

*Chapter 10*

**SYNTHESIS AND STUDY OF PROPERTIES OF  
AROMATIC POLYETHER–IMIDES ON THE BASIS OF  
DERIVATIVES OF CHLORAL AND DDT WITH USE OF  
POLYNITROREPLACEMENT PROCESSES**

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**ABSTRACT**

The new aromatic polyether–imides containing «hinge» groupings and six–member imide cycles in polymeric macromolecules are obtained with help of polynitroreplacement reaction. It is shown, that polyether–imides soluble in organic solvent and possessing the greater chemical, thermo– and fire– resistance in comparison with the similar systems containing five–member imide cycles in polymeric macromolecules have been obtained at use of sodium salts of aromatic bisphenols and of dinitronaphtalimides (derivatives of chloral and DDT) as co–monomers.

**Keywords:** polyether–imides, polynitroreplacement, dinitrinaftalimides, dichloroethylene, carbonyl.

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## INTRODUCTION

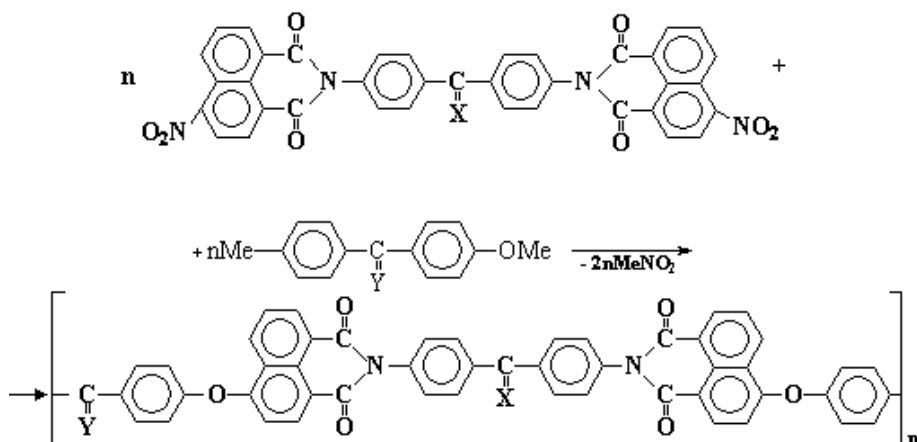
According to works [1–5], nitrogroupings activated by two carbonyls participate in reactions of nucleophilic replacements; in particular, the activation of nitrogroupings by two carbonyls contained in cyclic imides is effective one [4; 6].

Besides the replacing of five-member imide fragments on six-member ones leads to the formation of soluble in organic solvents [7–9] polymers with higher chemical, thermo- and fire resistance.

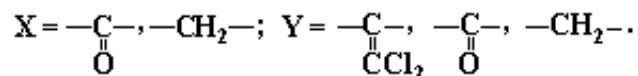
In view of above-stated, the reaction of interaction between aromatic bisphenols, containing dichloroethylene, carbonyl and methylene «hinge» groupings, and dinitronaphtalimides, being also derivatives of chloral and DDT, was carried out.

## EXPERIMENTAL

The reaction was kept in soft temperature conditions (50 – 70 °C) without water (because N-replaced nitronaphtalimides are easily deactivated as a result of hydrolysis and disclosing of a cycle) in dimethyl sulfoxide environment during 2 hours. Reaction resulted in the appearance of final products due to the scheme:

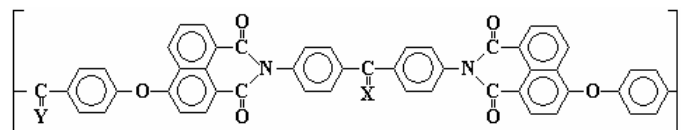


where



Conditions of synthesis and some characteristics of polyetherimides obtained are listed in table. 1.

Sodium phenoxide was added into reactionary mixes for replacing trailer nitrogroupings and to increase the thermostability in all cases after the end of reaction of synthesis of polyetherimide.

