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Reaction of Biguanides and Related Compounds. VIII.[1] The Condensation of Arylbiguanides and N-Amidino-O-alkylisoureas with Diketene and Ethyl Acetoacetate

Mitsuru Furukawa, Takatoshi Yoshida, Motoo Goto, and Seigoro Hayashi

Faculty of Pharmaceutical Sciences, Kumamoto University[2]

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The reaction of arylbiguanides and N-amidino-O-alkylisoureas with diketene was found to proceed through the acylated intermediates to give pyrimidines and *s*-triazines. The reaction of arylbiguanides with ethyl acetoacetate was also attempted and the proportion of pyrimidines and *s*-triazines obtained was found to be almost equall to that in the case of the reaction with diketene. Therefore, this reaction was also elucidated to proceed *via* the acylated intermediates.

It has been reported that guanidine readily reacted with diketene, which affords a valuable precursor of acetoacetic ester, at room temperature to give 2-amino-4-methyl-5,6-dihydro-6-oxopyrimidine.[3] Biguanides in which a guanidine moiety is involved in the molecule have also been known to react with ethyl acetoacetate in the presence of sodium alkoxide to give 2-guanidino-4-hydroxy-6-methylpyrimidines.[4] In a series of studies on the reactivities of biguanides and the related compounds,[1,5] we have analogously shown that they behaved just like as guanidine toward some carbonyl compounds. Thus, we attempted the reaction of arylbiguanides and N-amidino-O-alkylisoureas with diketene and in more details repeated the reaction of arylbiguanides with ethyl acetoacetate in the absence of any catalyst.

Reaction of Arylbiguanide with Ethyl Acetoacetate

Curd[4] has reported that the reaction of *p*-chlorophenylbiguanide with an equivalent amount of ethyl acetoacetate in ethanol in the presence of sodium hydroxide or sodium ethoxide gave a 69% yield of 2-*p*-chlorophenylguanidino-4-hydroxy-6-methylpyrimidine and a small amount of a compound believed to be 2-amino-4-*p*-chlorophenylamino-6-acetonyl-*s*-triazine. Although the structure of the former pyrimidine compound has been established by an unequivocal synthesis from *p*-chlorophenylguanidine and 4-hydroxy-6-methyl-2-methylthiopyrimidine,[6] the reaction product of S-methylisothiourea and ethyl acetoacetate, no evidence for the structure of the latter triazine compound was provided. However, the formation of the triazine compound should be anticipated by the facts that biguanides react with ethyl carboxylate to give 2,4-diamino-*s*-triazines.[7] The reaction between biguanides and ethyl

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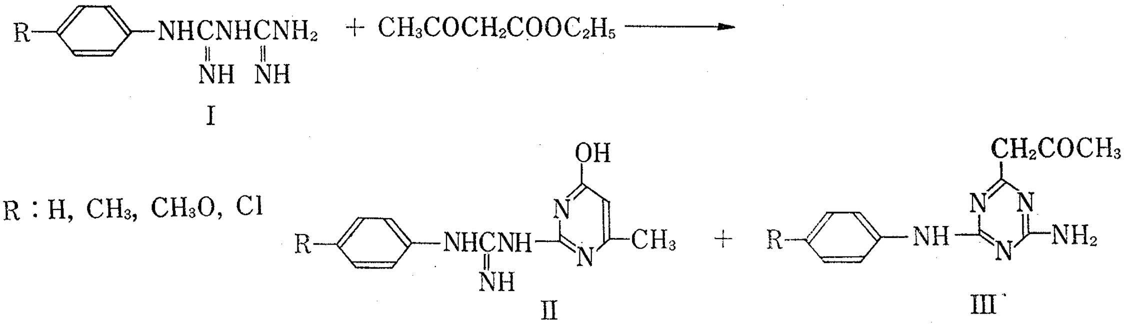
[1] Part VII: M. Furukawa, Y. Kojima, and S. Hayashi, *Chem. Pharm. Bull.* (Tokyo), **21**, 1126 (1973).
[2] Location: *Oe-hon machi, Kumamoto.*
[3] R.N. Lacey, *J. Chem. Soc.*, **1954**, 839.
[4] F.H.S. Curd and F.L. Rose, *J. Chem. Soc.*, **1946**, 362.
[5] *a*) S. Hayashi, M. Furukawa, J. Yamamoto, and Y. Nishizima, *Chem. Pharm. Bull.* (Tokyo), **16**, 471, 474 (1968). *b*) M. Furukawa, Y. Fujino, and S. Hayashi, *ibid.*, **19**, 2284 (1971). *c*) M. Furukawa, Y. Fujino, Y. Kojima, and S. Hayashi, *ibid.*, **20**, 521 (1972). *d*) M. Furukawa, T. Yoshida, Y. Kojima, and S. Hayashi, *ibid.*, **21**, 478 (1973).
[6] H.L. Wheeler and D.F. McFarland, *Am. Chem. J.*, **42**, 101 (1909).
[7] *a*) F.H.S. Curd, J.K. Landquist, and F.L. Rose, *J. Chem. Soc.*, **1947**, 155. *b*) C.G. Overberger, F.W. Michelotti, and P.M. Carabateas, *ibid.*, **79**, 941 (1957). *c*) C.G. Overberger and S.L. Sharpiro, *J. Am. Chem. Soc.*, **76**, 93 (1954). *d*) M. Furukawa, Y. Seto, and S. Toyoshima, *Chem. Pharm. Bull.* (Tokyo), **9**, 914 (1961).

