





Table 1

**Dependence of composition of the copolymers on the composition of initial mixture when copolymerizing p-EGM ( $M_1$ ) with AA ( $M_2$ ), AIBN  $[I]=8 \text{ mol/m}^3$ ,  $T = 333 \text{ K}$**

Initial monomer ratios, mol.%		Composition of the copolymers, mol.%		$\alpha$ , %	Yield, %	Maleate groups, %
$M_1$	$M_2$	$m_1$	$m_2$			
9.99	90.01	8.21	91.79	166.2	48.7	59.8
24.99	75.01	22.13	77.87	154.0	42.4	61.7
50.04	49.96	48.82	51.18	133.1	37.9	63.2
75.06	24.94	73.64	26.36	129.5	31.5	69.4
90.16	9.84	88.33	11.67	104.3	28.7	71.5

Table 1 shows obtained copolymers are enriched with the segments of AA at any ratio of the initial mixture. The yield of the copolymer and swelling degree increases with increasing the concentration of AA in initial mixture which is most probably due to rather high degree of branching and crosslinking. However it is necessary to note that swelling ability of synthesized copolymers is lower in comparison with the ones obtained before at mass ratio [11, 12].

The dependence of the composition of the copolymer on the composition of initial mixture is more clearly demonstrated on composition diagram (Fig. 1).

Using integrated equation of Mayo-Lewis on the basis of the data on composition of the copolymers and initial mixture relative activities of the monomers have been calculated.

From given data (Table 2) it can be said that the meaning of relative activity  $r_1$  in the system p-EGM-AA is lower than 1, which justifies that the macroradical ending with the segment of p-EGM shows higher activity to «other» monomer or radical, whereas the macroradical ending to the chain of the second monomer (AA) reacts much easier with «its» monomer or radical.

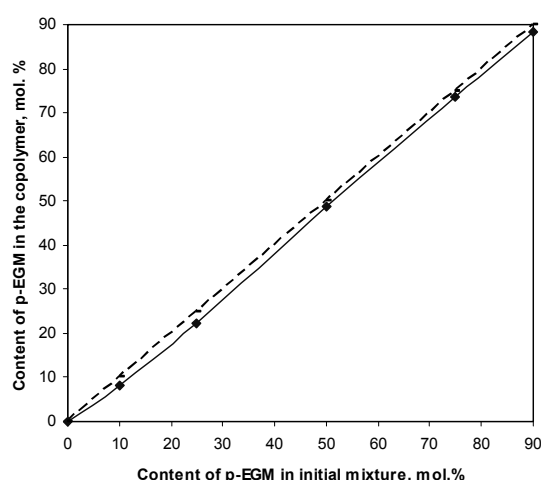


Figure 1. Diagram of dependence of composition of the copolymers of p-EGM-AA on the composition of the initial monomer feed

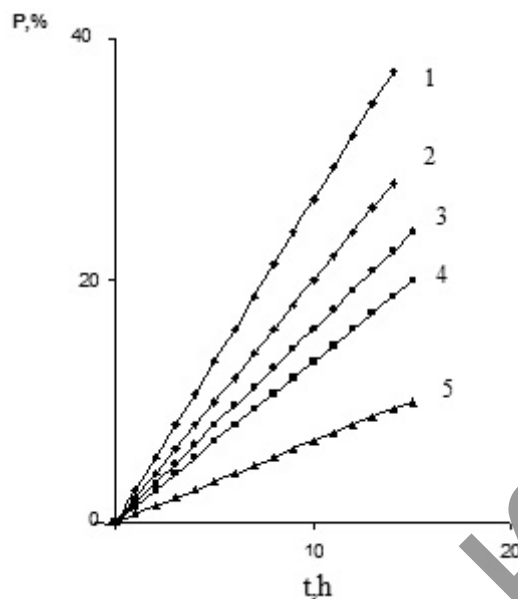
Table 2

**Constants and copolymerization parameters**

$M_1$	$M_2$	$r_1$	$r_2$	$r_1 \cdot r_2$	$1/r_1$	$1/r_2$
П-ЭГМ	AA	0.69	1.22	0.84	1.45	0.82

As it is known the meanings of copolymerization constants are the main characteristics when considering the question of relative reactivity of the monomers in dependence on their structure. However more detailed information about relative reactivity of the monomers when copolymerizing can be obtained on the basis of kinetic data.

Figure 2 shows the increase of molar fraction of AA in the solution leads to the increase of total rate of copolymerization which correlates well with data on swelling of final products.



1 — 8.21:91.79 mol.%; 2 — 22.13:77.87 mol.%; 3 — 48.82:51.18 mol.%;  
4 — 73.64:26.36 mol.%; 5 — 88.33:11.67 mol.%

Figure 2. Kinetic curve of the dependence of copolymerization of p-EGM-AA

### Conclusion

So a brief review of the material given in this article shows that as a result of copolymerization of polyethylene glycol maleate with acrylamide novel polymers of network structure were obtained. The kinetic data show that the copolymerization rate, yield, the degree of swelling of the final products increased with increasing molar content of acrylamide in the initial monomer feed.

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**Жоғары айналу дәрежесіндегі полиэтиленгликольмалеинаттың  
акриламидпен радикалды сополимерленудің  
константалары мен параметрлері**

Алғаш рет полиэтиленгликольмалеинаттың акриламидпен радикалды сополимеризациясы анықталды. Жарық шашырату және гель-сіңіруші хроматография әдісімен полиэтиленгликольмалеинаттың молекулалық массасы зерттелді. Соплимерлердің құрамы газдық хроматография әдісі арқылы белгіленді. Кинетикалық қисық шешуде акриламид мольдік үлесін жоғарылатса, реакцияның жылдамдығының және сополимерлер ісіну қабілетін арттыратынын көруге болады.

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**Константы и параметры радикальной сополимеризации  
полиэтиленгликольмалеината с акриламидом  
при высоких степенях превращения**

Впервые осуществлена радикальная сополимеризация полиэтиленгликольмалеината с акриламидом. Методом светорассеяния и гель-проникающей хроматографии определена молекулярная масса полиэтиленгликольмалеината. С применением газовой хроматографии определен состав сополимеров. Рассчитаны константы и исследована кинетика реакции сополимеризации. Кинетические кривые показывают, что с повышением мольной доли акриламида в растворе увеличиваются скорость реакции и набухающая способность сополимеров.