o-FERROTSENIL BENZOIC ACID MOCHEVINA AND DETERMINATION OF BIOSTIMULATORY PROPERTIES OF COMPOUNDS WITH THOMACHEVINA DERIVATIVES

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DOI: 10.5958/2249-7137.2021.02609.4

ABSTRACT

The biological activity of the water-soluble salts of the reaction products, as well as data on the reaction of o-ferrocenylbenzoic acid with monomethylolochevin, are presented in this paper. Many scientists have researched the properties of ferrocene, one of the most important metallocenes, and have synthesized novel products since its discovery. Ferrocene-based biologically active compounds are widely employed in medicine, pharmacy, agriculture, and other industries.

KEYWORDS: *Ferrocene, Cyclopendanyl Ring, O-Ferrocenylbenzoic Acid, Ferrocenocarboxylic Acid, Monomethylurea, 1-(2-Carboxyphenyl)-1'-N-Methyloxyferrocenolamide, Biological Activity.*

INTRODUCTION

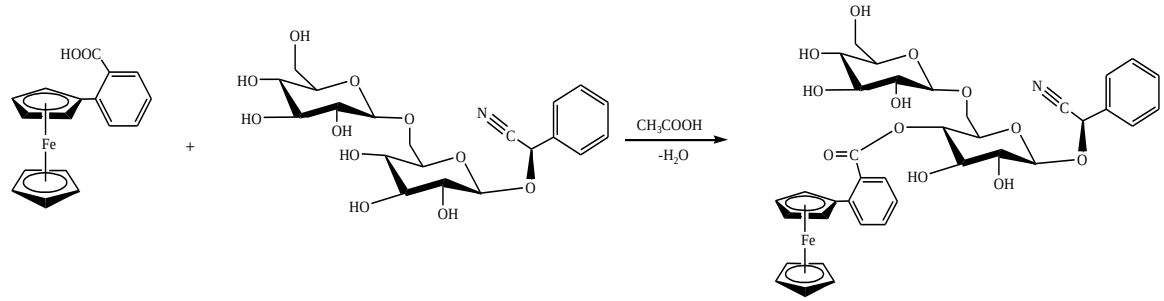
Many scientists have researched the properties of ferrocene, one of the most important metallocenes, and have synthesized novel products since its discovery. Ferrocene-based biologically active compounds are widely employed in medicine, pharmacy, agriculture, and other industries **[1].**

The Purpose Of The Study: 1- (2-carboxyphenyl) -1'-N-methyloxyferrocenolamide sodium - **AXM**, obtained on the basis of o-ferrocenylbenzoic acid, (1- (2-carboxyphenyl) -1'-N-methyloxyferrocenolamide potassium - **AXM-3**, 1- (2- carboxyphenyl) -1'-N-ferrocenylamidometankanarboxamide potassium - **AXM-4**, 1- (2-carboxyphenyl) -1'-N-ferrocenylthioamidometantiocarboxamide potassium - determination of biostimulatory properties of drugs **AXM-5**.

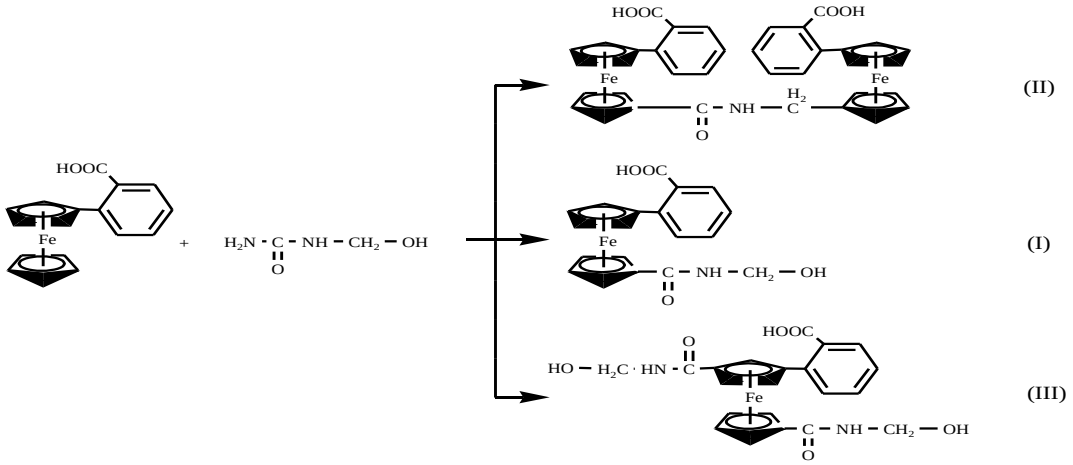
One-dimensional polymers of p-ferrocenylbenzoic acid with Mn $(OAc)_2 \cdot 2H_2O$ and Cd $(OAc)_2 \cdot 2H_2O$ were synthesized by Chinese scientists **[2]** and their structure and properties were studied. The authors **[3,4]** have developed a technology for the production of м-ferrocenylbenzoic acid with thiourea, methyldoldithiourea.