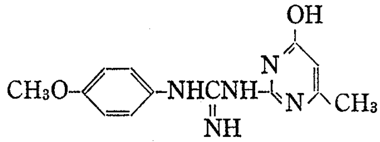
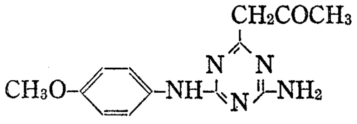
carboxylate readily proceeds in low boiling alcohol with or without alkoxide catalyst. Therefore, we attempted to carry out the reaction of arylbiguanide with ethyl acetoacetate in boiling ethanol in the absence of any alkoxide catalyst.

When equivalent amounts of *p*-chlorophenylbiguanide (I, R=Cl) and ethyl acetoacetate were boiled in ethanol for two hours, 2-*p*-chlorophenylguanidino-4-hydroxy-6-methylpyrimidine (II, R=Cl) and 2-amino-4-*p*-chlorophenylamino-6-acetonyl-*s*-triazine (III, R=Cl) were obtained in 33% and 40% yields, respectively. Analogously, another arylbiguanide (I) also reacted readily with ethyl acetoacetate to give the corresponding pyrimidines (II) and *s*-triazines (III) in the ratio of the yield similar to that in the case of *p*-chlorophenylbiguanide. Support for the structure of the *s*-triazines was provided by the mass spectrum which exhibited the corresponding molecular ions (M^+) as the most abundant peak and the abundant fragment ion peaks corresponding to $(M-CH_3CO)^+$ and $(M-CH_3COCH_2)^+$. These two compounds (II and III) were also obtained by the reaction in boiling ethanol in the presence of ethoxide catalyst, though the proportion of them depended upon the amount of the ethoxide employed.



In Table I, the yields of 2-*p*-methoxyphenylguanidino-4-hydroxy-6-methylpyrimidine (II, R=CH_3O) and 2-amino-4-*p*-methoxyphenylamino-6-acetonyl-*s*-triazine (III, R=CH_3O) in the reaction between *p*-methoxyphenylbiguanide (I, R=CH_3O) and ethyl acetoacetate in the presence of various amounts of ethoxide catalyst under refluxing conditions were shown.

Table I. The Yields of 2-*p*-Methoxyphenylguanidino-4-hydroxy-6-methylpyrimidine and 2-Amino-4-*p*-methoxyphenylamino-6-acetonyl-*s*-triazine in the Presence of Various Amounts of Sodium Ethoxide