**Table 1. Conditions of synthesis and some characteristics of polyetherimides of general formula**

Compound	X	Y	$\eta_{\text{str}}$ , dl/g	$T_{\text{sample}}$ , °C	$T_{10\%}$ , °C	KI	Output, %	Conditions of synthesis		
								Solvent	Temperature, °C	Duration, hours
1	$\begin{array}{c} -\text{C}- \\    \\ \text{O} \end{array}$	$\begin{array}{c} -\text{C}- \\    \\ \text{CCl}_2 \end{array}$	0,47	230–240	420	58	85	DMSO / toluene	60	2
2	$\begin{array}{c} -\text{C}- \\    \\ \text{O} \end{array}$	$\begin{array}{c} -\text{C}- \\    \\ \text{O} \end{array}$	0,52	272–281	480	32	91	DMSO / toluene	70	2
3	$\begin{array}{c} -\text{C}- \\    \\ \text{O} \end{array}$	$-\text{CH}_2-$	0,60	263–272	450	31	95	DMSO / toluene	60	2
4	$-\text{CH}_2-$	$\begin{array}{c} -\text{C}- \\    \\ \text{CCl}_2 \end{array}$	0,47	235–243	410	58	90	DMSO / toluene	60	2
5	$-\text{CH}_2-$	$-\text{CH}_2-$	0,55	267–275	420	31,8	87	DMSO / toluene	60	2
6	$-\text{CH}_2-$	$\begin{array}{c} -\text{C}- \\    \\ \text{O} \end{array}$	0,6	263–273	450	32,6	94	DMSO / toluene	70	2

The structure of synthesized polyetherimides has been confirmed with the data of the IR-spectral analysis. Particularly, IR-spectra of polyetherimides based on 1,1-dichlor-2,2-di(p-oxiphenyl)ethylene contain maxima of absorption in the range from 840 up to 980  $\text{cm}^{-1}$  attributed to 1,1-dichlorethylene groupings [10]. All spectra of polyethernaphtalimides contain doublets at 1738–1745 and 1780–1785  $\text{cm}^{-1}$ , characteristic for carbonyl groups of six-member anhydride cycle <sup>[10]</sup>. Besides the strips of absorption caused by presence of «bridge» groupings occur in IR-spectra: 1260  $\text{cm}^{-1}$  (–O–) and 1645–1680  $\text{cm}^{-1}$  (–CO–).

The temperatures of a softening of polymers, according to the TMA data, are 230–275 °C, and temperatures of the beginning of decomposition (10 % of weight loss, according to the TGA data) are 410–480 °C.

The feature of obtained polyetherimides is the significant distinction between temperatures of glassing and decomposition of these polymers.

Synthesized polyetherimides, containing dichloroethylene groupings, possess high fire resistance (KI = 58) and good solubility in organic solvents (N-MP, DMFA, DMAA), tetrachloroethane, dichloroethane and chloroform.

## SYNTHESIS OF POLYETHERIMIDES

The NaOH (of 0,04M in 25 ml of H<sub>2</sub>O) was poured into the reactionary flask (supplied with the mixer, the Dyne – Stark trap, the return refrigerator and barbator for inert gas) of capacity 1,5 l in where loaded bisphenol (of 0,02 M) and 390 ml of DMSO and 210 ml of toluene were constantly mixed at temperature 80 °C. Then temperature was raised up to 150 °C and water was driven away. After the thorough removal of water traces the temperature of reactionary mass was reduced down to 60–70 °C and dinitroptalimide (of 0,02 M) was added. Reaction was carried out at this temperature within 2 hours. Then reactionary mass was diluted by DMSO and besieged into the acidified water. Obtained deposit was filtered, washed out by distilled water and ethanol and dried in vacuum at 70 °C and 133 Pa.

## DISCUSSION

Obtained polyetherimides are of interest as easily processed polymers on the standard equipment. Synthesized polyetherimides can be used as thermoreactive polymers, their mixes with other heterochained and heterocyclic polymers also are of interest with the purpose of obtaining the composite materials with high chemical and fire resistance.

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*Chapter 11*

## PROPERTIES OF THE FILLED ACRYLIC POLYMERS

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### ABSTRACT

In the present work physical and mechanical properties of inflated with organic and inorganic fillers acrylic polymers in wide range of ratio of components in inert (air) and aggressive (water) mediums are discussed. Electronic microscopy and infra red spectroscopy was used for explanation of the received data.

