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REARRANGEMENT AND ALKYLATION OF SOME 1,2,4-TRIAZINE DERIVATIVES

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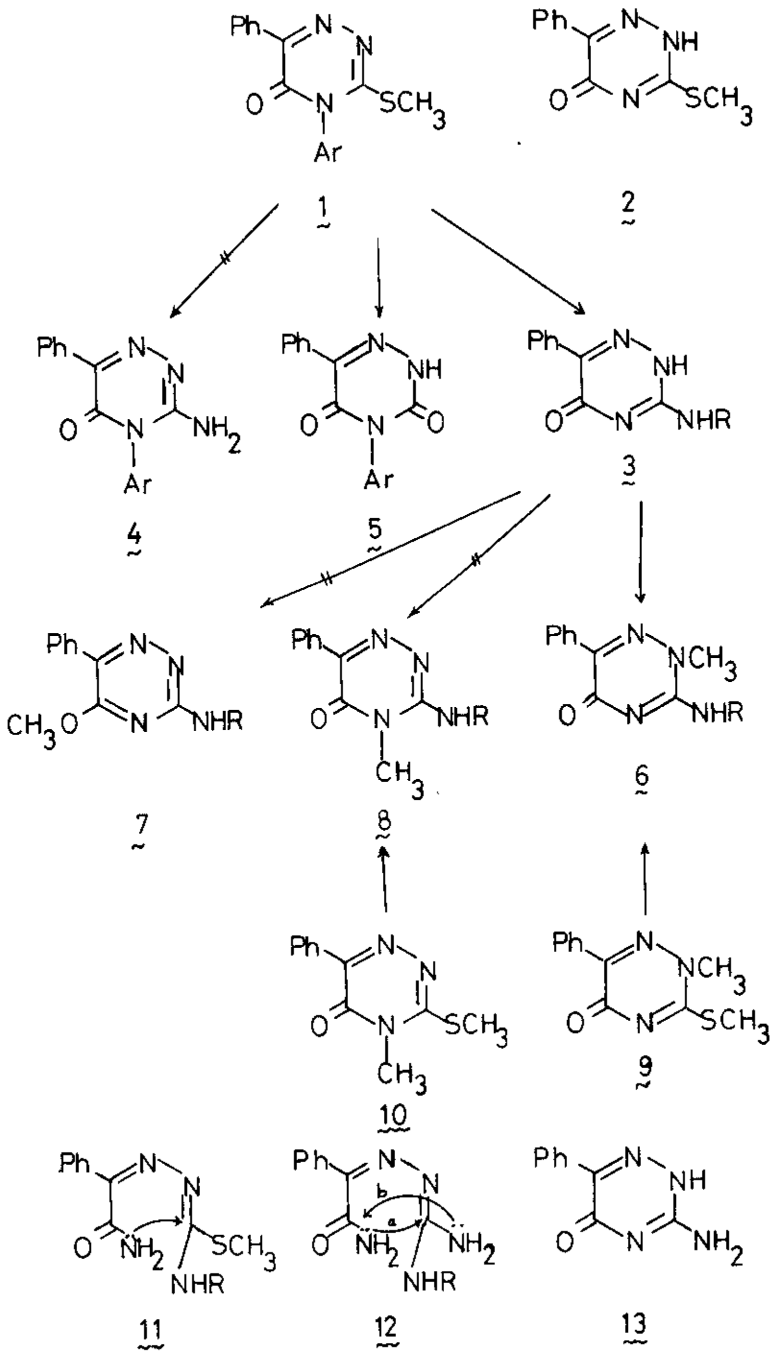
Abstract- 4-Aryl-5-oxo-3-alkylmercapto-1,2,4-triazine derivatives undergo interesting reaction with ammonia to give mainly, instead of the expected corresponding 3-amino derivatives, the 3-arylamino-2,5-dihydro-5-oxo-1,2,4-triazines. In this reaction 4-aryl-3,5-dioxo-2,3,4,5-tetrahydro-1,2,4-triazines were obtained as a minor product. Alkylation of 3-arylamino-4,5-dihydro-5-oxo-1,2,4-triazines with methyl iodide in alkaline medium gives the corresponding 2-methyl derivatives. Independent synthesis of 2- and 4-methyl-3-arylamino-1,2,4-triazine derivatives is also described.