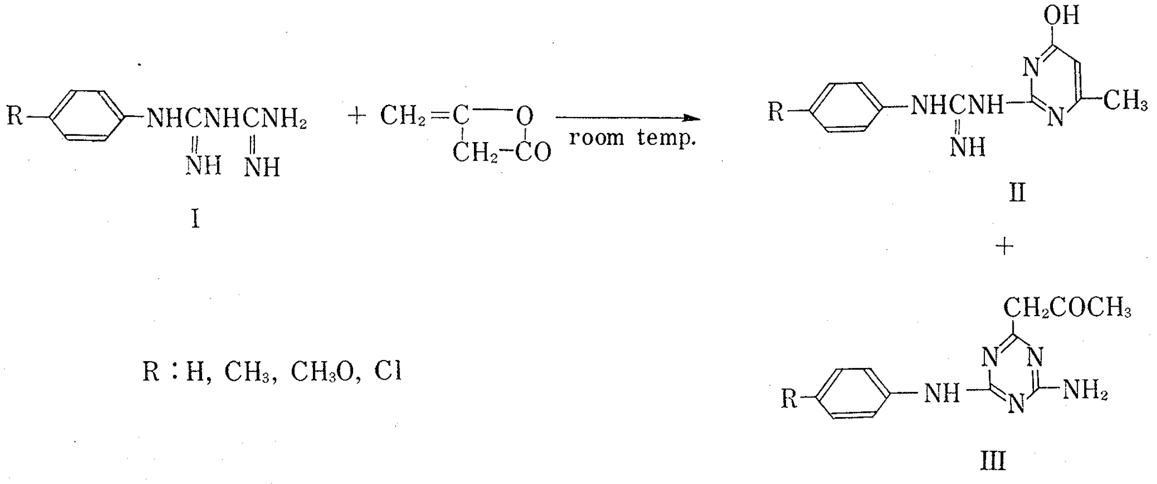
Sodium ethoxide (mole)	Yield (%)	
		
0	32.8	46.6
0.1	35.4	42.7
0.3	41.8	31.8
0.5	51.0	13.6
1.0	51.8	12.7

As can be seen in Table I, ethoxide catalyst is effective to increase the yield of the pyrimidine compound and prevents the formation of the *s*-triazine compound. In addition, the reaction seems to be rather prevented by the presence of ethoxide catalyst. The isolation of the pyrimidine compound from the reaction mixture in the course of the reaction readily occured in the absence of ethoxide catalyst, but the prolonged reaction time was required in the presence of the catalyst.

Reaction of Arylbiguanide with Diketene

The reaction between biguanides and diketene has been unknown in the literature. However, it is not difficult to anticipate that the reaction would proceed just like as the reaction of biguanides with ethyl acetoacetate, because diketene affords a valuable precursor of ethyl acetoacetate.

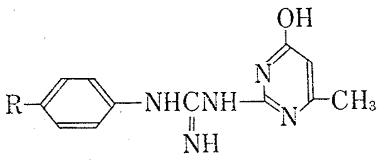
When *p*-chlorophenylbiguanide was stirred with an equivalent amount of freshly distilled diketene in acetone at room temperature for two hours, 2-*p*-chlorophenylguanidino-4-hydroxy-6-methylpyrimidine (II, R=Cl) and 2-amino-4-*p*-chlorophenylamino-6-acetonyl-*s*-triazine (III, R=Cl) were isolated in 41% and 49% yields, respectively, whose structure were confirmed by identification with the authentic samples obtained from *p*-chlorophenylbiguanide and ethyl acetoacetate by mixed melting point determination and comparison of the infrared (IR) spectra. Analogously, another arylbiguanide also reacted readily with diketene under the similar reaction conditions to give the corresponding pyrimidine and *s*-triazine derivatives.

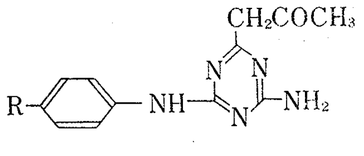


In Table II, the yields of the pyrimidine and *s*-triazine derivatives were illustrated in comparison with those in the reaction of arylbiguanide with ethyl acetoacetate.

As shown in Table II, the ratios of the yields of the pyrimidine and *s*-triazine derivatives in the reaction with diketene were parallel to those in the reaction with ethyl acetoacetate.