**Keywords:** fillers, compounded mix, physical and mechanical properties.

Acrylic polymers are polymers that are received through interaction of polyatomic alcohols, phenols and acrylic acid. The presence of one or more isolated binary bonds stipulates for their high reactionary ability. Properties of the received polymers depend on the nature of substances, entering into chemical reactions. To get materials with wide range of properties one can modify components, for example, via mixing acrylic acid with unsaturated aliphatic or aromatic bibasic carbon acids. As a result, we get acrylic polymers of different forms and structure.

Traditionally acrylic polymers are used in the form of dyes, lacquers, enamels [1,2]. But properties of the filled acrylic polymers are studied insufficiently, though filled with organic or inorganic fillers polymer compositions that have various chemical nature and structure, are being widely employed [3].

In this work polymers' films made out of acrylic dispersions, such as "Forcit", Finland, A10 (acrylic-styrene dispersion), A2001, A30, Lentex A4, Russia, were investigated. Acrylic dispersions were mixed with organic and inorganic fillers. A well-known in Russia fertilizer "Rastvorin A" (which is a mixture of salts, i.e. sulphate, phosphate and nitrate of ammonium and magnesium) was taken as inorganic filler, and waste of grain production (which is

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organic powder with particles dimension 64-240 microns, poured density 350 kg/cm<sup>3</sup>) was taken as organic filler.

In the table 1 physical and mechanical characteristics of the inflated with organic and inorganic fillers acrylic compounded mix based on A4 acrylic dispersion are presented. The same behavior of samples based on the other acrylic dispersions was revealed.

**Table 1**

Content of A4 acrylic dispersion, %	Content of organic filler, %	Content of inorganic filler, %	Strength, MPa	Deformation at break, %
100	0	0	1,5	1000
90	0	10	1,3	1200
80	0	20	1,0	1400
60	0	40	0,8	800
90	10	0	1,6	900
80	20	0	1,7	400
60	40	0	2,5	150
40	40	20	0,5	2000

As it's shown in the table 1, the increase of organic filler content in compounded mix leads to deterioration of flexibility. The introduce of organic filler brings the strength increase. While the increase of content of inorganic filler (till 20%) brings noticeable deformation, though the durability decreases.

On the 1-3(th) figures electronic microscopical paintings of the splitted surface of the samples: the initial polymer matrix (fig.1); polymer matrix inflated with inorganic filler (fig.2); polymer matrix inflated with organic filler (fig.3), are presented.

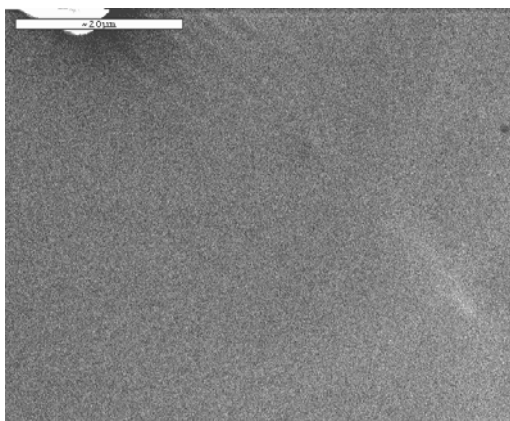


Fig. 1. Electrical microscopical picture of the splitted surface of initial acrylic polymer matrix based on acrylic dispersion A4

As it's shown on the fig.1-3, compounded mix inflated with organic filler has more homogeneous structure then mix with inorganic filler which has substantively dissimilar structure. This dissimilar structure includes crystallites of salts, and with increasing of filler

content this homogeneousness became more vivid and explain the decrease of durability of the compounded mixes, table 1.

