

## Reaction of Dimethyloxosulphonio- and Triphenylphosphonio-(3-oxocyclohex-1-enyl)methanides with Diphenylcyclopropanone

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Dimethyloxosulphonio- and triphenylphosphonio-(3-oxocyclohex-1-enyl)methanides react with diphenylcyclopropanone to afford 8-hydroxy-3,4-dihydronaphthalen-1(2H)-one derivatives.

It has recently been shown that acyl-,<sup>1</sup> phenyl-,<sup>1d</sup> or vinyl-stabilised ylides<sup>2</sup> react with cyclopropanones to give pyrone or phenol derivatives. In our study on the chemistry of 3-oxoalk-1-enyl-stabilised ylides,<sup>3</sup> we found that the reaction of dimethyloxosulphonio- [(I) or (II)] or triphenylphosphonio-(3-oxocyclohex-1-enyl)methanide (V) with diphenylcyclopropanone (DPP) gave the 8-hydroxy-3,4-dihydronaphthalen-1(2H)-one derivatives (III) or (IV) with ejection of dimethyl sulphoxide or triphenylphosphine.

The reaction of the methanide (I) or (II) with DPP in refluxing toluene gave the derivatives (III) (64%) or (IV) (55%). Structure (III) was assigned on the basis of i.r. [ $\nu_{\max}$  (CHCl<sub>3</sub>) 1625 cm<sup>-1</sup> (H-bonded C=O)] and n.m.r. [ $\tau$  -2.94 (1H, s, exch. with D<sub>2</sub>O, H-bonded OH), 2.7—

3.0 (10H, m, ArH), 3.2 (1H, s, 5-H), and 7.0—8.1 (6H, methylenes)] data. A similar reaction of triphenylphosphonio-(3-oxocyclohex-1-enyl)methanide (V) with DPP gave the naphthalenone (III) (40%) accompanied by triphenylphosphine (39%) and triphenylphosphine oxide (28%).

The formation of (III) or (IV) from (I), (II), or (V) is thought to proceed by initial attack of the ylide  $\alpha$ -carbon on the  $\beta$ -carbon in DPP, followed by ejection of dimethyl sulphoxide or triphenylphosphine from (i) into (ii), and finally cyclisation of (ii) into (III) or (IV), as shown in the Scheme. The formation of triphenylphosphine in the reaction of (V) with DPP is in accord

<sup>1</sup> (a) T. Eicher, E. von Angerer, and A.-M. Hansen, *Annalen*, 1971, **746**, 102; (b) T. Sasaki, K. Kanematsu, and A. Kakehi, *J. Org. Chem.*, 1971, **36**, 2451; (c) Y. Hayashi and H. Nozaki, *Tetrahedron*, 1971, **27**, 3085; (d) R. Breslow, M. Oda, and J. Pecoraro, *Tetrahedron Letters*, 1972, 4415.

<sup>2</sup> T. Eicher and E. von Angerer, *Annalen*, 1971, **746**, 120; T. Sasaki, K. Kanematsu, A. Kakehi, and G. Ito, *Tetrahedron*, 1972, **28**, 4947.

<sup>3</sup> Y. Tamura, T. Nishimura, J. Eiho, and T. Miyamoto, *Chem. and Ind.*, 1971, 1199; Y. Tamura, T. Miyamoto, T. Nishimura, and Y. Kita, *Tetrahedron Letters*, 1973, 2351; Y. Tamura, T. Miyamoto, T. Nishimura, J. Eiho, and Y. Kita, *J.C.S. Perkin I*, 1974, 102; Y. Tamura, T. Miyamoto, J. Eiho, H. Taniguchi, T. Nishimura, and Y. Kita, *ibid.*, p. 105; Y. Tamura, T. Miyamoto, H. Kiyokawa, and Y. Kita, *ibid.*, p. 1125; Y. Tamura, T. Miyamoto, and H. Taniguchi, *Chem. and Ind.*, in the press; Y. Tamura, T. Miyamoto, and Y. Kita, *J.C.S. Chem. Comm.*, 1974, 531.