Table II. The Yields of 2-Arylguanidino-4-hydroxy-6-methylpyrimidine and 2-Amino-4-arylamino-6-acetonyl-*s*-triazine in the Reaction of Arylbiguanide with Ethyl Acetoacetate and Diketene

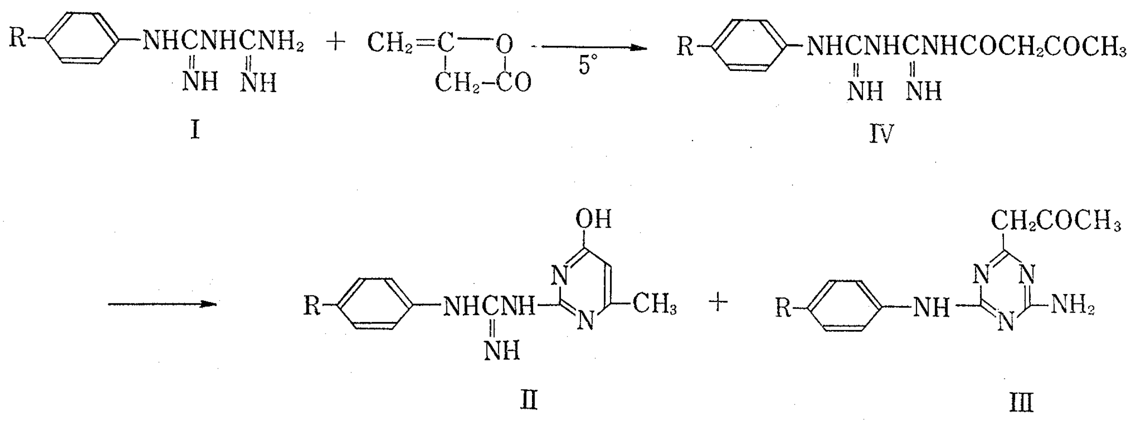

I


II

R	Yield (%)			
	I		III	
	ethyl acetoacetate	diketene	ethyl acetoacetate	diketene
H	39	43	44	51
CH_3	33	38	48	52
CH_3O	33	39	47	53
Cl	33	41	40	49

This result implies that the both reactions should proceed through the formation of the same intermediate. It is reasonable to assign acetoacetylbiguanide as the most possible intermediate. In the reaction of phenylbiguanide with ethyl formate, Overberger[7c] suggests the formation of N^1-phenyl-N^5-formylbiguanide as the intermediate to give 4-amino-2-anilino-*s*-triazine, due to the fact that formic acid, which may be formed by hydrolysis of the formyl intermediate with water eliminated in the aromatization step, is isolated. Shapiro[8] also presumes the formation of acylated form as the intermediate in the reaction between phenylbiguanide and ethyl trifluoroacetate, from which a mixture of 4-amino-2-anilino-6-trifluoromethyl-*s*-triazine and 4-amino-2-anilino-6-hydroxy-*s*-triazine.

In order to isolate the acylated intermediate anticipated, the reaction of arylbiguanide with diketene was carried out under milder conditions. When arylbiguanide was stirred with an equivalent amount of fleshly distilled diketene in acetone below 5° for three hours, N^1-aryl-N^5-acetoacetylbiguanide (IV) was successfully isolated from the reaction mixture in analytically pure state, though no reaction of arylbiguanide with ethyl acetoacetate occured under the similar conditions.



Support for the assigned structure of this product was provided by the experimental elementary analysis and the IR spectrum which exhibited the absorption assignable to a carbonyl group at near 1670 cm^{-1}. In the mass spectrum, no molecular ion peak (M^+) was observed and instead the peak corresponding to the elimination of water from the molecular ion was observed as the most abundant peak. The fragmentation pattern was extremely similar to that of 4-amino-2-arylamino-6-acetonyl-*s*-triazine (III), which would be probably formed by heating in the measurement of mass spectrum. In fact this product did not show the regular melting point and was observed to convert readily into 4-amino-2-arylamino-6-acetonyl-*s*-triazine (III) by fusion. Moreover, heating of N^1-aryl-N^5-acetoacetylbiguanide in ethanol for two hours under reflux or stirring in acetone at room temperature for a long time gave a mixture of 2-arylguanidino-4-hydroxy-6-methylpyrimidine (II) and 2-amino-4-arylamino-6-acetonyl-*s*-triazine (III), the proportion of them being similar to the case of the reaction of arylbiguanide with diketene at room temperature. Therefore, it is evident that the formation of the pyrimidine and *s*-triazine derivatives through the same acylated intermediate, N^1-aryl-N^5-acetoacetylbiguanide (IV), in which the keto carbonyl and amide carbonyl groups undergo nucleophilic attack by N^4 and N^2 nitrogen atoms to give the following transition state intermediates respectively, which favor *trans* elimination of water to give 2-arylguanidino-4-hydroxy-6-methylpyrimidine (II) and 2-amino-4-arylamino-6-acetonyl-*s*-triazine (III) respectively. Moreover, the result that the reaction of arylbiguanide with ethyl acetoacetate was parallel to the reaction with diketene would provide an unequivocal evidence

