AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Pedagogical and Educational Research
ISSN (E): 2832-9791| Volume 21, | February, 2024

FIRE RETARDANT PROPERTIES OF POLYESTERSULFONE KETONES

Rayimov Zukhriddin Khayriddin ogli
Doctorant of the Bukhara Institute of Engineering and Technology,
Bukhara, Uzbekistan,
G-mail: zuhriddinrayimov0@gmail.com

Haydarov Axtam Amonovich
Docent of the Bukhara Institute of Engineering and Technology,
Bukhara, Uzbekistan,
E-mail: axtam-xaydarov@mail.ru

Haytiyev Shaxruz Botir ogli
Magistr of the Bukhara Institute of Engineering and Technology,
Bukhara, Uzbekistan,
G-mail: shaxruzbekkhaytiey@gmail.com

A B S T R A C T

Currently, a large number of methods for the synthesis of block copolymers make it possible to combine an unlimited number of different molecules and synthesize a large number of block copolymers. The thermal and mechanical properties and stability of the synthesized block copolymers vary widely. Newly synthesized block copolymers and copolymers can be used as heat-resistant structural and film materials in various fields of modern industry (automotive, electronics, electrical, aviation, chemical industries).

K E Y W O R D S

Oxygen index (OI), destruction products, aromatic polymers, the pre-fire zone, polyestersulfone ketone, polyarylates, fire-resistant polymers

Introduction

The fire-resistant properties of polymers and composite materials based on them are of great practical importance. Interest in this area is aroused by the growth of research related to the creation of technology for the production of non-flammable polymers.

Currently, many polymers with high fire resistance have been synthesized. The oxygen index (OI) is used to evaluate the fire resistance of the resulting polymer materials. This index indicates the minimum amount of oxygen in a mixture of oxygen and nitrogen that ensures combustion of the polymer. The lower the oxygen index, the more easily the polymer sample ignites. Therefore, substances with an oxygen index of less than 21 burn in the atmosphere (oxygen content in the air is 21%).

One of the effective ways to increase the fire resistance of polymer materials is the creation of fire retardants. Fire retardants included in the structure of polymers change their composition and help reduce the flammability of polymers.

Fire retardants work in different ways:

1. Effectively affects the first stage of combustion. Because it prevents the material from being interested in the decomposition temperature.
2. Inhibits the process of material destruction upon impact.
3. Prevents the interaction of active radicals with the polymer or its destruction products. Reduces the concentration of flammable gases in the pre-fire zone.

RESEARCH METHODOLOGY

It is known from research that the most effective universal flame retardants are phosphorus and halogen compounds. They act on the surface, which is a source of non-flammable volatile products, and in the pre-flame zone. The choice of fire retardants is based on specific polymer materials and their structural properties. For aromatic polymers, flame retardants such as halogenated hydroxy compounds, especially halogenated phenols, are widely used.

The obtained values of the oxygen index of polyestersulfone ketone are presented in Table 1.

Table 1 **Fire resistance of polyestersulfone ketones***

№	Primary dioxy compounds	Oxygen index	№ T/r	Primary dioxy compounds	Oxygen index
1	OSK−1D	31,0	11	OK−10D + OS−10D	31,5
2	OSK−3D	31,0	12	OK−20D + OS−20D	32,0
3	OSK−5D	31,0	13	OSK−1F	31,5
4	OSK−7D	31,0	14	OSK−5F	32,0
5	OSK−10D	32,0	15	OSK−10F	32,5
6	OSK−20D	32,5	16	OSK−20F	32,0
7	OK−1D + OS−1D	32,5	17	OK−1F + OS−1F	33,0
8	OK−3D + OS−3D	32,5	18	OK−5F + OS−5F	33,0
9	OK−5D + OS−5D	32,5	19	OK−10F + OS−10F	32,0
10	OK−7D + OS−7D	32,0	20	OK−20F + OS−20F	32,5

* An equimolar mixture of isophthalic and terephthalic acid dichlorides was used as acid components.

From the data obtained it is clear that all synthesized polyethersulfone ketones have high fire resistance. However, polyethersulfoneketones are inferior to polyarylates, polysulfones and polyarylate sulfones in fire resistance. This situation is explained by the fact that fire resistance property is usually achieved through the addition of halogens to polymer materials. There are no halogen atoms in the polyestersulfone ketone molecule. However, fire resistance testing results for polyethersulfoneketones show that the oxygen index values of these polyesters are in the range of 31.0-33.0.