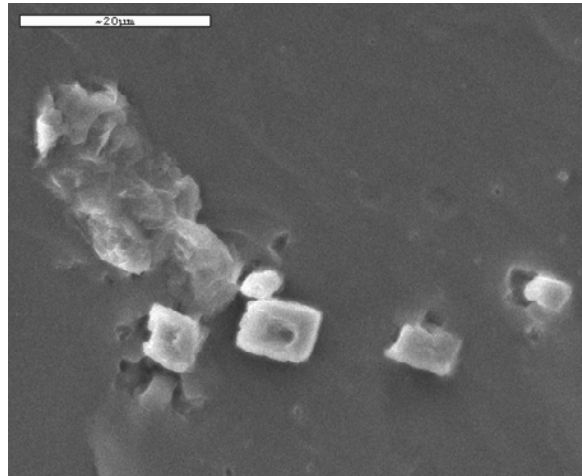


Fig. 2. Electrical microscopical picture of the splitted surface of the inflated with inorganic filler (20%) acrylic polymer matrix based on acrylic dispersion A4

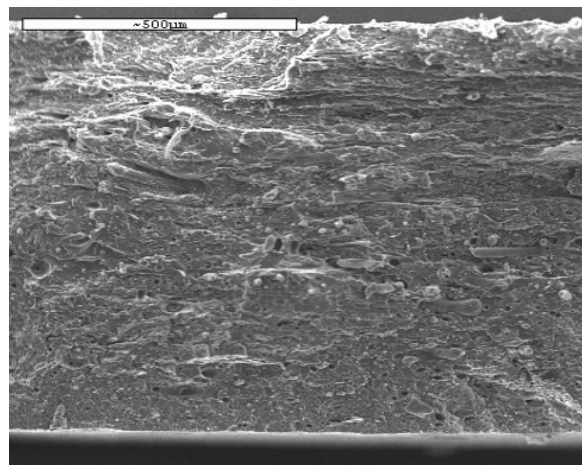


Fig. 3. Electrical microscopical picture of the splitted surface of the inflated with organic filler (20%) acrylic polymer matrix based on acrylic dispersion A4

According to infra-red spectroscopy, inorganic filler is inert regarding to the polymer matrix as spectrums of absorption of not filled polymer films and samples inflated with inorganic filler are the same.

While having a small content of organic filler in polymer matrix and as a consequence, absence of aggregation of powdery particles, fig.3, braking of demolition processes may take place [4], which leads to the durability increase of heterogeneous system, table 1.

The next step was the investigation of influence of water on changing of physical and mechanical properties of compounded mixes, tables 2 and 3.

**Table 2. Durability changes (MPa) in polymer matrixes based on different acrylic polymers after exposition in water**

Grades of acrylic polymers	Exposition of samples in water, days				
	0	5	10	14	18
A10	1,5	1,4	1,3	1,2	0,5
A2001	4,2	3,8	2,0	1,8	1,2
A30	11,0	3,5	3,0	1,7	1,1

**Table 3. Durability changes (Mpa) in filled systems**

Content of acrylic polymer A4, %	Content of organic filler, %	Content of inorganic filler, %	Exposition of samples in water, days				
			0	5	10	14	18
90	0	10	1,3	3,0	3,5	3,6	3,8
80	0	20	1,0	2,3	2,1	2,3	2,2
60	0	40	0,8	1,1	0,9	0,8	0,9
90	10	0	1,6	1,7	3,0	3,5	4,0
80	20	0	1,7	1,7	2,5	2,6	2,5
60	40	0	2,5	1,6	0,8	0,5	0,4
40	40	20	0,5	0,9	1,0	0,5	0,2

As it's shown, the durability of all polymer mixes based on different acrylic dispersions decreases with time in water. Though the deformation at break increases in 3-5 times. So, we can say about plasticizing influence of water for these polymers.

As you can see, table 3, the increase of organic filler content up to 40% brings the durability increase. Contrary to the behavior of organic filler, the inflation with inorganic filler leads to the decrease of durability of samples.

At small content of both fillers (till 20%) the strength of the samples increases with exposition in water. The increase of durability during exposition of samples in water can be explained with revealed changes in relaxation properties of the investigated systems, displayed flexibility and manifested ability to realization of orientation in the process of deformation [5].

Thus, fillers insert their own amendments in mechanical properties of the compounded mixes independently from each other, i.e.: the presence of organic filler brings an increase of durability at small exposition in water, while inorganic filler improves flexibility of the compounded mix.

