4. Characteristics of industrial wastes consisting of YTPE and ATPE mixtures

№ sır.	characteristic	Industrial wastes consisting of YTPE and ATPE mixtures					
		Markalar:					
		B-1	B-2	B-3	Q-1	Q-2	Q-3
1	primary	PE-nin sənaye tullantıları			YTPE və ATPE qarışıqları əsasında sənaye tullantıları		
2	density q/sm^3	0,915	0,915	0,915	0,915	0,915	0,915
3	Flow rate of the alloy, g / 10 min. Loads: at 21.17 H. When 49.0 H	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35
4	Mass fraction of volatile substances, %	0,30	0,30	0,30	5,0	5,0	5,0
5	Mass fraction of ash, %	5,0	5,0	5,0	7,0	7,0	7,0
6	Stretch limit, MPa	8,0	8,0	8,0	8,0	8,0	8,0
7	Fracture strength limit, MPa	8,0	8,0	8,0	8,0	8,0	8,0
8	Relative elongation at break, %	300	300	300	250	250	250
9	Scattering density (kg formation), kg / m ³ 400 400 400 300 300 300 Characteristics of industrial wastes consisting of YTPE and ATPE mixtures	400	400	400	300	300	300

Table 3.5. Polymer-bitumen obtained using SBS polymer physical and mechanical properties of the composition

Göstəricilərin adı	Bakı 85/25 bitumun göstəriciləri	DÜİST 52056 əsasən tələbat	SBS-lə modifikasiya olunmuş polimer-bitum		
			2 k. h. SBS	4 k. h. SBS	6 k. h. SBS
Iynənin nümunəyə girmə dərinliyi (Penetrasiya), 0,1 mm 25°C-də	40 25	47 25	64 26	78 27	68 25
Uzanması, sm 25°C-də 0°C-də	15 8	40 3,5	50 13	48 12	53 14
Yumşalma temperaturu, °C	56	48	53	72	78
Qızdırıldıqdan sonra yumşalma temperaturunun dəyişməsi, °C	3	2	2	1	1
Kövrəklik temperaturu, °C	-15	-19	-23	-24	-26
Elastiklik, % 25°C-də 0°C-də	40 30	80 70	75 65	85 74	85 75
Alovlanma temperaturu, °C	230	300	340	360	400
Quma və ya mərmərə yapışması (ilişməsi)	tələbatı ödəyir				
Yanğın təhlükəsi	təhlükəlidir				
135°C-də kinematik özlülük	-	455	980	1914	2102
60°C-də dinamik özlülük	-	210	1806	2947	3048
ASTM D 1754 üsulu ilə həcm dəyişikliyi, % küt.	sınaq olunanndan sonra				
Qalıq penetrasiya, %	-	72	80	93	96
Yumşalma temperaturu, °C	40	53	63	66	74
25°C temperaturda uzanması, %	110	47	45	38	32

CONCLUSION

The use of HRS, mainly in the modification of petroleum bitumen, has a more significant effect. The price of HRS-modified bitumen increases by 30%. The price of asphalt concrete made with modified bitumen increases by 7%. However, the life of the asphalt layer of the HRS-modified bitumen pavement increases by 40%, extending the service life of the road from 2 to 8 years, which saves more than 50% of the cost of repairing and rebuilding the road. Our calculations show that the city of Baku and its environs have 600,000 tons of modified road surfaces per year. When covered with asphalt concrete, it is possible to achieve 3.5 million economic benefits per year. Tehnoloji this new method is proposed etdiyimiz at the same time, are the two most important issue, but ask you to say that the use of, than those used rezin tullantılarından emalı tullantılarından and oil product is taken and ekologiyamıza eligible following the polimer and oil emalı which brings great falakat tullantılarından clean the city of Baku.

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