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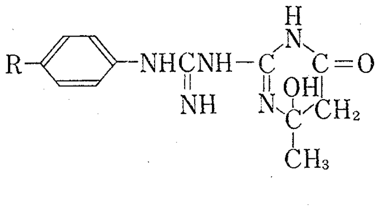
8) S.L. Sharpiro, V.A. Parrino, and L. Freedman, *J. Org. Chem.*, **25**, 379 (1960).



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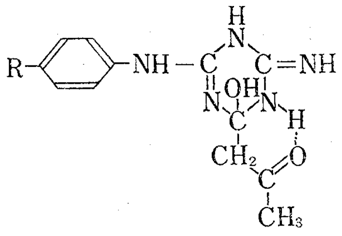
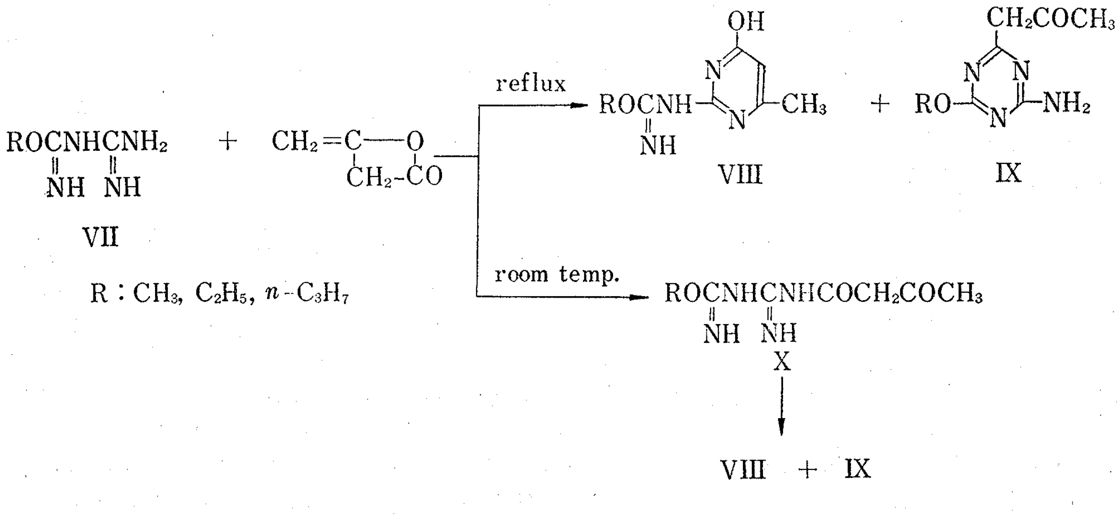


VI

for the formation of the acylated intermediate (IV) in this reaction, though the intermediate could not be isolated, due to the more drastic reaction conditions. Unfortunately, no reaction occurred under milder conditions and the materials were quantitatively recovered unchanged.

Reaction of N-Amidino-O-alkylisourea with Diketene

We have found that N-amidino-O-alkylisourea reacts with ethyl acetoacetate in ethanol under refluxing conditions to give 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine and 2-amino-4-alkoxy-6-acetonyl-*s*-triazine.[5a] Similar behaviors are also expected in the reaction with diketene. The reaction was successfully carried out by heating equivalents of N-amidino-O-alkylisourea (VII) and diketene in ethanol for one hour under reflux to give a mixture of 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine (VIII) and 2-amino-4-alkoxy-6-acetonyl-*s*-triazine (IX), of which structures were established by identification with the respective authentic samples.[5a] Similarly to the case of arylbiguanide, treatment of equivalents of N-amidino-O-alkylisourea (VII) and diketene in ethanol for one hour at room temperature gave successfully a moderate yield of N-acetoacetylamidino-O-alkylisourea (X) together with a small amount of 2-amino-4-alkoxy-6-acetonyl-*s*-triazine (IX) and sometimes 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine (VIII). The IR spectrum of N-acetoacetylamidino-O-alkylisourea (X) exhibited absorptions assignable to the amino and imino groups at 3250—3350 cm^{-1} and due to the carbonyl group at near 1640 cm^{-1}. N-Acetoacetylamidino-O-alkylisourea (X) was also readily converted by refluxing in ethanol into 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine (VIII) and 2-amino-4-alkoxy-6-acetonyl-*s*-triazine (IX).



