Synthesis of Copolymers Based on Heteroring Compounds and Acrylic Monomers, Their Industrial Application in Petrochemical Industry

S.A. Karimova	Bukhara Institute of Engineering and Technology
S.F Fozilov	Bukhara Institute of Engineering and Technology
B. A. Mavlanov	Bukhara Institute of Engineering and Technology
A.A. Madjidov.	Bukhara State medical institute

ABSTRACT

Copolymers based on quinozolindione-2,4 acrylate and acrylic monomers were synthesized. The IR spectra of the obtained polymer products were studied. When they were added to diesel fuel, it was observed that the physico-chemical properties of diesel fuel improved.

Synthesized copolymers based on quinozolindione-2,4 acrylate with acrylic monomers and studied by IK-spectrum. Pri vvedenii prisadok physiko-khimicheskie i tekhnologicheskie svoystva dieselnyx topliv polnostyu otvechayut gosudarstvennym standartam.

Synthesized copolymers based on quinozolinedione-2,4 acrylates from acrylic monomers and studied IR spectra. With the introduction of additives, the physicochemical and technological properties of diesel fuels fully meet state standards.

Keywords: Student performance, Machine learning, Feature selection

After the independence of the Republic of Uzbekistan, the oil and gas industry also developed rapidly. In our country, which has achieved fuel independence, the main task of industry specialists is to improve the quality of manufactured products up to the requirements of world standards.

The process of dieselization of motor vehicles implemented in all countries is related to the fact that the diesel engine is more economical than the carburettor engine and has a higher efficiency. The increasing demand for diesel fuel can be met by introducing its additives.

Rational use of petroleum fuels, improvement of their quality and expansion of resources is one of the main issues of modern oil refining and petrochemical industries.

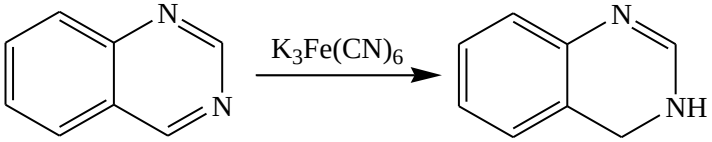
Depressor additives are an effective and economical way to improve the low-temperature properties of petroleum-derived fuels and oils. When these substances are introduced in a very small amount (usually 0.05-0.10%), a significant decrease in the solidification temperature at low temperatures and an improvement in the rheological properties are observed.

Unlike all other methods, this direction ensures rational use of oil resources, comprehensive improvement of low-temperature properties of oil products and oils. It is desirable to obtain copolymers based on acrylic monomers with quinazolone compounds containing heterorings and to study the laws of their interaction and to synthesize copolymer additives that improve

the physico-chemical properties of diesel fuels of practical importance based on them.

Compounds containing the quinazolone ring can be divided into three main classes based on their physical and chemical properties and their methods of preparation and ease of preparation. There are three classes of quinazolone derivatives, and the important problems of their preparation, reactions, and their interconversion are discussed.

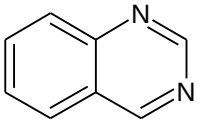
A simple class of quinazolones combines unsubstituted compounds in a heterocyclic ring. They may be substituted or unsubstituted in the carboxyl ring. If the benzene ring is substituted, the heterocyclic ring is not substituted, then such compounds are called Z-substituted quinazolones. The compounds of this group are characterized by the lack of satisfactory production methods: their physical, chemical and biological properties have not been sufficiently investigated, and therefore the issue of their use is unclear. All reported 3-substituted quinazolones are well-characterized, low-flowing, crystalline solids that are quite unstable when stored under laboratory conditions and easily undergo oxidation, reduction, and hydrolysis reactions. The simplest representative of this class of compounds is quinazoline, which was first obtained by Gabriel in 1895 by mild oxidation of 3,4-dihydroquinazoline with an alkaline solution of red blood salt.