This means that polyestersulfoneketones do not burn in air. Comparison of a number of polyethersulfone ketones does not allow us to identify a single polyester with high fire resistance. The difference in these parameters is small, i.e. 2%.

SUMMARY

Thus, the synthesized polyethersulfone ketones are self-extinguishing and low-flammability polymers. The proposed polymers can be used as fire-resistant structural and film materials in those industries where high demands are placed on the fire resistance of materials.

Fire-resistant polymers include polyarylates based on 4,4-dioxydiphenyl-2,2-propane, an equal molar mixture of phenolphthaleins, dichlorides of isophthalic and terephthalic acids. Fragments of 3,5-dibromo-p-hydroxybenzoi acid chlorohydride are incorporated into the macromolecule of these polyarylates during polyesterification. Its amount varied from 1 mol.% to 90 mol.%. When 12-15% bromine is added to the structure of polyesters, their fire-fighting properties increase by 1.5 times.

REFERENCES

1. Zuhriddin, R., & Niginabonu, J. (2022). Production of polyethylene terephthalate. Universum: технические науки, (5-11 (98)), 58-62.

2. Бердиева З. М., Жахонов Ж., Мирзаев А. АНАЛИЗ РАСТИТЕЛЬНОГО ПОЛИФЕНОЛА //SCIENTIFIC ASPECTS AND TRENDS IN THE FIELD OF SCIENTIFIC RESEARCH. – 2023. – Т. 1. – №. 8. – С. 284-287.

3. Зухриддин Хайриддин Угли Райимов, & Сафар Бахронович Усмонов (2023). Синтез ароматических полиэфирсульфонкетонов на основе олигосульфонкетона различного состава и строения. Science and Education, 4 (4), 495-502.

4. Bobir, O., Vokhid, A., Gulnoz, G., & Sherzod, R. (2022). SYNTHESIS AND PROPERTIES OF NITROGEN-RETAINING CORROSION INHIBITORS. Universum: химия и биология, (4-2 (94)), 43-46.

5. Zuhriddin, R., & Niginabonu, J. (2022). Production of polyethylene terephthalate. Universum: технические науки, (5-11 (98)), 58-62.

6. Худойназарова, Г. А., Юсупова, М. Н., & Хайдаров, А. А. (2020). ЭКСПЕРИМЕНТАЛЬНОЕ ОПРЕДЕЛЕНИЕ МОЛЕКУЛЯРНОЙ МАССЫ ПОЛИМЕРА В ЛАБОРАТОРНОМ ПРАКТИКУМЕ ПО ХИМИИ. Universum: химия и биология, (11-1 (77)), 74-77.

7. O'G'Li, R. Z. K., & Qizi, J. N. Q. (2022). Analysis of importance and methods of production of block sopolymers based on polyetylenterephtalate. International Journal of Advanced Technology and Natural Sciences, 3(1), 51-55.

8.Muhiddinovna B. Z. Functions and forms of chemical experiment //European science review. – 2020. – №. 1-2. – С. 48-50.

9. Rayimov, Z. X. O. G. L. (2021). Ftal angidridning vinillanish jarayoni erituvchilari. Science and Education, 2(12), 266-269.

10. Olimov, B. B., & Rakhmatov, S. (2022). SYNTHESIS AND USE OF CORROSION INHIBITORS ON THE BASIS OF DIATOMIC PHENOLS IN THE OIL AND GAS INDUSTRY. In Kimyo va tibbiyot: nazariyadan amaliyotgacha (pp. 141-143).

11. Zuhriddin Xayriddin O'G'Li Rayimov, & Sadullo Toyir O'G'Li Hayitov (2023). Ikkilamchi polietilentereftalatning mexanik qayta ishlash retsikli. Science and Education, 4 (4), 490-494.

12. Hayrulla o'g'li, Q. O. (2023). GUANIDIN ASOSIDA POLIMER KOMPOZITSION MATERIALLAR SINTEZ QILISH. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 3(11), 293-296.

13. Zuhriddin, R., Niginabonu, J., Aminjon, V., & Temurbek, D. (2022). Mechanisms of eterification of tereftalic acid with etylenglycol. Universum: технические науки, (5-11 (98)), 63-67.
14. Хайдаров, А. А., Темирова, М. И., Хаитов, А. А., & Норова, Д. Р. (2016). Разработка состава полимерных композиций на основе сополимера фталимидометилметакрилат с акриловыми мономерами для первичной обработки каракулевых шкур. Молодой ученый, (8), 330-332.