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*Chapter 12*

## **POLYSULFONETHERKETONES ON THE OLIGOETHER BASE, THEIR THERMO- AND CHEMICAL RESISTANCE**

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### **ABSTRACT**

In the article are described package - sopolysulfonetherketones, manufactured on the oligoether base and are given the research results of their thermo- and chemical resistance study in aggressive medium (acids and alkali). Oligomers are manufactured by high temperature polycondensation method in aprotic dipolar solvent medium - dimethylsulfoxide (DMSO) - within inert gas atmosphere (nitrogen). The structure of produced oligomers is proved by the results of element analysis and IR - spectroscopy. It is demonstrated that synthesized polysulfonetherketones has a good thermoresistance and resistance to acid and alkali reaction.

**Keywords:** oligosulphone (OS), oligoketon (OK), oligosulphoneketon (OSK), polycondensation, package - sopolysulfonetherketones, dian (D), phenolphthalein (PH), compound ether links, ordinary ether links, thermoresistance, chemical resistance.

In different fields of technics widely used such polymer materials as: polyarilates, polysulfones, polyketons. Each one of them is characterised by definite advantages over the others. As a fact, they have their own drawbacks.

To combine positive properties of different classes of polymers in one material lately widely started to use oligomers, that contain in their chain links of this class of polymers.

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So, with the objective to improve some properties of polysulfones and polyetherketones are manufactured and examined some properties of number of package copolymers [1-7, 8, 9], which attract a wide interest from different fields of industry as a thermoresistant materials of constructive and electroisulative application. With the objective to manufacture package-copolysulfoneketones with high molecular mass, thermoresistance, and good physico-mechanical characteristics are synthesized oligoketons (OK), oligosulphoneketons (OSK), oligosulphones (OS) of different structure and condensation degree.

Oligosulphoneketon, oligosulphone, oligoketon synthesis was conducted by means of high temperature polycondensation in aprotic dipolar solvent medium - dimethylsulfoxide (DMSO) - within inert gas atmosphere (nitrogen).

Test reaction was conducted for diphenylolpropane (DPHP) disodium salt and 4,4<sup>1</sup> dichlorodiphenylsulfone (DCHDPS) in OS-D case, and phenylphtalein disodium salt (PHPH) and 4,4<sup>1</sup> - dichlorodiphenylsulfone in OS-PH case.

In case of getting oligoketons instead of 4,4<sup>1</sup> - dichlorodiphenylsulfone were used the corresponding molar quantity of 4,4<sup>1</sup> - dichlorobenzophenone (DCHDBPH).

In case of getting oligosulfoneketones (OSK) test reaction was conducted for diphenylolpropane disodium salt (DPHP) (or phenylphtalein) and for a mixture 50:50 molar % of dichlorodiphenylsulfone and dichlor diphenylbenzophenone.

Oligosulphone synthesis is conducted in molar proportion DPHP: DCHDPS-2:1 (OS-1D); 6:5 (OS-5D); 8:7 (OS-7D); 11:10 (OS-10D); 21:20 (OS-20D) and PHPH:DCHDPS-2:1 (OS-1PH); 11:10 (OS-10D); 21:20 (OS-20PH).

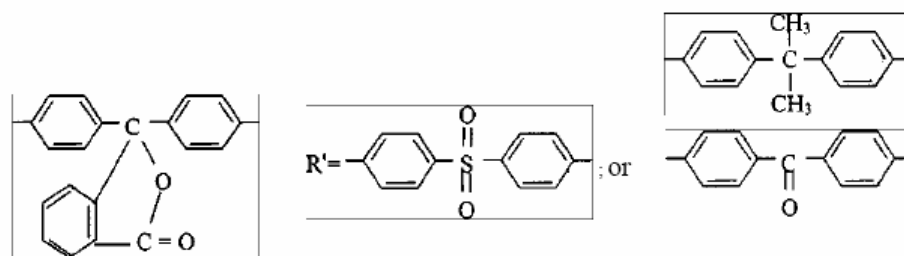
Some oligosulphone, oligoketon, oligosulphoneketon properties are demonstrated in Table 1.