One of the important derivatives of ferrocene is *o*-ferrocenylbenzoic acid, whose isomers show strong acid properties compared to*p*-, *m*-ferrocenyl benzoic acids **[5].**

For the first time by Uzbek chemists, the derivative of o-ferrocenylbenzoic acid with amygdalin ([(6-O-β-D -glucopyranosyl-4-O- (*o*-ferrocenyl-benzoyl) β-D -glucopyranosyl) oxy) (phenyl) acetonitrile) synthesis was performed **[6].**The reaction was carried out according to the following scheme:



Experiment Section: Compounds of *o*-ferrocenylbenzoic acid with urea and thiourea derivatives were synthesized in the Laboratory of Commodity Chemistry of Andijan State University. The reaction of *o*-ferrocenylbenzoic acid with monomethylomochevina was carried out according to the following scheme:



The reaction products are mainly formed in (I) product 98.4%, as a by-product (II) 0.4%, (III) 1.2%.The reaction products were purified using column chromatography.In the analysis of the IR spectrum of the purified compound (I), the intensive absorption in the 760 cm^{-1} area was determined by the benzene ring, the extracellular fan-like oscillations (ρ_{CH}) by 1404 cm^{-1}, and the 1554 cm^{-1} absorption by the ring plane (β_{CH}) and 691 the absorption peaks at cm^{-1} represent the deformation (δ_{CCC}) oscillations of the ring, while the high-intensity peak at 1685 cm^{-1} represents the valence (ν_{CC}) oscillations of the carbons in the ring.Deformation vibration of the cyclopentadienyl ring (δ_{CCC}) is manifested in the area of 885 cm^{-1}.The valence oscillation (ν_{CC}) of carbon atoms has an average intensity in the exchanged and unchanged rings and is located in the area of 1100 cm^{-1}, respectively. The β_{CH}oscillation of the cyclopentadienyl ring in the compound was observed in the exchanged ring at 1009 cm-1, 1260 cm-1, and 1454 cm-1

areas.The carboxyl group-specific (δ_{COH}) oscillation gives absorption lines in the 1260 cm-1 area. At 3084 cm^{-1} represents the valence oscillation of the -NH- group. (Figure 1).

