SYNTHESIS OF A NEW SUPERPLASTICIZER FROM LOCAL RAW MATERIALS

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Introduction: In recent years, the use of chemical additives to concrete mixes has been one of the most important problems in our republic, and the synthesis of new organic plasticizers that increase the durability and strength of structures suitable for climatic conditions and aggressive environments is considered one of the most important urgent problems. [1].

At the same time, the use of concrete mix with chemical additives based on local raw materials leads to the construction of durable buildings and high economic efficiency. Superplasticizers are the most effective chemical additives for concrete mixtures. Chemical admixtures are an effective and easy way to improve the quality of a concrete mix [2].

With their help, strong, frost-resistant and durable concrete structures are made.

Additives used to change the properties of concrete mixtures are divided into 3 groups:

- additives that improve the properties of ready-made concrete mixtures of the first group [3].

EXPERIMENTAL PART:

Pyrolysis oil, 85% sulfuric acid and formalin are added to a container equipped with a stirrer and heating, the mass ratio of substances is as follows: 1:1:2.74, after which the solution is stirred at a temperature of 70^{0}C for 60 minutes. After complete melting of the pyrolysis oil, the reaction is continued for 3 hours at 160 ^{0}C. After completion of the reaction, the reaction mixture is cooled and neutralized with diethanolamine. The neutralized mixture is dried at a temperature of 70 ^{0}C. At the same time, the output of naphthalenesulfo-formaldehyde products is 78.8%. In the process of obtaining a plasticizing additive based on pyrolysis oil, the ratio of the initial products is of particular importance.

RESULT AND ITS DISCUSSION: The thermogravimetric analysis curve of the superplasticizer neutralized with diethanolamine is studied and the analyzes are presented. The thermal analysis analysis of the superplasticizer neutralized with diethanolamine is presented in Figure 3 and consists of two lines. Analysis of the thermogravimetric analysis (TGA) curve (curve 1) shows that the mass loss on the TGA curve mainly occurs in the 1st temperature range.

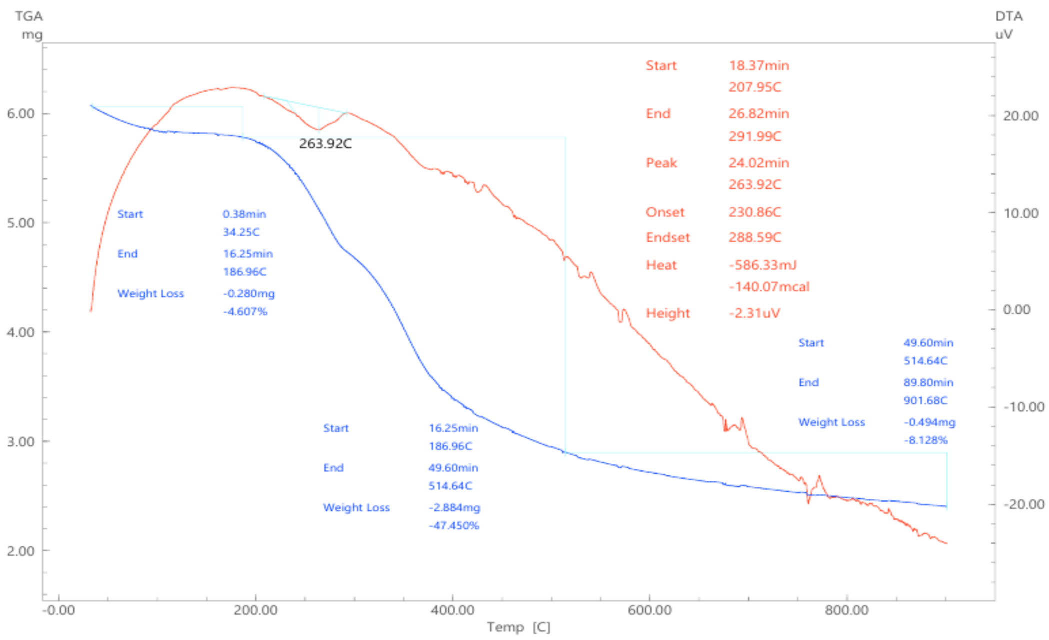


Figure 3. DTA analysis of superplasticizer neutralized with diethanolamine

Table 1

Tabular presentation of TGA analysis of superplasticizer neutralized with diethanolamine