**Table 1. Oligosulfone, oligosulfoneketone, oligoketone properties**

Oligomers	Polycondensation degree	$n_{pr}$ $m^3 / kg$	Output, %	Melting $t^{\circ} K$	Estimated molar mass	Hydroxile group contents,%
OS-1D	1	0,002	98	358-361	670,84	5,07 5,08
OS-20D	20	0,024	98	458-462	9078,05	0,38 0,32
OS-1PH	1	0,002	98	475-778	850,90	4,00 4,03
OS-20PH	20	0,025	99	565-573	10969,88	0,31 0,29
OK-1D	1	0,003	98	402-403	634,78	5,35 5,40
OK-20D	20	0,020	99	440-449	8358,01	0,40 0,45
OK-1PH	1	0,003	98	462-473	814,85	4,17 4,20
OK-20PH	20	0,022	99	528-533	10248,77	0,33 0,30
OSK-1D	1	0,006	98	410-416	1077,30	3,15 3,20
OSK-20D	20	0,022	99	452-467	17208,58	0,20 0,18
OSK-1PH	1	0,004	98	471-473	1347,43	2,52 2,62
OSK-20PH	20	0,013	99	536-544	20900,39	0,16 0,22

The general diagram of oligosulphone, oligosulphoneketon, oligoketon synthesis you can draw as follows:





their equimolar compound (50:50)

The structure of manufactured oligomers is proved by the results of element analysis and IR- spectroscopy. The presence of absorption stripes in IR- spectra, corresponding to ordinary ether links in fields 980,1014,1045  $\text{cm}^{-1}$  to isopropylidene group in dian remainder 1290, 1365, 1385, 1415-1456; 1930-1980 $\text{cm}^{-1}$  (in case of dian oligomers) to lactone group 1750-1780 $\text{cm}^{-1}$  (in case of phenolphthalein oligomers), to hydroxile groups 3650-3740 $\text{cm}^{-1}$  to sulphonylic group 1150-1170, 1215,1245-1285, 1820 $\text{cm}^{-1}$  (for oligosulfones) and ketogroup 1610-1650 $\text{cm}^{-1}$  (for oligoketons and oligosulfoneketones) testifies the formation of oligosulfones, oligosulfoneketones and oligoketones.

Since from 1960-s aromatic ethers attract attention of different researchers for their thermoresistance, also for a number of valuable properties [10-12].

It is worthy to note, that according to their thermo- and chemical resistance aromatic ethers outdo polyarylates, but the latter is superior in heat resistance.

Study of thermoresistance of the condensational type of polymers is a matter of great importance nowadays. In this connection great interest attracted the research of the thermoresistance of polysulfonetherketones (PSEK), synthesized by us. The results of thermogravimetric PSEK analysis are given in Table 2.

**Table 2. Thermic properties of polysulfonetherketones**

№ п/п	Primary compounds		Thermoresistance, K		
	dioxy-compounds	dichloranhydrids	2%	10%	50%
1	OSK-1D	DCHATK/DCHAIK	688	760	970
2	OSK-10 D	DCHATK/DCHAIK	699	770	988
3	OSK-20 D	DCHATK/DCHAIK	720	777	993
4	OK-1 D+OC-1 D	DCHATK/DCHAIK	683	753	833
5	OK-10 D+OC-10 D	DCHATK/DCHAIK	693	763	870
6	OK-20 D+OC-20 D	DCHATK/DCHAIK	710	765	873
7	OSK-1PH	DCHATK/DCHAIK	692	770	978
8	OSK-10PH	DCHATK/DCHAIK	690	778	986
9	OSK-20PH	DCHATK/DCHAIK	704	782	998
10	OK-1PH+OC-1PH	DCHATK/DCHAIK	696	766	970
11	OK-1PH+OC-10PH	DCHATK/DCHAIK	690	770	978
12	OK-20PH+OC-20PH	DCHATK/DCHAIK	698	776	995

Analysis data, given in Table 1, demonstrate that polysulfonetherketones are characterised by high thermic indicators and outdo polyarylates, polyarylatesulfones,

polyetherketones. It's worthy to note, that 2% mass loss for all synthesized PSEK keeps on the 673 level and higher.