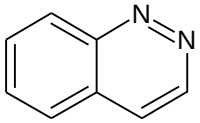
Quinazoline is a colorless crystalline compound with a melting point of 48-49 K degrees. It has a weak aroma and a bitter taste. Quinazoline and its simple substituted compounds do not occur in nature. Some alkaloids have a quinazoline skeleton in their structure.

The second class of compounds includes the derivatives containing the oxygen group adjacent to the nitrogen atom in the heteroring in the 2- and 4- positions of the quinosaline ring. Also included are compounds with a functional group that can be easily removed by replacing or changing the hydroxyl groups in these positions. This indicates that quinazoline derivatives, including thioxoquinazolines, are of great importance.

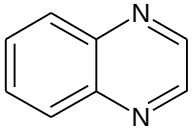
Quinazoline compounds were introduced to science for the first time in 1887 by Professor Weddige of the University of Leipzig [1-3]. He found that these compounds are isomers of cinnoline (II) and quinoxaline (III), which were known at that time.



Quinazoline



Cinnoline



Quinoxaline

First is the looped xThe naming and numbering of inazoline compounds has been confusing due to the use of different nomenclature by researchers of each school of thought. He synthesized the compound containing the quinozoline ring in 1869 [4].

Since the methods of obtaining 2-thioxoquinazolone-4s and their chemical transformations are summarized in the literature, we tried to describe the materials that are not known in the literature for this work.

We also decided to synthesize the compounds formed with quinazolindione-2,4 and 2-thioxoquinazolone-4, n-methylolchlor-acetamidol.

Experimental part.

Synthesis of quinazolone - 4. We placed 80 g of anthranilic acid in a 500 ml round-bottomed flask, added 48 ml of formamide to it and heated it in a sand bath with a reverse cooler at

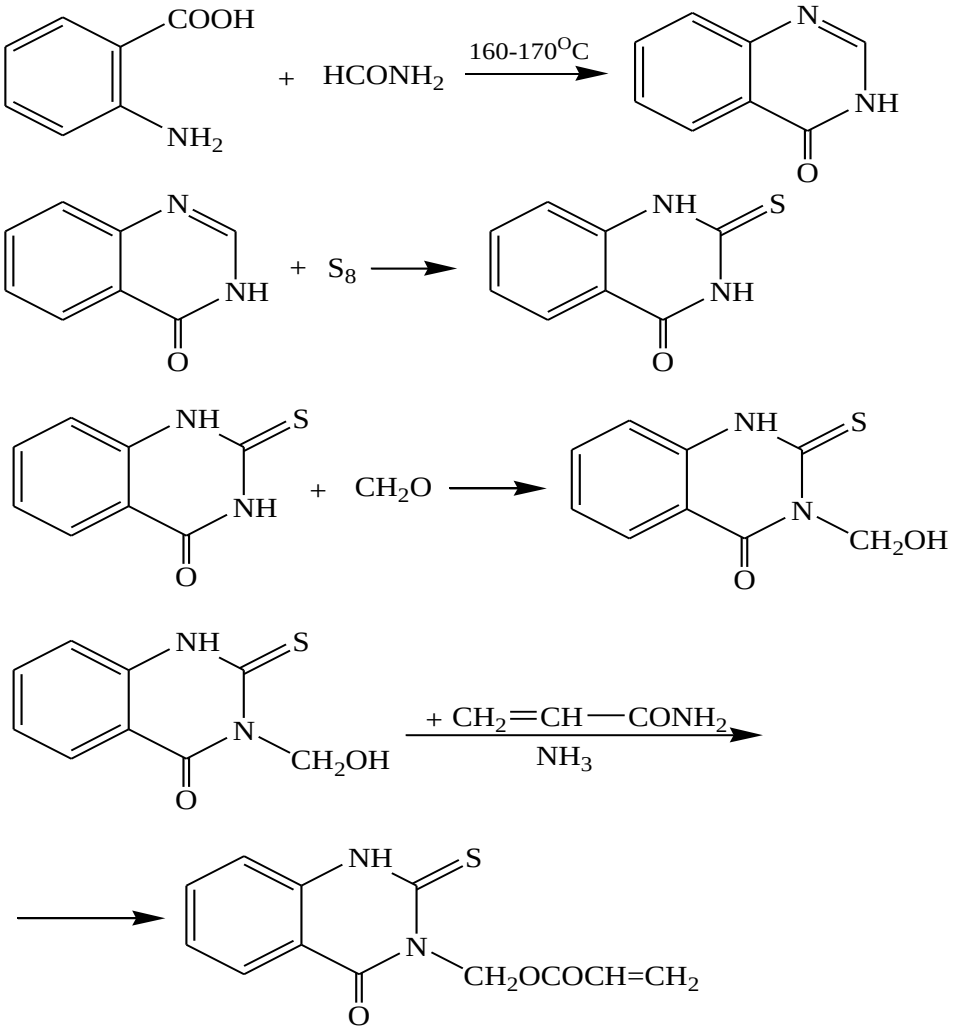
a temperature of 160-175 0C for 2 hours, then the resulting product was recrystallized from water. The yield is 80 g (92%), Rf = 0.38 Ts = 158-160 0C.

