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REACTION OF 1-METHYL-2-(METHYLTHIO)QUINOLINIUM IODIDE WITH ACTIVE METHYLENE COMPOUNDS

Hiroshi Tomisawa*, Toshio Tanbara, Hideki Kato, Hiroshi Hongo,
and Reiko Fujita
Tohoku College of Pharmacy
Komatsushima Sendai 983, Japan

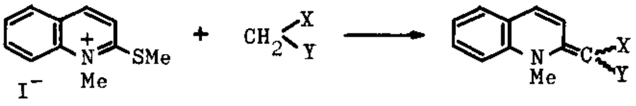
1-Methyl-2-(methylthio)quinolinium iodide (I) reacted with active methylene compounds (IIa-f) in the presence of sodium hydride to give 1,2-dihydro-1-methyl-2-(substitutedmethylene)-quinolines (IIIa-f) in almost quantitative yields.

There are considerable number of literatures[1,2] dealing with the syntheses of 2-substituted quinoline derivatives by nucleophilic substitution reactions. During the course of our investigation[3] on the reaction of 1-methyl-2-quinolone and 1-methyl-2-thioquinolone, attention in our laboratory was focussed upon the syntheses of the 1,2-dihydro-1-methyl-2-(substitutedmethylene)quinolines from 1-methyl-2-(methylthio)quinolinium iodide (I)[4] which was easily prepared from 1-methyl-2-quinolone via 1-methyl-2-thioquinolone in two steps. The reaction of I with active methylene compounds such as malononitrile (IIa), dimethyl malonate (IIb), acetylacetone (IIc), methyl acetoacetate (IId), methyl cyanoacetate (IIe), and 1,3-cyclohexanedione (IIf) in the presence of sodium hydride (NaH) gave 2-dicyanomethylene- (IIIa), 2-[bis(methoxycarbonyl)methylene]- (IIIb), 2-diacetylmethylene- (IIIc), 2-[acetyl-(methoxycarbonyl)methylene]- (IIId), 2-[cyano(methoxycarbonyl)methylene]- (IIIe), and 2-(2,6-dioxocyclohexylidenyl)-1,2-dihydro-1-methylquinoline (IIIf) in almost quantitative yields, respectively. This type of reaction is apparently a new and promising method for the introduction of carbon-substituents into the 2-position of quinoline ring[2].

A general procedure for the preparation of III was as follows.

II (3.75 mmol) was added to a suspension of NaH (90 mg, 3.75 mmol) in tetrahydrofuran (THF) (20 ml). The mixture was stirred for 10 min at room temperature and then I (1 g, 3.15 mmol) was added. The reaction mixture was stirred for 1.5 hr at the same temperature and treated in the usual way to give III.
The structure of IIIa-f were confirmed by their spectral analyses.

Yields and physical properties of the products (IIIa-f) are shown in Tables I and II.



I IIa-f IIIa-f

Table I. Syntheses of IIIa-f by the Reaction of I with IIa-f*

	II		Solvent	Base	Reaction	III(%)
	X	Y			Time (hr)	
a	CN	CN	THF	NaH	1.5	99
b	COOMe	COOMe	THF	NaH	1.5	95
c	COMe	COMe	THF	NaH	1.5	88
d	COMe	COOMe	THF	NaH	1.5	98
e	CN	COOMe	THF	NaH	1.5	99
f**	$COCH_2CH_2CH_2CO$		DMF	NaH	2.0	81

* These reactions were carried out at room temperature.

** Dimethylformamide (DMF) (20 ml) was employed as a solvent in this case.

Table II. Physical Properties of the Products (IIIa-f)

Products	mp* (°C)	Crystals(Solvent)	MS (m/e,M^+)	IR cm^{-1} (Nujol)	NMR** ($CDCl_3$)
IIIa[2b]	263-265	yellow-green needles ($CHCl_3$-Me_2CO)	207	2190,2165, 1620	4.25***(3H,s,N-Me), 7.4-8.2*** (6H,m,Ar-H)
IIIb	123-124	yellow prisms (C_6H_6)	273	1670,1645, 1615	3.73(3H,s,N-Me), 3.78(6H,s,COOMe X2), 7.1-8.2(6H,m,Ar-H)
IIIc	139-141	brick-red prisms (Me_2CO)	241	1635,1610	2.42(6H,s,COMe X2), 4.08(3H,s,N-Me), 7.5-8.3(6H,m,Ar-H)
IIId	160-161	orange needles (C_6H_6-hexane)	257	1670,1605	2.73(3H,s,COMe), 3.90, 4.12(3H,3H,s, s,N-Me,COOMe), 7.3-8.2(6H,m,Ar-H)
IIIe	145-145.5	orange prisms (C_6H_6)	240	2175,1665 1610	3.81, 3.93(3H,3H,s,s,N-Me,COOMe), 7.2-7.9(4H,m,Ar-H), 7.70, 8.21(1H,1H,d,d, J=10Hz,C_3-H,C_4-H)
IIIf	213-214	orange plates (C_6H_6-hexane)	253	1610	1.9-2.3(2H,m,$COCH_2C\underline{H}_2$), 2.55(4H,broad t, $COCH_2$ X2), 4.11(3H,s,N-Me), 7.3-8.3(6H, m,Ar-H)

* All melting points are uncorrected.

** Chemical shifts are shown as ppm from TMS.

*** Trifluoroacetic acid was used as a solvent.

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