Among polysulfonetherketones on the dian oligosulfoneketon base (OSK-D), equimolar mixture of iso- and terephthalic acid dichlorinhydrins the most inferior thermoresistance has BSP on the OSK-1 D base. According to the length growth the increase of PSEK thermoresistance is observed, which is explained by the reason that with the OSK length growth the fewer unstable compound ether links are left. The same order is observed among the number of oligosulfoneketones (OSK) on the phenolphthalein base. In these polysulfonetherketones the saturation of polymer chain by thermoresistant ordinary ether links is observed and a portion of unstable compound ether links, as it was noted before, falls down abruptly, moreover, with the increase of primary OSK data package density in polysulfonetherketones it increases. Probably, these three factors promote the predictable growth PSEK thermoresistance in the line. Also, has been studied thermic characteristics in polysulfonetherketone line on the equimolar compound dian oligosulfone base (OS-D) with oligoketones (OK-D) and on the phenolphthalein oligosulfone compound base (OS-PH) with oligoketones (OK-PH). The comparison of these two rows shows that polymers on the equimolar compound base of phenolphthalein oligosulfones with the oligoketones demonstrate more high indicators of thermic resistance. Package sopolysulfonetherketone on the OS - 20 PH+OK - 20PH base possesses the most thermoresistance  $t^0$  of 2% and 10% mass loss of this BSP is accordingly equated to 638 and 776 K (Table 2).

With the length growth of primary oligomers in every group of polymer polysulfonetherketones is observed a considerable increase of polymer thermoresistance, the reason for this is, evidently, that with the length growth of OSK, OS and OK in polysulfonetherketones reduces the quantity of unstable compound links that positively influences thermic resistance.

Most of the thermoresistant polymers are distinguished by their considerable chemical resistance in acids and alkalis [13]. A great interest in study of package sopolysulfonetherketone chemical resistance attributes to this fact.

Polyethers are stable in mineral and organic acids, except for concentrated sulphur acid, in diluted alkalis and some oxidizers [14]. Polymer chemical resistance can be increased by diminishing the concentration of accessible chemically unstable links, by means of injecting the macromolecules with substitutes inhibitory for aggressive medium components to have access to chemically unstable links.

Tests for film PSEK specimens have been conducted in 10%, 30% concentrated sulphur acid, 10% and concentrated saline acid (36,5%), in 10%, 50% sodium hydroxide solution. The research results are given in Table 3. The Table demonstrates that polysulfonetherketones on dian OSK base display good stability in diluted sulphur acid solutions, as well as in concentrated saline acid. In concentrated alkali PSEK is exposed to destruction, that is probably, is due to the presence in the polysulfonetherketones chain chemically unstable compound ether links. This justifies the fact, that PSEK based on short OSK and saturated by these links they are sooner destructed than PSEK on OSK-10 and OSK-20. More than that, this speed of polymers is caused by low package density of PSEK on short oligosulfoneketone base.