Diethanolamine	**Mass loss, g**	**Mass loss, %**
34-187^{0}C	-0.280	-4.607
187-514.64^{0}C	-2.884	-47.450
514.64-901.68^{0}C	-0.494	-8.128
Overall	-3.658	-60.185

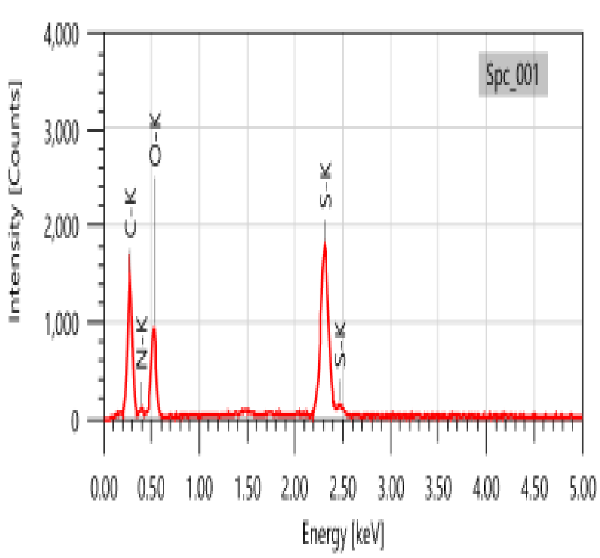
Table 2

Tablichnyy vid analiza DTA superplasticatora, neytralizatsiyalangan dietanoaminom

Diethanolamine	Total energy absorption, µV	Unit of measurement relative to mass, µV/mg	Теплый	Heat to Ground
263.92^{0}C	2.31		-140.07	

Thermal analysis of the newly synthesized superplasticizer (naphthalenesulfonic acid formaldehyde) was studied in the frequency range of 20–950°C. The derivatogram is shown in the figure. 2 and consists of 2 curves. On the derivatogram of the resulting plasticizer, five endothermic effects were observed at temperatures of 50.23, 94.03, 138.71, 750.16, 782.49°C. In the temperature range of 20-300°C, the mass of the substance decreases by 14.812% (-1.041 mg). Endoeffects 1 and 2 indicate the evaporation of hygroscopic water from the plasticizer, and endoeffect 3 corresponds to the temperature of the liquefaction of the plasticizer. The weight loss in the temperature range of 300-600°C was 9.050% (-0.636 mg). No peaks were observed on the DTA curve in this temperature range. In the temperature range 600-950°C, the weight loss was 39.172% (-2.753 mg). In this temperature range, two endothermic peaks were observed on the DTA curve at 750.16 0C and 782.49 ^{0}C. The endothermic peak observed at 750-160°C represents the breakdown of bonds in the plasticizer. When DTA analysis of the obtained superplasticizer was observed 1 endothermic effect in the temperature range of 20-950°C.

The results of SEM analysis of the superplasticizer neutralized with diethanolamine were studied



Display name	Standard data	Quantification method	Result Type
Spc_001	Standardless	ZAF	Metal

Element	Line	Mass%	Atom%
C	K	52.44±0.31	61.99±0.37
N	K	6.79±0.11	6.08±0.32
O	K	29.41±0.40	26.10±0.35
S	K	11.35±0.11	5.03±0.05
Total		100.00	100.00
Spc_001			Fitting ratio 0.0288

Rice. 4. Results of elemental analysis and analysis of the superplasticizer neutralized with diethanolamine.

On the SEM image of the superplasticizer neutralized with diethanolamine in Fig. 4, it was found that the mass fraction of the functional group in the composition of the elements is 52.44% carbon, 29.41% oxygen, 6.79% metallic sodium and 11.35% gold sulfur.

Table 3

Physical and chemical parameters of the superplasticizer neutralized with diethanolamine

Name of indicators	In the form of a solution	In powder form
	Significance of indicators for additions	
Appearance	Homogeneous dark brown liquid	The same light brown powder
Density at 20°C, g/sm3	1,07	0.5
Mass fraction of water, no more than %	70	3,0
Hydrogen ion activity indicator (pH), 2.5% aqueous solution	7,0	7,0
Mass fraction of chlorine ions in dry matter, not more than	2,0	2,0
Solubility in water 20 0C, g/100 g of water	-	50

Table 3 shows that the resulting plasticizer meets almost all the requirements of GOST for additional technical parameters. The synthesis of such superplasticizers is one of the urgent problems. The resulting superplasticizers serve as a practical solution to these current problems.

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