INTRODUCTION OF NEW METHODS OF STUDYING THE METHYLATION REACTION OF QUINAZOLIN-4-ONE IN DIFFERENT SOLVENTS

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Abstract: the structure of the quinazolin-4-one molecule, its chemical properties, and methylation reactions in the presence of various solvents are fully explained in the article. The dependence of the methylation reaction on the methylating agent, the nature of the solvent, the temperature, and the duration of time have been studied.

Key words: quinazolin-4-one, molecule, chemical properties, solvent, methylation reaction, solvent nature, temperature, time duration

INTRODUCTION

When alkylating compounds containing an amide group in most organic substances, the reaction takes place in two directions. Therefore, in such compounds, the reaction takes place either by binding to an oxygen atom or to a nitrogen atom [1-3].

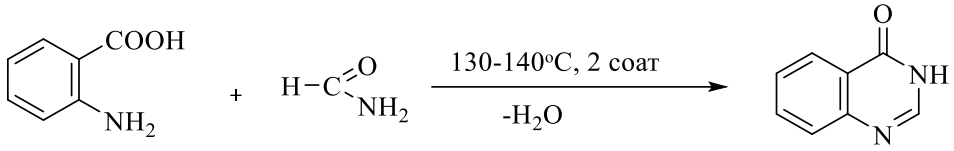
Similar systems exist as tautomers of amide and enol, imino. Therefore, when such compounds are alkylated, the alkylation reactions are directed toward the oxygen atom. Quinazolin-4-ones, like other heterocyclic compounds, have an amide group, and in order to form anions in chemical reactions, this negative charge belongs equally to all three atoms.

Therefore, in chemical processes, the chemical reaction is directed towards O^4 or N^3 atoms. Determining the reaction direction of these compounds is of great theoretical and practical interest. The analysis of substituted quinazolin-4-ones and their homologues in the second case shows that the course of the reaction depends on the nature of the solvent, the nature of the substituents on the aromatic ring in alkylating agents [4-6].

METHODS

For several years, anthranilic acid serves as the main raw material in the synthesis of quinazolin-4-ones. In the literature, this compound was synthesized by various methods and the product yield was 90-92%. In this case, anthranilic acid and formamide obtained in a 1:1 equivalent amount for the reaction are

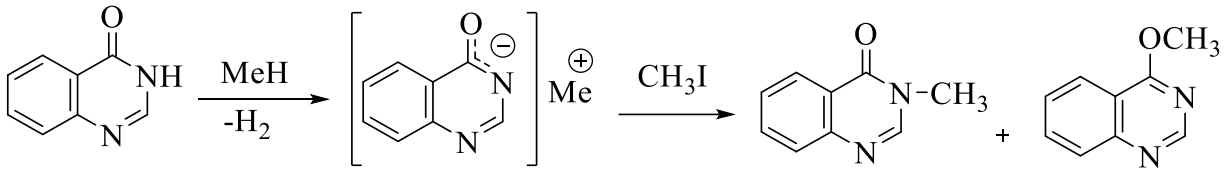
heated in an oil bath at 130ºC through a reverse cooler. On cooling, quinazolin-4-one is formed.



RESULTS AND DISCUSSION

The yield of quinazolin-4-one (2) obtained by this method is 96%.

The methylation reaction in the molecule of this heterocyclic compound was mainly studied by leaving reactions at nitrogen atom N-3 and oxygen O-4 atoms. Due to the presence of the N-1 double bond, the N-1-C-2 nitrogen atoms are very unlikely to participate in the reaction. The quinazolin-4-one molecule forms anions under the influence of alkali metal hydrides, in which the negative charges are redistributed among N-3, -C-4, -O-4 atoms.



Me⊕=Li,Na

The ambident anion of the formed sodium salt is delocalized between the N-3 and O-4 atoms. The methylation reaction of this ambident anion was methylated with methylation agents such as methyl iodide, dimethyl sulfate, or methyltosylate. As a result of chemical reactions, 3-methylquinazolin-4-one and 4-methoxyquinazoline were formed.