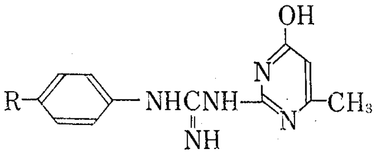
This result indicates evidently that the formation of 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine (VIII) and 2-amino-4-alkoxy-6-acetonyl-*s*-triazine (IX) in the reaction of N-amidino-O-alkylisourea (VII) with diketene under refluxing conditions proceeds through the same intermediate of N-acetoacetylamidino-O-alkylisourea (X).

Experimental

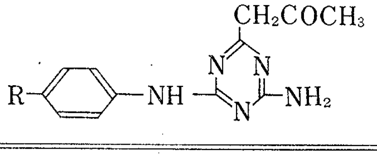
General Procedure for the Reaction of Arylbiguanide with Ethyl Acetoacetate——A mixture of 0.004 mole of arylbiguanide and 0.004 mole of ethyl acetoacetate in 12 ml of dehyd. EtOH was heated for 2 hr under reflux. The precipitates deposited on heating were collected by filtration without cooling, washed with hot EtOH and recrystallized from DMF to give 2-arylguanidino-4-hydroxy-6-methylpyrimidine. The mass spectrum of the compound exhibited the corresponding molecular ion (M^+) as the most abundant peak.

The filtrate was concentrated by evaporation and the precipitates deposited in cooling were collected by filtration and recrystallized from EtOH containing a small amount of DMF to give 2-amino-4-arylamino-6-acetonyl-*s*-triazine. The mass spectrum of this compound exhibited the corresponding molecular ion (M^+) as the most abundant peak and the abundant fragment ion peak corresponding to $(M-CH_3CO)^+$ and $(M-CH_3COCH_2)^+$. Details of the data were summarized in Table III.

TABLE III. 2-Arylguanidino-4-hydroxy-6-methylpyrimidine and 2-Amino-4-arylamino-6-acetonyl-*s*-triazine



R	mp (°C)	Yield (%)	Formula	Analysis (%) Calcd. C	Calcd. H	Calcd. N	Found C	Found H	Found N	IR ν_{max}^{KBr} cm^{-1} NH	=NH
H	260	39	$C_{12}H_{13}ON_5$	59.25	5.39	28.79	59.54	5.29	28.63	3305	3080
CH_3	277	38	$C_{13}H_{15}ON_5$	60.68	5.88	27.22	60.73	5.72	26.99	3310	3085
CH_3O	259	33	$C_{13}H_{15}O_2N_5$	57.13	5.53	25.63	57.34	5.48	25.46	3295	3090
Cl	289	33	$C_{12}H_{12}ON_5Cl$	51.89	4.35	25.22	52.10	4.43	24.93	3290	3075



R	mp (°C)	Yield (%)	Formula	Analysis (%) Calcd. C	Calcd. H	Calcd. N	Found C	Found H	Found N	IR ν_{max}^{KBr} cm^{-1} NH_2	CO
H	158—160	44	$C_{12}H_{13}ON_5$	59.25	5.39	28.79	59.21	5.21	28.44	3445	1640
CH_3	174—175	48	$C_{13}H_{15}ON_5$	60.68	5.88	27.22	60.67	5.89	26.91	3440	1628
CH_3O	175—176	47	$C_{13}H_{15}O_2N_5$	57.13	5.53	25.63	57.23	5.44	25.35	3460	1630
Cl	164—165	40	$C_{12}H_{12}ON_5Cl$	51.89	4.35	25.22	52.07	4.47	24.85	3450	1638

Reaction between *p*-Methoxyphenylbiguanide and Ethyl Acetoacetate in the Presence of Sodium Ethoxide Catalyst——A mixture of 0.004 mole of *p*-methoxyphenylbiguanide, 0.004 mole of ethyl acetoacetate and 0.0004 mole, 0.0012 mole, 0.002 mole and 0.004 mole of sodium ethoxide, respectively, in 12 ml of EtOH was heated for 5 hr under reflux. The precipitates deposited were collected by filtration without cooling and washed with EtOH to give 2-*p*-methoxyphenylguanidino-4-hydroxy-6-methylpyrimidine in analytically pure state.