Asymmetric triazin-5-ones have been shown to undergo attack on position 5 with nucleophilic reagents, specially Grignard reagents[1-3]. Recently it has been found that some derivatives of this system particularly with 4-aryl substituents are readily attacked with hydrazine leading to an interesting rearrangement in this class of compounds[4,5].

It seemed now of interest to investigate the possible reaction of ammonia with 3-methylmercapto-4-aryl-4,5-dihydro-5-oxo-1,2,4-triazines 1a-c. Previous reports showed that the action of ammonia and amines on 3-alkylmercapto-1,2,4-triazine derivatives which have structures like 2 lead only to the formation of 3-amino or 3-substituted amino derivatives like 3[6,7]. We have, now, found that 6-phenyl-3-methylmercapto-4-aryl-4,5-dihydro-5-oxo-1,2,4-triazines 1a-c react with ammonium acetate in acetic acid solution when heated under reflux for 4 h to give mainly the corresponding 6-phenyl-3-arylamino-2,5-dihydro-5-oxo-1,2,4-triazines 3a-c instead of the expected 6-phenyl-3-amino-4-aryl-2,5-dihydro-5-oxo-1,2,4-triazines



a, R = C_6H_5　　b, R = $C_6H_4CH_3$-p　　c, R = C_6H_4Cl-p

4a-c. In this reaction 6-phenyl-4-aryl-3,5-dioxo-2,3,4,5-tetrahydro-1,2,4-triazines 5a-c were also isolated as a minor product. The identity of compounds 3a-c and 5a-c was confirmed by independent synthesis according to reported procedures by the action of arylamines on 2 (to give 3)[8] and by the action of alcoholic HCl on 1 (to give 5)[9], respectively.

Alkylation of compounds 3a-c with methyl iodide in the presence of molar equivalent of sodium methoxide in methanolic solution under reflux for 1 h or at room temperature overnight afforded exclusively the 2-methyl derivatives 6a-c, respectively and none of the other isomers 7a-c or 8a-c[10-14]. The structure of compounds 6a-c has been established by independent synthesis by the action of the appropriate arylamine on 6-phenyl-2-methyl-3-methylmercapto-4,5-dihydro-5-oxo-1,2,4-triazine 9. The isomeric 4-methyl-3-arylamino derivatives 8a-c were obtained by the action of the appropriate arylamine on 6-phenyl-4-methyl-3-methylmercapto-4,5-dihydro-5-oxo-1,2,4-triazine 10.

The conversion of 1 into 3 most probably proceeds via an open ring compound resulted from the nucleophilic attack of ammonia on position 5 of 1 (similar to that proposed and established for the action of hydrazine on compound 1[4]) and has been attributed to the increased electrophilicity of this C=O group due to the electron withdrawing effect of the 4-aryl substituents[4,5]. Therefore 11 or 12 could be the intermediate of this reaction. Intermediate 11 cyclizes by elimination of either of the amino groups (a or b). However, if 12 is the intermediate, the elimination of NH_2 from $CONH_2$ is the more favourable as previously established in case of reaction of 1 with hydrazine[4,5]. Moreover, route a could lead, via the elimination of arylamines (RNH_2), to the formation of 13, which has not been detected in this reaction.

The formation of compounds 5a-c in this reaction might well be explained as a result of acid hydrolysis, which is well known for such type of methylmercapto triazines but in other medium (alcohol and HCl[9]). Evidence for this comes from the findings that compounds 1a,b undergo hydrolysis into 5a,b when heated under reflux either in acetic acid alone or in the presence of sodium acetate. The hydrolysis was found to be almost complete after 40 h.

Comp.*	Yield %	M.p. °C	Comp.*	Yield %	M.p. °C
3a	60	325	6a	85	305
3b	70	334	6b	82	289
3c	68	352	6c	88	320
5a	25	245	8a	92	180
5b	10	244	8b	96	218
5c	15	255	8c	88	137

*Satisfactory analyses for the synthesised compounds were obtained.

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