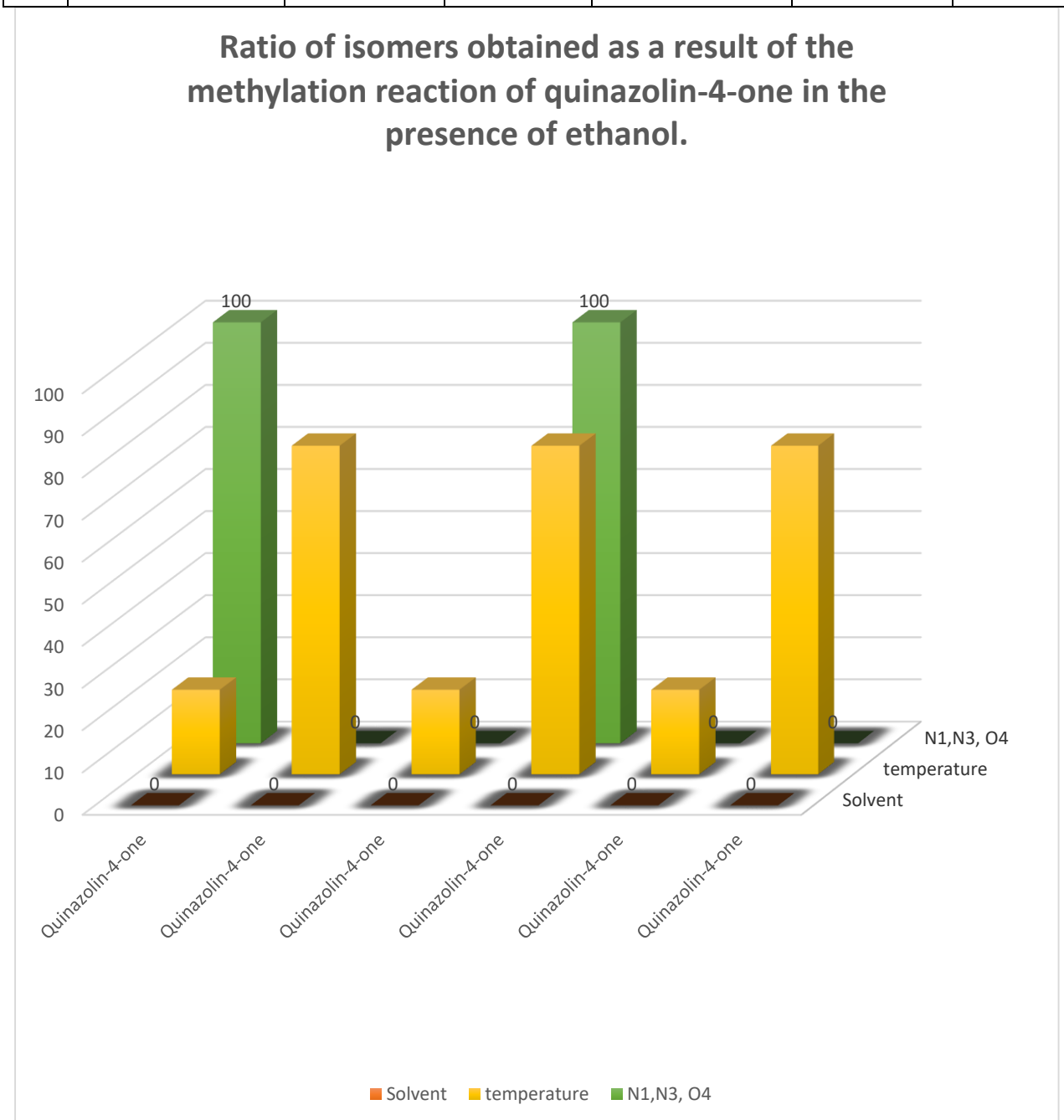
CONCLUSION

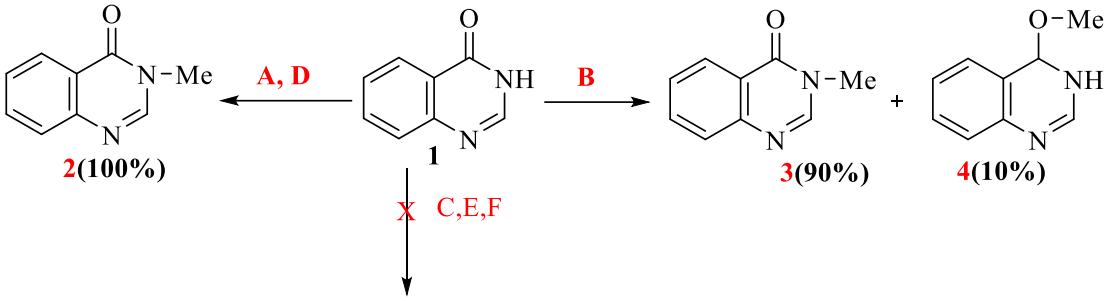
Isomers obtained by methylation reaction of quinazolin-4-one in ethanol solvent.