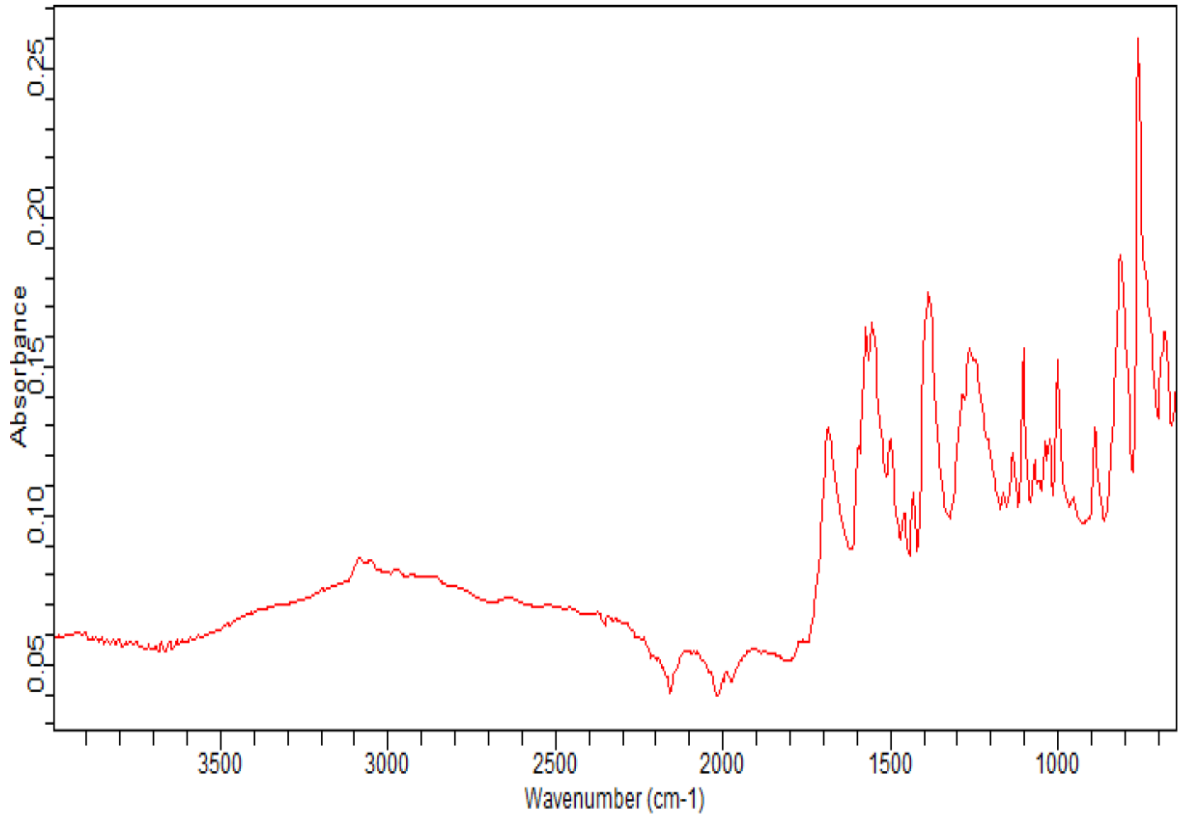


Figure 1. 1- (2-carboxyphenyl) -1'-N-methyloxyferrocenylamide

IR spectrum

Mass spectrometric analysis of 1- (2-carboxyphenyl) -1'-N-methyloxyperrocenylamide showed that $FcCONHCH_2Fc$ 427 *m / z*, $FcC_6H_4COOH^+$ 307 *m / z*, FcC_6H_4COOH 306 *m / z*, Fe C_6H_4C + 273 *m / s* peaks were observed..

The biostimulatory properties of water-soluble sodium and potassium salts of isolated substance (I) 1- (2-carboxyphenyl) -1'-N-methyloxyferrocenolamide were obtained and studied in wheat plants.The results of the study showed that the biological activity of 10^{-7} M solution of sodium salt of 1- (2-carboxyphenyl) -1'-N-methyloxyferrocenolamide (AXM) was high, which had a positive effect on wheat germination from control and other analogues.

Method and survey materials. The method "Determination of seed germination and seed fertility" was determined by morphophysiological evaluation according to SS 12042-80 **[7].** Five of the six samples were taken for this purpose. Initially, wheat grain samples were taken. Then each sample was treated with a separate drug (AXM, AXM-3, AXM-4, AXM-5). The samples tested were grown between 20 x 100 cm wet filter papers. Samples of treated wheat were weighed every 24 hours. In the study, the ratio of water used for fermentation to grain weight was calculated in%. Root length and grass length were measured after 24, 48, 72 hours and results were recorded **[8].**

Results obtained: The biostimulating properties of AXM, AXM-3, AXM-4 and AXM-5 preparations based on o-ferrocenylbenzoic acid were tested on the control (water) wheat variety Alekseevich. The results are presented in Table 1.

TABLE 1EFFECT OF AQUEOUS SOLUTIONS OF DRUGS AXM, AXM-3, AXM-4 AND AXM-5 ON THE SWELLING OF AUTUMN WHEAT OF ALEKSEEVICH VARIETY