Synthesis of quinazalindione-2,4. 40 g (0.284 m) of glacial acetic acid and 500 ml of hot water were placed in a reaction flask. All substances were mixed for 2 hours using a mechanical mixer. Then 400 ml of water was added.

Anthranilic acid did not dissolve completely. 22.5 g of potassium (cyanopotassium) is added, which was initially dissolved in 150 ml of water. 300 g (7.4 m) of sodium hydroxide was added to the reaction mass. A very sharp heating occurred. Then, it is cooled with ice. After 2/3 of sodium hydroxide is added, crystals begin to fall. The resulting product was recrystallized from water. Yield 35 g (85%), Liquid = 294-295. chromatogram Rf = 0.30 in the benzenesulfol - acetone 3:1 system.

2- Thioxoquinozalone-4 synthesis. 25 g of quinazolon-4 was placed in a 250 ml round-bottomed flask, 12 g of sulfur was added to it, and heated in a sand bath with an air cooler at a temperature of 220-230 0C for 3 hours, after good melting, it was heated for another hour at 260 0C and cooled.

Synthesis of quinazolindione-2,4 acrylate. 20.8 g (0.1 mol) of 3-hydroxymethyl- 2-thioxoquinozalone-4 and 7.1 g (0.1 mol) of acrylamide, 150 ml of benzene were placed in a 250 ml round-bottom flask fitted with a reflux condenser. It was heated in a water bath at 80 oC for 4 hours. 20 mL of 0.1 N NS1 was added to separate the evolved ammonia. The resulting quinozolindione-2,4 acrylate was recrystallized from dioxane. The yield is 21.57 g (87%). Quinazolindione-2,4 acrylate was synthesized according to the following scheme: Absorption areas of 1478-1517 cm-1, 1566-1581 cm-1, 1612-1628 cm-1 were observed in the IR spectrum of quinazoline and its derivatives. Two strong absorption bands at 1500 and 1700 cm-1 in the IR spectrum of quinazolone-4 in the crystalline state belong to the double bond. Also, the intense absorption peak in the region of 1640-1720 cm-1 shows valence vibrations of the carbonyl group.



The aromatic ring in quinazolone-4 produces an absorption region of 1600-1580 cm-1, 1260-1250 cm-1, 770-750 cm-1. The corresponding absorption region 1260-1250 cm-1 and 770-750 cm-1 belongs to planar and non-planar deformation vibrations of the 1,2-substituted benzene ring.

The absorption region of 3300-2300 cm-1 for quinazolone-4 and its derivatives represents NH intermolecular hydrogen bond.

It was also studied that copolymers synthesized on the basis of quinazoline and acrylic monomers have depressor properties for diesel fuels. Their physical and chemical properties are listed in the table.