Ratio of isomers obtained as a result of the methylation reaction of quinazolin-4-one in the presence of ethanol. Table-1

№	Primary substance	Alkylating agent	Solvent	Temperature °C	Duration on the hour	N^1/N^3, O^4%
1	Quinazolin-4-one	CH_3I	ethanol	20-25	24	N^3-100

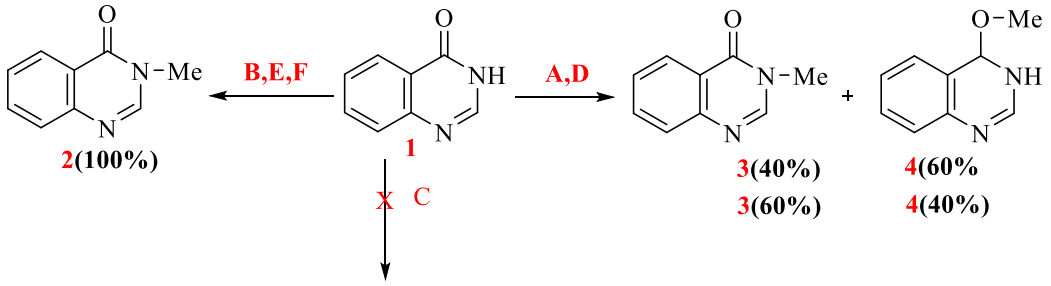
2	Quinazolin-4-one	CH_3I	ethanol	75-78	4	N^3-90 O^4-10
3	Quinazolin-4-one	MeOTs	ethanol	20-25	24	-
4	Quinazolin-4-one	MeOTs	ethanol	75-78	4	N^3-100
5	Quinazolin-4-one	$(CH_3)_2SO_4$	ethanol	20-25	24	-
6	Quinazolin-4-one	$(CH_3)_2SO_4$	ethanol	75-78	4	-





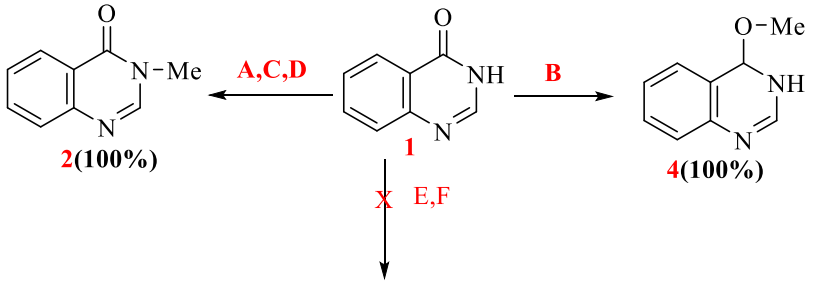
A method: 1: CH_3I-1:1, C_2H_5OH, 20-25°C, 24 h, N^3-100 %
B method:: 1: CH_3I-1:1, C_2H_5OH, 75-78°C, 4 h, N^3-90 %, O^4-10%
C method: 1: MeOTs -1:1, C_2H_5OH, 20-25°C, 24h, (-)
D method:: 1: MeOTs -1:1, C_2H_5OH, 75-78°C, 4 h, N^3-100 %
E method:: 1: $(CH_3)_2SO_4$ -1:1, C_2H_5OH, 20-25°C, 24 h, (-)
F method: 1: $(CH_3)_2SO_4$ -1:1, C_2H_5OH, 20-25°C, 4 h, (-)

Isomers obtained by methylation reaction of quinazolin-4-one in dioxane-1,4 solvent.



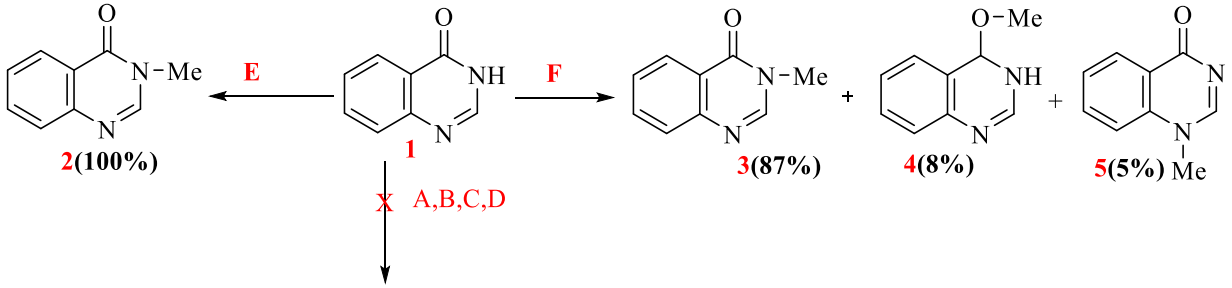
A method: 1: CH_3I-1:1, **dioxane-1,4,** 20-25°C, 24 h, N^3-40 %, O^4 -60%
B method: 1: CH_3I-1:1, **dioxane-1,4,** 80-90°C, 4 h, N^3-100%
C method: 1: MeOTs -1:1, **dioxane-1,4,**20-25°C, 24 h (-)
D method: 1: MeOTs -1:1, **dioxane-1,4,** 80-90°C, 4 h, N^3-60 %, O^4-40%
E method: 1: $(CH_3)_2SO_4$ -1:1, **dioxane-1,4,** 20-25°C, 24 h, N^3-100%
F method: 1: $(CH_3)_2SO_4$ -1:1, **dioxane-1,4,**80-90°C, 4 h, N^3-100%

Ratio of isomers obtained by the methylation reaction of quinazolin-4-one in the presence of DMFA.