The filtrate was concentrated by evaporation and the precipitates deposited upon cooling were collected by filtration and recrystallized from EtOH to give 2-amino-4-*p*-methoxyphenylamino-6-acetonyl-*s*-triazine. The ratio of the yields of these two product which was varied by the amount of the ethoxide catalyst used was summarized in Table I.

Reaction of Arylbiguanide with Diketene——1) At Room Temperature: To a solution of 0.004 mole of arylbiguanide in 10 ml of acetone was added dropwise with stirring 0.004 mole of freshly distilled diketene during a period of 20 min. The precipitates were immediately deposited from the reaction solution accompanying elevation of the temperature. Stirring was continued for additional 2 hr and then the solution was evaporated to dryness. The residue was extracted with hot EtOH and the insoluble part was collected by filtration and recrystallized from DMF to give 2-arylguanidino-4-hydroxy-6-methylpyrimidine, which was identified with an authentic sample prepared from arylbiguanide and ethyl acetoacetate by mixed melting point determination and comparison of the IR spectrum.

The filtrate was concentrated by evaporation and the residue was recrystallized from EtOH containing a small amount of DMF to give 2-amino-4-arylamino-6-acetonyl-*s*-triazine, which was identified with an authentic sample prepared from arylbiguanide and ethyl acetoacetate. The yields of these two compounds were summarized in Table II.

2) Below 5°: A solution of 0.004 mole of arylbiguanide in 5 ml of acetone was cooled below 5° and to the solution was added dropwise with stirring 0.004 mole of freshly distilled diketene. Stirring was continued for additional 2 hr keeping the temperature below 5°. The precipitates gradually deposited were collected by filtration and washed with acetone to give N^1-aryl-N^5-acetoacetylbiguanide in analytically pure state. Details of the data were summarized in Table IV.

TABLE IV. N^1-Aryl-N^5-acetoacetylbiguanide

$R-C_6H_4-NH\underset{\underset{NH}{\|}}{C}NH\underset{\underset{NH}{\|}}{C}NHCOCH_2COCH_3$

R	Yield (%)	Formula	Analysis (%) Calcd. C	Calcd. H	Calcd. N	Found C	Found H	Found N	IR ν_{max}^{KBr} cm^{-1} NH	CO
H	48	$C_{12}H_{15}O_2N_5$	55.16	5.79	26.81	55.33	5.57	26.58	3395 3335	1670
CH_3O	65	$C_{13}H_{17}O_3N_5$	53.60	5.88	24.04	53.76	5.82	23.58	3395 3330	1667
Cl	60	$C_{12}H_{14}O_2N_5Cl$	48.73	4.77	23.69	48.81	4.69	23.43	3395 3340	1672

These compounds did not show regular melting point and no molecular ion peak was observed in the mass spectrum. Instead, the fragment ion corresponding to the elimination of water was observed as the most abundant peak and the fragmentation pattern extremely resembled to that of 2-amino-4-arylamino-6-acetonyl-*s*-triazine. It would probably depend upon the facile conversion of the product into 2-amino-4-arylamino-6-acetonyl-*s*-triazine by heating in the measurement of mass spectrum.

Conversion of N^1-Aryl-N^5-acetoacetylbiguanide into 2-Arylguanidino-4-hydroxy-6-methylpyrimidine and 2-Amino-4-arylamino-6-acetonyl-*s*-triazine——1) A solution of 0.004 mole of N^1-aryl-N^5-acetoacetylbiguanide in 20 ml of EtOH was heated for 2 hr under reflux. The precipitates deposited on heating were collected by filtration without cooling and washed with hot EtOH to give 2-arylguanidino-4-hydroxy-6-methylpyrimidine in pure state. The filtrate and the washings were concentrated by evaporation and the residue was recrystallized from EtOH containing a small amount of DMF to give 2-amino-4-arylamino-6-acetonyl-*s*-triazine. The ratio of the yields of these two products was almost equal to those obtained by the reaction at room temperature.

