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The Synthesis and Properties of Acrylic and Methacrylic Ether of Salicylic Acid

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Abstract: *Acryloyl and metacryloyl ethers of salicylic acid were synthesized. For this salicylic acid was included with (meth)acryoyl anhidride in akvimole proportion in polymer solvents to the reaktion. The structureof obtained methacryloyl salycylates was confirmed in IG spektrums. It was defined that, acryl monomers keeping salicylic fragments in its contain have high antibacterial properties.*

Keywords: *Methacryloyl salycylate, antibacterial monomer.*

1. INTRODUCTION

As it is known salicylates are widely used from the end of XIX century to nowadays. Acetyl ether (AST-aspirin) of salicylic acid, sodium salicylate, salicylic amide (SAM), methyl salicylate are used as analgesics, antipyretics, antiagregants in medicine. Along with it the drugs obtained on the base of SA have altereffects as injury of mucous membrane of gastrointestinal system, violation of kidney function. That is why improvement of the known methods of the synthesis of SA derivatives, also work out new obtaining methods of new derivatives with high biological activity, less toxic, with lower altereffects are considered one of the actual problems[1]. On the other hand the research works are being held in the direction of increasing duration of action of most drugs, also antiseptic and antibacterial drugs. One of the methods of providing longtime effectivity of drugs is the inclusion of biological active fragments to side groups of high molecular compounds.One of the widely spread method is inclusion of biological active monomers to polymer chain at the stage of synthesis of macromolecules[2]. From this point of view the synthesis of monomers having new biological activity is very important.

The research works that led in the field of methacrylamide derivatives of biological active monomers-4-amino-SA keeping salicylic groups in its molecule are known in the literature [3]. Recent years wide investigations are being led in the obtaining of ally-, vinyl-, methacryloyl-, oligoolefin ethers of salicylic and acetylsalicylic and also high molecular compounds and composites on their base [4].

The presented article is dedicated to the obtaining of acryloyl and mehtacryloyl ethers of SA and the study of antibacterial properties.

2. EXPERIMENTAL PART

The syntyhesis of acryloyl-and methacryloyl ethers of SA. 100 ml chloroform and 13,7g (0.1 mol) SA are poured into flask supplied with mixer, anticooler and thermometer. Onto reaction mixture 9,05g(0.1 mol) chloroanhydride of acryl acid is gradually added through funnel drop. After mixing the solution at 25º C temperature during 30 min 10% aqueous solution of sodium carbonate is added in it until it gets Ph 5, 5 and again is mixed and is left silent for deposition of the main product. The obtained precipitation is washed with water, is filtered and is dried in vacuum drying. Then is crystallized in ethanol-water mixture (1:1 volume proportion), in conclusion 15g (78%) crystalloid substance- acrylsalicylate (AST) (I) decomposes. Dioxane, chloroform, acetone are used as solvents. The highest yield is observed when acetone solvent is used.

Physical-chemical indicators of crystal form salicylic acrylate [1] are as follows: nol.mass-192g, melting point-95ºC.

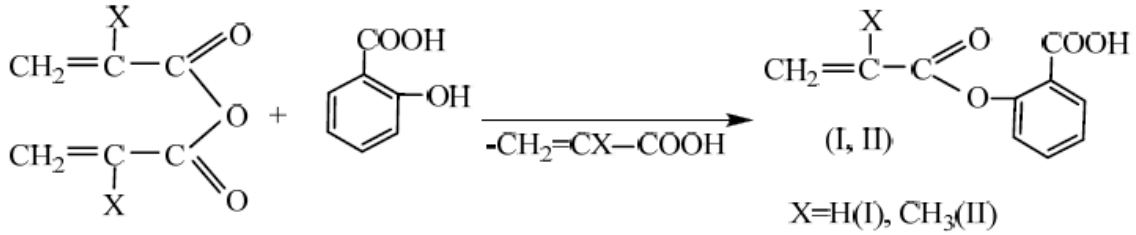
Monomer [1] is solved well in polar solvents as methanol, ethanol, propanol, acetone, diethyl ether, methylethylketone, dimethylformamide, dimethylsylph-oxide, but partially in water.

IG spectrums of synthesized compounds are fixed in BRUKER spectrometry of ALPHA firm in 600-4000 sm^{-1} range NMR^{1}H spectrums are recorded in DMSO solution by "BRUKER" brand spectrometry having 300.18MHs frequency.

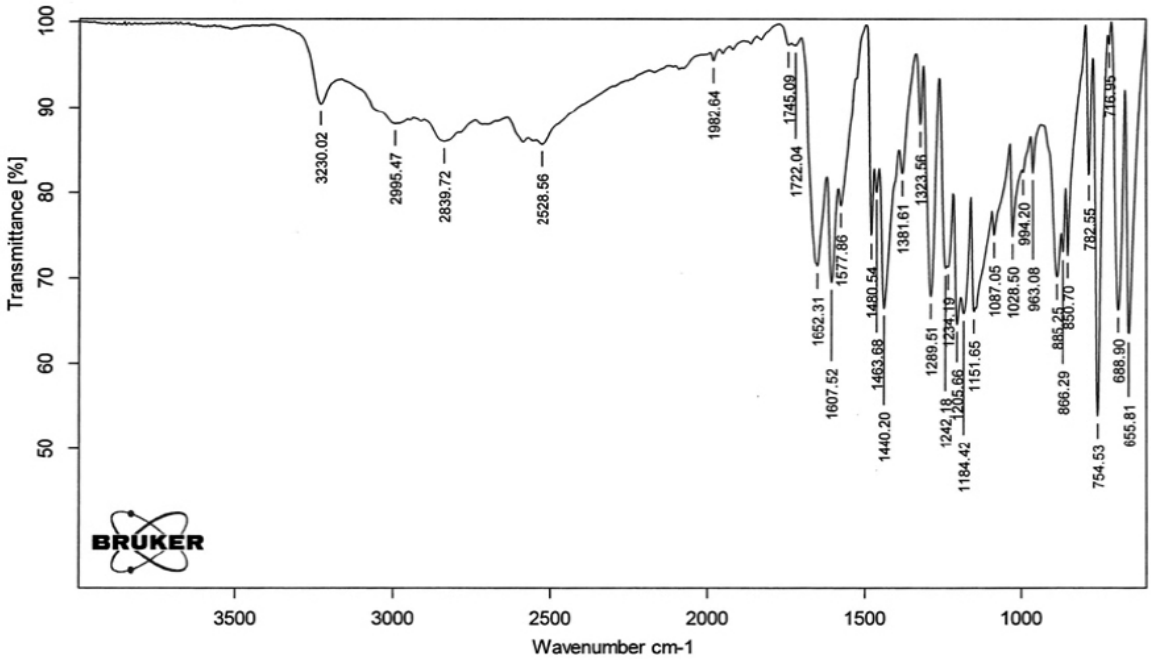
For the study of antibactertial properties of obtained monomers standart methods are used [5].