Statistical indicators	Grain weight before germination, mg	Grain mass during germination, mg			The ratio of water used for budding to grain weight,%	Root length, cm	Grass length, cm	Forgetfulness, %
		24 In hours	48 In hours	72 In hours				
	Control							
Average indicator	0,36 ±0.01	0,12 ±0.04	0,08 ±0.03	0,11 ±0.02	89,94 ±6.89	2,60 ±0.30	1,56 ±0.08	**63,66 ±1.20**
	AXM							
10-4	0,37	0,20	0,17	0,09	122,32	2,20	1,53	65,00
10-5	0,40	0,23	0,13	0,08	108,67	2,83	1,83	52,67
10-6	0,41	0,24	0,19	0,12	133,48	3,10	2,17	**76,00**
10-7	0,42	0,24	0,16	0,12	126,33	3,17	2,07	**79,00**
10-8	0,46	0,26	0,18	0,09	115,37	2,73	1,50	**71,00**
Average indicator	**0,41 ±0.01**	**0,23 ±0.01**	**0,16 ±0.01**	**0,09 ±0.01**	**121,23 ±5.80**	**2,80 ±0.16**	**1,82 ±0.09**	**68,73 ±3.62**
	AXM-3							
10-4	0,40	0,21	0,15	0,08	113,99	2,67	1,67	61,33
10-5	0,43	0,24	0,16	0,04	102,69	2,90	1,40	60,33
10-6	0,45	0,24	0,19	0,03	101,62	2,07	1,00	64,00
10-7	0,39	0,22	0,14	0,06	108,40	2,83	1,37	**67,33**
10-8	0,37	0,21	0,13	0,06	108,94	2,50	1,40	50,00
Average indicator	**0,41 ±0.01**	**0,22 ±0.01**	**0,15 ±0.01**	**0,05 ±0.01**	**107,12 ±3.05**	**2,59 ±0.16**	**1,36 ±0.08**	**60,60 ±3.98**
	AXM-4							
10-4	0,46	0,26	0,18	0,09	114,64	1,23	1,50	**71,33**
10-5	0,40	0,23	0,21	0,08	133,87	2,57	1,83	**76,33**
10-6	0,38	0,21	0,13	0,11	120,71	3,83	2,00	**68,67**
10-7	0,41	0,24	0,19	0,09	126,78	2,83	2,17	59,00
10-8	0,41	0,21	0,16	0,05	104,62	2,33	1,67	43,67
Average indicator	**0,41 ±0.01**	**0,22 ±0.01**	**0,17 ±0.01**	**0,08 ±0.01**	**120,12 ±5.11**	**2,56 ±0.26**	**1,83 ±0.09**	**63,80 ±5.04**
	AXM-5							
10-4	0,46	0,26	0,18	0,09	114,64	2,73	2,00	57,33
10-5	0,40	0,23	0,21	0,08	133,87	2,73	1,83	67,00
10-6	0,38	0,21	0,13	0,11	120,71	2,17	1,67	48,00
10-7	0,41	0,24	0,19	0,09	126,78	3,00	2,00	59,00

10-8	0,41	0,21	0,16	0,05	104,62	2,33	2,00	**70,67**
Average indicator	**0,41 ±0.01**	**0,22 ±0.01**	**0,17 ±0.02**	**0,08 ±0.01**	**120,12 ±5.11**	**2,59 ±0.23**	**1,90 ±0.07**	**60,40 ±3.76**

The results shown in Table 1 show that the weight of wheat grains taken before the control was 0.36 mg before germination, the weight of the grain during germination was 0.12 mg after 24 hours, 0.08 mg after 48 hours and 0.11 mg after 72 hours. The ratio of water used for germination to the weight of the grain was 89.94%. It was then determined that the root length was 2.60 cm, the grass length was 1.56 cm and the yield was 63.66%.

The following results were obtained when studying the effect of 10^{-4}, 10-^{5}, 10^{-6}, 10^{-7}, 10^{-8} M concentrated solutions of drugs AXM, AXM-3, AXM-4, AXM-5 on the germination of wheat. The mean of the study results was 0.41 mg of grain weight in all variants before swelling, 0.23, 0.22, 0.22, 0.22 mg after 24 hours, respectively 0.16, 0.15, 0.17, 0.17 mg after 48 hours and after 72 hours it was found to increase by 0.09, 0.05, 0.08, 0.08 mg. The ratio of water used for germination to grain weight is 121.23, 107.12, 120.12, 120.12%, root length 2.80, 2.59, 2.56, 2.59 cm and grass length 1.82, 1.36, 1.83, 1.90cm, respectively, and the average forgetfulness was found to be 68.73, 60.60, 63.80, 60.40%. Among the above solutions, it was observed that in the 10^{-6}, 10^{-7} M concentrated solutions of AXM, the forgetfulness was higher than the control by 12.34%, 15.34%, respectively.

CONCLUSION

Practical studies have shown that when applied to the germination of Alekseevich wheat, a solution of AXM with a concentration of 10^{-7} M showed high biostimulatory activity, and fertility was 15.34% higher than the control. The identified data showed that a 10^{-7} M concentrated solution of AXM could be used in agriculture to accelerate the germination of wheat.

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