2) A suspension of N^1-ary-N^5-acetoacetylbiguanide in acetone was stirred at room temperature for 10 hr and allowed to stand overnight. The mixture was evaporated to dryness and the residue was extracted with hot EtOH. The insoluble part was collected by filtration and recrystallized from DMF to give 2-arylguanidino-4-hydroxy-6-methylpyrimidine. The filtrate was concentrated by evaporation and the residue was recrystallized from EtOH containing a small amount of DMF to give 2-amino-4-arylamino-6-acetonyl-*s*-triazine.

Reaction of N-Amidino-O-alkylisourea with Diketene——1) Under Reflux: To a solution of 0.01 mole of N-amidino-O-alkylisourea HCl in 50 ml of EtOH was added with stirring an ethanolic solution of NaOEt prepared by dissolving 0.01 atom of Na in 10 ml of EtOH. Precipitated NaCl was filtered off and 0.01 mole of freshly distilled diketene was added to the filtrate. The mixture was heated for 1 hr under reflux and the precipitates deposited were collected on cooling. Recrystallization from a large amount of EtOH to give 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine. The filtrate was concentrated by distillation and the precipitates deposited on cooling were collected by filtration and recrystallized from EtOH to give 2-amino-4-alkoxy-6-acetonyl-*s*-triazine. The yields of these compounds obtained were as follows: Alkoxy group, pyrimidine/triazine (%): CH_3O, 39/5.5; C_2H_5O, 51/5; *n*-C_3H_7O, 90/0.

2) At Room Temperature: To a solution of 0.01 mole of N-amidino-O-alkylisourea HCl in 50 ml of EtOH was added with stirring an ethanolic solution of NaOEt prepared by dissolving 0.01 atom of Na in 10 ml of EtOH. After the precipitated NaCl was filtered off, 0.01 mole of freshly distilled diketene was added with stirring to the filtrate and stirring was continued for additional 1 hr at room temperature. The solution was concentrated under reduced pressure at room temperature and the precipitates deposited were collected by filtration to give N-acetoacetylamidino-O-alkylisourea. Purification was carried out by allowing to stand in refrigerator an ethanolic solution dissolved in EtOH at room temperature. Details of the data were summarized in Table V. These componds did not show a regular melting point.

TABLE V. N-Acetoacetylamidino-O-alkylisourea

$RO\underset{\underset{NH}{\|}}{C}NH\underset{\underset{NH}{\|}}{C}NHCOCH_2COCH_3$

R	Yield (%)	Formula	Analysis (%) Calcd. C	Calcd. H	Calcd. N	Found C	Found H	Found N	IR ν_{max}^{KBr} cm^{-1} NH	CO
CH_3	45	$C_7H_{12}O_3N_4$	41.99	6.04	27.99	41.99	5.80	27.60	3345	1642
C_2H_5	70	$C_8H_{14}O_3N_4$	44.83	6.59	26.16	44.84	6.53	25.86	3260	1645
n-C_3H_7	57	$C_9H_{16}O_3N_4$	47.36	7.07	24.55	47.32	7.14	24.82	3280	1645

The filtrate was further concentrated by evaporation under reduced pressure at room temperature to give 2-amino-4-alkoxy-6-acetonyl-*s*-triazine, the yields being as follows. Alkoxy group, yield (%): CH_3O, 11; C_2H_5O, 5; n-C_3H_7O, 19. Only in the case of N-amidino-O-methoxyisourea, 5.5% yield of 2-methoxyamidino-4-hydroxy-6-methylpyrimidine was also yielded.

Conversion of N-Acetoacetylamidino-O-alkylisourea into 2-Alkoxyamidino-4-hydroxy-6-methylpyrimidine and 2-Amino-4-alkoxy-6-acetonyl-s-triazine——A solution of 0.003 mole of N-acetoacetylamidino-O-alkylisourea in 20 ml of EtOH was heated for 1 hr under reflux. The precipitates deposited were collected by filtration on cooling and recrystallized from EtOH to give 2-alkoxyamidino-4-hydroxy-6-methylpyrimidine. The filtrate was concentrated by distillation and the precipitates deposited on cooling were recrystallized from dil. EtOH to give 2-amino-4-alkoxy-6-acetonyl-*s*-triazine. The yields of these compounds were as follows: Alkoxy group, pyrimidine/triazine (%): CH_3O, 90/3; C_2H_5O, 60/25; n-C_3H_7O, 85/0.

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