

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

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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 investigation³ 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 (IIId), methyl cyanoacetate (IIe), and 1,3-cyclohexanedione (IIIf) 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 (IIIIf) 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 ring².

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.

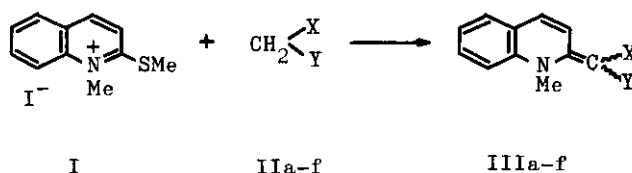


Table I. Syntheses of IIIa-f by the Reaction of I with IIa-f*

	II		Solvent	Base	Reaction Time (hr)	III(%)
	X	Y				
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 ₂ CH ₂ CH ₂ CO		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 ($^{\circ}\text{C}$)	Crystals(Solvent)	MS (m/e, M^+)	IR cm^{-1} (Nujol)	NMR ^{**} (CDCl_3)
IIIa ^{2b}	263-265	yellow-green needles ($\text{CHCl}_3\text{-Me}_2\text{CO}$)	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, COOMe X2), 4.08 (3H, s, N-Me), 7.5-8.3 (6H, m, Ar-H)
IIId	160-161	orange needles ($\text{C}_6\text{H}_6\text{-hexane}$)	257	1670, 1605	2.73 (3H, s, COOMe), 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)
IIIff	213-214	orange plates ($\text{C}_6\text{H}_6\text{-hexane}$)	253	1610	1.9-2.3 (2H, m, COCH_2CH_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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