THE REACTION OF 6-METHYL-7-AZIDO-5,8-QUINOLINEDIONES WITH CYCLIC SECONDARY AMINES. A CONVENIENT SYNTHESIS OF 6-SUBSTITUTED AMINOMETHYL-7-AMINO-5,8-QUINOLINEDIONES[1]

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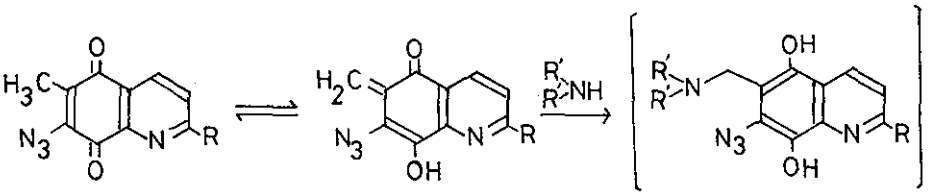
The 6-methyl-7-azido-5,8-quinolinediones (Ia,b) react with amines(pyrrolidine, piperidine and morphorine) in benzene solution to give 6-substituted aminomethyl-7-amino-5,8-quinolinediones(IIIa-e).

The reactions of azidoquinones with nucleophilic species have been reported by Moore and co-workers[2]. There have not been examined about the reactions of methyl substituted azidoquinones with nucleophiles.

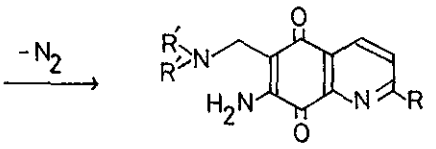
In this paper, it is reported that 6-methyl-7-azido-5,8-quinolinediones(Ia,b) react with cyclic secondary amines(pyrrolidine, piperidine and morphorine) to give 6-substituted aminomethyl-7-amino-5,8-quinolinediones(IIIa-e).



Ia R=H
b R=CH_3

I-A

II

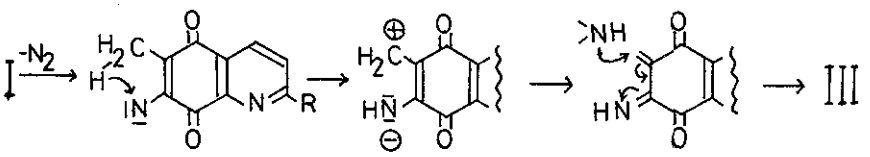


III

	R	
a	H	
b	H	
c	H	
d	CH_3	
e	CH_3	

The azidoquinolinediones(Ia,b) were readily synthesized in high yields(85-87%) from respective bromo-substituted quinolinediones[3] by direct nucleophilic displacement of the halogen by azido ion in ethanolic solution. Reaction of I with one equivalent of amine in benzene solution at 65-68° for 5h afforded III in 60-67% yields. The reaction provides a simple method for the synthesis of quinones of the type III, which are not easily available by other methods. The structure of these aminoquinolinediones is supported by their spectral data which are present in Table I. They all show characteristic absorptions for amino and carbonyl groups in their ir spectra. Their nmr spectra reveal the correct proton counts and chemical shifts.

The formation of III presumably proceeds by addition of amines to the tautomer form(I-A) of I, followed by intramolecular oxidation reduction reaction[4] of the resulting azido-hydroquinone(II) to the corresponding aminoquinolinediones(III). Another mechanism for the formation of III is possible as follow.



In this mechanism, nitrene intermediate is first formed and then abstracts a hydrogen in methyl group, followed by a Michael addition of amines.

TABLE I

Physical Properties of Azidoquinolinediones(I) and 6-Substituted Aminomethyl-7-amino-5,8-quinolinediones(III)[5]

Comp'd	mp(°C)	ir,cm^{-1}(KBr)	nmr,δppm($CDCl_3$)
Ia	141-142	2108, 1670, 1660	2.16(3H,s,CH_3)
Ib	119-121	2110, 1680, 1654	2.12(3H,s,CH_3); 2.74(3H,s, CH_3)
IIIa	156-157	3410, 3243, 1685, 1610	1.81, 2.58(8H,pyrrolidine); 3.80(2H,s,CH_2); 5.50(2H,b, NH_2)
IIIb	123-124	3403, 3238, 1700, 1613	1.52, 2.43(10H,piperidine); 3.62(2H,s,CH_2); 6.40(2H,b, NH_2)

TABLE I(Continued)

Comp'd	mp(°C)	ir,cm^{-1}(KBr)	nmr,δppm($CDCl_3$)
IIIc	175-177	3402, 3235, 1682, 1608	2.52, 3.72(8H,morphorine); 3.62(2H,s,CH_2); 6.42(2H,b,NH_2)
IIId	126-128	3413, 3240, 1710, 1620	1.80, 2.54(8H,pyrrolidine); 2.72(3H,s,CH_3); 3.76(2H,s,CH_2); 6.22(2H,b,NH_2)
IIIe	113-114	3410, 3238, 1680, 1615	1.52, 2.42(10H,piperidine); 2.68(3H,s,CH_3); 3.61(2H,s,CH_2); 6.40(2H,b,NH_2)

References

1 This constitutes Part XXX of a series entitled "Studies on Heterocyclic Compounds" Part XXIX: S.Yoshina, A.Tanaka, and T.Usui, J.Pharm.Soc.Japan, in press.

2 G.Cajipe, D.Rutolo, and H.W.Moore, Tetrahedron Letters, 1973, 4695.

3 The bromoquinolinediones were prepared from the respective quinolinediones(V.Petrow and B.Sturgeon, J.Chem.Soc., 1954, 570)with Br_2 in AcOH-AcONa at room temp. for 4 days. 6-Methyl-7-bromo-5,8-quinolinedione had mp 223-224°(64%, from EtOH); 2,6-dimethyl-7-bromo-5,8-quinolinedione had mp 182-184°(61%, from EtOH).

4 i)L.F.Fieser and J.L.Hartwell, J.Amer.Chem.Soc., 57, 1935, 1482.
ii)H.W.Moore and H.R.Shelden, J.Org.Chem., 33, 1968, 4019.

5 Microanalysis of all the compounds reported are in agreement with their calculation.

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