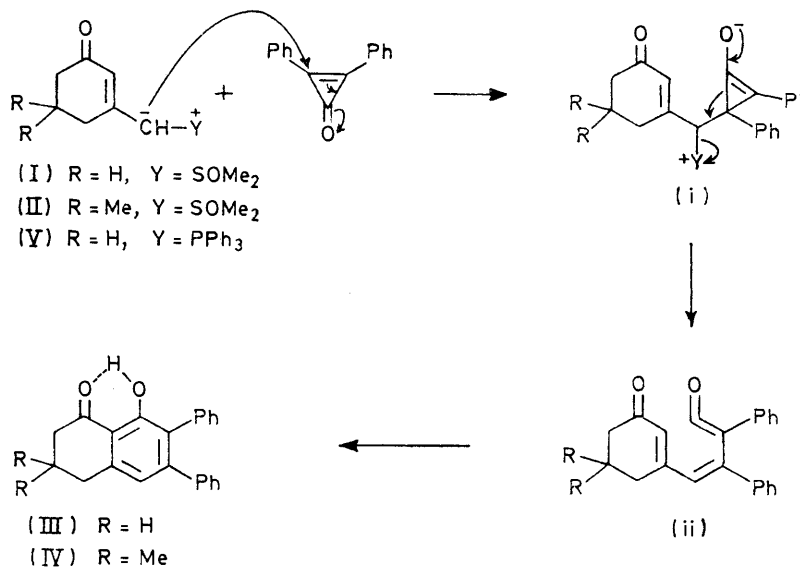
with this mechanism. Triphenylphosphine oxide is thought to be produced by a Wittig-type reaction,<sup>1a</sup> but the methylenecyclopropene (VI) expected as a counterpart was probably too unstable to allow its isolation.

#### EXPERIMENTAL

I.r. spectra were recorded with a Hitachi G2 spectrometer, u.v. spectra with a Hitachi 124 spectrometer, and n.m.r. spectra with a Hitachi R20A spectrometer (internal standard tetramethylsilane; solvent  $\text{CDCl}_3$ ).

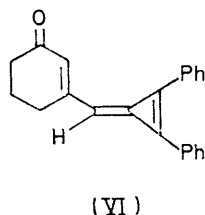
Concentration of the mixture *in vacuo* gave yellow crystals, which were recrystallised from ethanol to give the *naphthalenone* (III) (606 mg, 64%), m.p. 141—142° (Found: C, 83.8; H, 5.75.  $\text{C}_{22}\text{H}_{18}\text{O}_2$  requires C, 84.05; H, 5.75%);  $\lambda_{\text{max}}$  (EtOH) 225 (log  $\epsilon$  4.46), 292 (4.24), and 346 nm (3.75).

(b) *From the C-P ylide (V)*. A suspension of the C-P ylide (V) (740 mg) and DPP (412 mg) in dry toluene (40 ml) was refluxed for 2 h. Concentration of the mixture *in vacuo* followed by preparative t.l.c. (silica gel;  $\text{CHCl}_3$ ) gave triphenylphosphine (204 mg, 39%), the *naphthalenone* (III)



SCHEME

8-Hydroxy-6,7-diphenyl-3,4-dihydronaphthalen-1(2H)-one (III).—(a) *From the C-S(O) ylide (I)*. A suspension of the



C-S(O) ylide (I) (558 mg) and diphenylcyclopropenone (DPP) (618 mg) in dry toluene (50 ml) was refluxed for 0.5 h.

(248 mg, 40%), and triphenylphosphine oxide (155 mg, 28%), all of which were identical with authentic samples.

8-Hydroxy-3,3-dimethyl-6,7-diphenyl-3,4-dihydronaphthalen-1(2H)-one (IV).—This was prepared in 55% yield (95 mg) from the C-S(O) ylide (II) (107 mg) and DPP (103 mg) by procedure (a) above; yellow crystals, m.p. 189—190° (Found: C, 83.9; H, 6.45.  $\text{C}_{24}\text{H}_{22}\text{O}_2$  requires C, 84.15; H, 6.45%);  $\nu_{\text{max}}$  ( $\text{CHCl}_3$ ) 1625  $\text{cm}^{-1}$ ;  $\tau$  ( $\text{CDCl}_3$ ) —2.85 (1H, s, OH, disappeared on addition of  $\text{D}_2\text{O}$ ), 2.7—2.9 (10H, m, ArH), 3.20 (1H, s, 5-H), 7.20 (2H, s,  $\text{CH}_2$ ), 7.50 (2H, s,  $\text{CH}_2$ ), and 8.90 (6H, s, 2  $\times$  Me);  $\lambda_{\text{max}}$  (EtOH) 225 (log  $\epsilon$  4.32), 293 (4.15), and 347 nm (3.70).

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