A method: 1: CH_3I-1:1, DMFA, 20-25°C, 24 h, N^3-100%
B method: 1: CH_3I-1:1, DMFA, 80-90°C, 4 h, O^4-100%
C method: 1: MeOTs -1:1, DMFA, 20-25°C, 24 h, N^3-100%
D method: 1: MeOTs -1:1, DMFA, 80-90°C, 4 h, N^3-100%
E method: 1: $(CH_3)_2SO_4$ -1:1, DMFA, 20-25°C, 24 h, (-)
F method: 1: $(CH_3)_2SO_4$ -1:1, DMFA, 80-90°C, 4 h, (-)

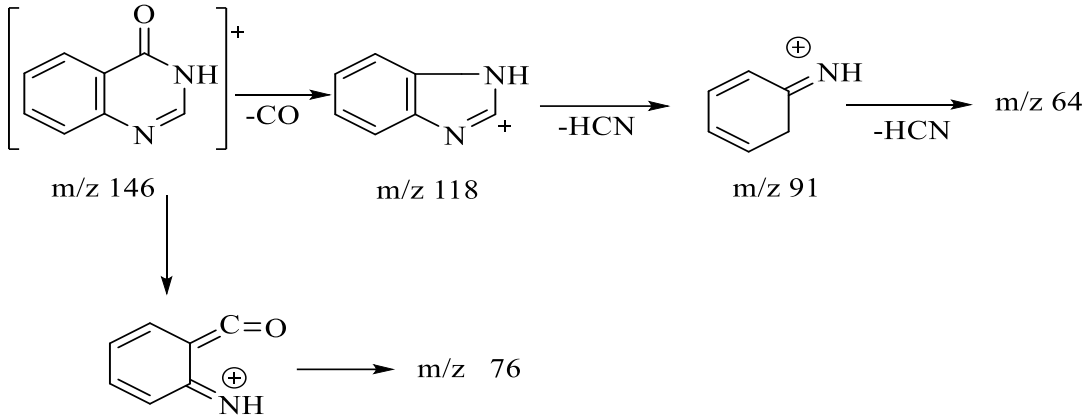
Isomers obtained by the methylation reaction of quinazolin-4-one in DMSO solvent.



A method: 1: CH_3I-1:1, **DMSO**, 20-25°C, 24 h, (-)
B method: 1: CH_3I-1:1, **DMSO**, 80-90°C, 4 h, (-)
C method: 1: MeOTs -1:1, **DMSO**, 20-25°C, 24 h, (-)
D method: 1: MeOTs -1:1, **DMSO**, 80-90°C, 4 h, (-)
E **method:** 1: $(CH_3)_2SO_4$ -1:1, **DMSO**, 20-25°C, 24 h, N^3-100
F **method:** 1: $(CH_3)_2SO_4$ -1:1, **DMSO**, 80-90°C, 4 h, N^1-5, N^3-87, O^4-8

For structural proof of quinazolin-4-one and derived products we studied using physico-chemical research methods.

The mass spectrum is characterized by the presence of a strong peak of the molecular ion. The fragmentation of the molecular ion is explained by the release of quinazolin-4-one CO and HCN from the molecule. Further decomposition of the $(M\text{-}CO)^+$ ion occurs with the release of two HCN molecules.



Quinazolin-4-one YMR 1H spectrum has a linear shape: YMR 1H spectra (d, ppm, J/Hz): there are lines 8.35 (1H, s, H-2), 8.20 (1H, dd, H-5 J_1=1.02, J_2=8.05), 7.81-7.77 ppm (1N, AA`VV`- type, H-7), 7.72 (1H, d, H-8, J=8.14.) 7.52-7.49 m.u. (1H, AA`VV`-type, H-6). In the NMR 1H-spectrum, the protons of the aromatic ring show the field excesses at 8.35-7.49 ppm. Based on this data, it was proved that the number of protons belongs to the quinazolin-4-one molecule.

It was proved by IR spectroscopy of N-Methylquinazolin-4-one. It is known from the spectrum that the valence vibrations of C=O groups appear in the area of 1664 cm^{-1}, (N-H) - 3436 cm^{-1}. From the area of 1612 cm^{-1} it can be seen that in the absorption lines of (C=N) groups, in the lines of 1468 cm-1 (C-H) group, (C=C) 1558 cm-1, 1665 (C=O), 1596 (C=N) absorption groups are formed on the lines.

UV spectra were obtained in acidic, alkaline and neutral media.

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