**Table 3. Polysulfonetherketones mass change dependance from exposure duration in aggressive medium**

№ п/п	Primary oligomers	Time of exposure, sec- $10^5$	Mass change, %				
			H <sub>2</sub> SO <sub>4</sub>		HCl	NaOH	
			10%	30%	36,5%	10%	50%
1	OSK-1 D	0,864	0,28	0,18	0,59	0,71	0,26
		1,728	0,56	0,72	1,42	2,38	-0,70
		3,456	0,63	0,91	2,01	2,42	-1,83
		13,824	0,79	1,01	2,32	0,11	-9,01
2		0,864	0,20	0,15	0,42	0,61	0,17
		1,728	0,34	0,53	1,21	1,82	0,62
		3,456	0,68	1,19	1,89	2,17	-1,52
		13,824	0,72	1,26	1,95	0,97	-7,11
3	OSK-20 D	0,864	0,14	0,13	0,23	0,43	0,10
		1,728	0,28	0,32	0,92	1,31	0,47
		3,456	0,48	0,83	1,91	1,62	-0,83
		13,824	0,59	0,97	1,96	1,47	-5,21
4	OSK-1 PH	0,864	0,36	0,81	0,99	0,40	0,41
		1,728	0,59	0,80	1,57	0,56	-0,59
		3,456	0,75	1,66	2,06	0,90	-0,87
		13,824	0,95	1,83	2,19	1,02	-9,75
5	OSK-10PH	0,864	0,38	0,55	0,66	0,47	0,67
		1,728	1,00	0,91	1,31	2,00	-0,31
		3,456	1,91	1,60	2,40	0,46	-0,06
		13,824	2,00	1,66	2,48	0,82	-7,93
6	OSK-20 PH	0,864	0,18	0,40	0,63	0,55	0,21
		1,728	0,85	0,97	1,74	1,60	-0,42
		3,456	1,45	1,29	1,89	1,29	-0,12
		13,824	1,48	1,39	2,15	1,63	-6,40
7	OK-1 D+OS-1 D (50:50)	0,864	0,27	0,30	0,40	0,31	0,17
		1,728	0,64	0,78	0,88	0,62	-0,16
		3,456	0,98	0,43	1,34	1,02	-0,63
		13,824	1,13	0,14	1,45	1,14	-7,77
8	OK-1 0 D+OS-1 OD (50:50)	0,864	0,28	0,17	0,24	0,21	0,20
		1,728	0,54	0,40	0,56	0,50	0,25
		3,456	0,83	0,66	0,74	0,59	0,16
		13,824	0,96	0,65	0,75	0,60	-1,12
9	OK-20 D+OS-20 D (50:50)	0,864	0,28	0,17	0,24	0,21	0,20
		1,728	0,54	0,40	0,56	0,50	0,25
		3,456	0,83	0,66	0,74	0,59	0,16
		13,824	0,96	0,65	0,75	0,60	-1,12
10	OK- 1PH+OC-1PH	0,864	0,62	0,77	0,70	0,48	0,57
		1,728	0,89	0,92	1,69	0,72	-0,72
		3,456	1,45	1,66	2,40	1,02	-0,91
		13,824	2,20	2,10	3,00	-1,22	-11,50
11	OK-10PH+OS-10PH	0,864	0,20	0,47	0,69	0,59	0,30
		1,728	0,89	0,96	1,62	1,65	-0,51
		3,456	1,30	1,36	1,90	1,32	-0,20
		13,824	1,55	1,47	2,00	-0,01	-7,40

The difference of PSEK package density is underlined clearly in this polymer group when they swell in acid solution. Diluted sulphur acid solutions don't influence PSEK, their swelling is generally due to water absorption. In 10% sulphur acid mass stabilization follows after swelling, that demonstrates the absence of solvability, all the more so of destruction. Preservation of resistant properties and permanence of indicated viscosity of BSP also justifies the absence of destructive processes.

Manufactured polysulfonetherketones mostly swell in concentrated saline acid solution. This is due to the fact, that saline acid belongs to electrolytes with high pressured steam which penetrate into polymers that have coefficient close to water coefficient. The swelled PSEK specimens even after  $13,82 \times 10^5$  seconds keeping in concentrated saline acid solution don't lose mass. (Table 3).

The comparison of two PSEK rows on the oligosulfoneketone base demonstrated that polysulfonetherketones on the phenolphthalein OSK base have greater swelling capacity, it, probably, depends on the reason that package density BSP on phenolphthalein OSK base is less in comparison with polymers on dian OSK base.

Combination of dian oligoketons with dian oligosulfones improves the PSEK stability in concentrated and diluted alkali solution, that is, evidently, connected with the presence in their structure chemically stable ordinary ether links. They are also stable in diluted sulphur and concentrated saline acids.

Chemical stability is increased with the primary oligoketone and oligosulphone length growth. BSP on the OK-1D + OS-1D base is less chemically stable as it outstands by its greater content of compound ether links.

Phenolphthalein BSP on the oligoketone and oligosulfone compound base are exposed to destruction in 10% alkali, have greater swell per cent in diluted sulphur acid solution and in concentrated saline acid solution in comparison with PSEK on the dian oligomers compound base.

The most chemically stable in polymer group is PSEK on OK-20-PH+OS-20PH, probably, it's due to high concentration of ordinary ether links in its structure and reduced concentration of unstable compound ether links.

Accordingly, synthesized polysulfonetherketones are characterised by high thermoresistance qualities, demonstrate chemical stability and can be used as polymer materials of constructional and film application.

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