3. Discussion of the Results

In order to obtain acrylic and methacryloyl ethers of SA anhydrides of acryl or methacryl acids have been included to esterification reaction with SA in solvent condition. Different from former researches in order to include vinyl group to SA molecule esterification reaction was held using hydroxyl group in molecule and corresponding ethers (I,II) were obtained:



The structure and degree of purity of monomers (I, II) were proved by IG- and NMR spectrums. In IG spectrums of monomers in 1640-1660, 1745, 1555 and 3460sm^{-1} areas corresponding absorption zones belonging to C=C, C=O, C-O-C and O-H groups were recorded.



The antimicrobial properties of AST and MST compounds were given in Table 2. As it is seen from the table these compounds as test-cultura show strong antibacterial activity against golden staphylicocus from gram-positive microorganisms (St.aureus) and Candida mushrooms.So MST kills them in 1:400 proportion dilution during 10 minutes, but during 20 minutes in 1:800 proportion dilution(the results of the experiment were shown in the addition).The effect of examined substances is as good as antiseptics(dioxane, ethyl alcohol, nitrofungin and so on) used in practice and are recommended to use as bactericidal substance.

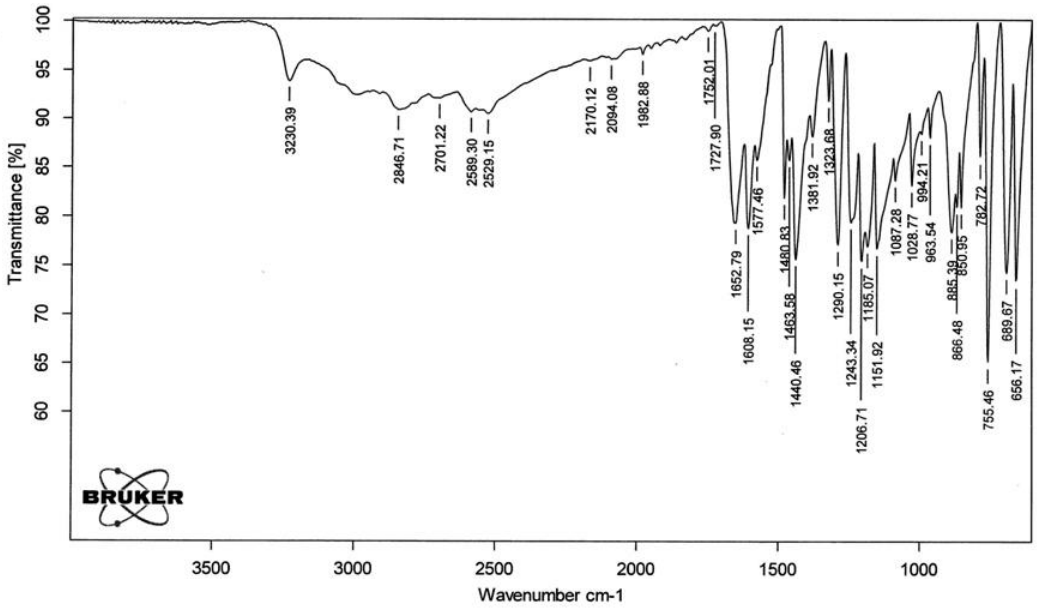


Table1. *Antibacterial properties of monomers*

Test culturas	Exposure Time (min.)	Examined substances																Controls											
		ST				Asp.				AST				MST				Rivanol				Ethyl alcohol				Nitrofungin			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
St.aureus	10	-	-	-	+	-	-	+	+	-	--	+	+	-	-	-	+	+	+	+	+	-	+	+	+				
	20	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	-	+	+	+				
	40	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	-	+	+	+				
	60	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	+	+	-	+	+	+				
Ps.aeruginoza	10	-	-	-	+	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+				
	20	-	-	-	+	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	-	+	+	+				
	40	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	-	+	+	+				
	60	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	+	-	-	-	+	-	+	+	+				
E.coli	10	-	-	+	+	-	-	+	+	-	-	+	+	-	-	-	+	-	-	-	+	+	+	+	+				
	20	-	-	-	+	-	-	+	+	-	-	+	+	-	-	-	-	-	-	-	+	-	+	+	+				
	40	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	+	-	+	+	+				
	60	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	+	+	+				
Candida albicans	10	-	-	-	+	-	-	-	+	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+
	20	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+
	40	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	+	+	-	+	+	+	-	+	+	+
	60	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	+	+	-	+	+	+	-	+	+	+

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