Table 1

Physicochemical properties of depressor compounds based on 2-thioxoquinozolindione-4 and acrylic monomers

Naming pointers	Diesel fuel **Dts 989: 20 01**	**2TX-4 + AK**	**2TX-4 +MA**	**2TX-4+MMA**	**2TX-4 +BX**
Cetane number	45	53	55	56	58
The composition of the faction: Driven at a temperature not higher than 50%, 0C 96% is driven at a temperature of 0C	 280 360	 264 360	 262 358	 260 357	 258 356

Kinematic viscosity, 20 0S: kV.mm/s (sST)	3,0-6,0	4,6	4,4	4,2	4,0
Solidification temperature, not high oC	-12	-26	-28	-29	-30
The fading temperature, oC, was not high in the average climatic zone	-5,0	-8	-10	-12	-14
The fading temperature, oC, was not high in the average climatic zone	0,2	0,13	0,15	0, 16	0,34
Water-soluble acids and alkalis	It won't happen				
The concentration of tar in 100 cm3 of fuel is mg	40	36	30	28	26
Acidity in 100 cm3 fuel, KON mg	5,0	It won't happen			
Number of iodine in 100 g of fuel	6,0	4,0	3,6	3,5	3,3
Laughter, in %	0,01	0,001	0,00 1	0,00 1	0,00 1
Coking in 10% residue	0,02	0,014	0,01 2	0,01 0	0,00 8
Filtration coefficient	3,0	2,5	2,0	1,8	1,6
The presence of mechanical impurities	won't be				
. Amount of water, % mass.					
20 oS: kg/m3, density	860	846	840	838	834

Thus, copolymers of acrylic and methacrylic acids with quinozolins and 2-thioxoquinozolindione-4 were synthesized [5-6]. It was found that when they are used as a depressor additive for diesel fuels, they significantly reduce the solidification temperature and improve the rheological properties at low temperatures.

References Used

1. S.F. Fazilov, Sh.B. Mavlanov, O.B. Akhmedova, B.N. Khamidov Synthesis of epichlorohydrin-based depressor compounds with compounds containing heteroring and studying their properties. Uzbekistan Chemistry Journal. 2011. No. 2. p. 57-59.
2. Kuliev A.M. I find problems like chemistry and technology. L.: Chemistry, 1985, p. 312.
3. Synthesis and research of fatty acids based on local secondary petroleum products. Khujakulov, Kamoliddin, Mavlanov, Babakhan, Fazilov, Sadriddin and others. IOP Conference Series: Earth and Environmental Science. Tom 839, Vypusk 41 October 2021 Number stati 0420735th International Scientific Conference on Agribusiness, Environmental Engineering and Biotechnologies, AGRITECH-V 2021 Krasnoyarsk16 June 2021 to 19 June 2021 Code 172484
4. Development of technologies for producing catalyst for destructive

hydrogenation of asphalt-free oil of heavy sulfur oil. Faizullaevich, Fozilov Sadriddin, Arashovich, Mavlanov Babakhan, Bobokulovich, Toirov Bakhtiyor and others.

5. Increasing the Resistance of the Cutting Tool during Heat Treatment and Coating. Sharipov J., Barakayev F., Fozilov S. and others. AIP Conference Proceedings. Volume 243216 June 2022 Number status 0500421st International Conference on Problems and Perspectives of Modern Science, ICPPMS 2021 Tashkent10 June 2021 to 11 June 2021 Code 180176
6. System Analysis and Simulation of the Process of Destructive Hydrogenization of Deasphaltisate of Heavy Oil. Ataullaev, Sherzod, Mavlanov, Bobokhon, Fozilov, Sadriddin and others. Materials Science Forum Volume 1049 MSF, Stranitsy 232 - 2392022 2nd International Scientific Workshop Advances in Materials Science, AMS II 2021Krasnoyarsk29 July 2021 to 31 July 2021Code 274589