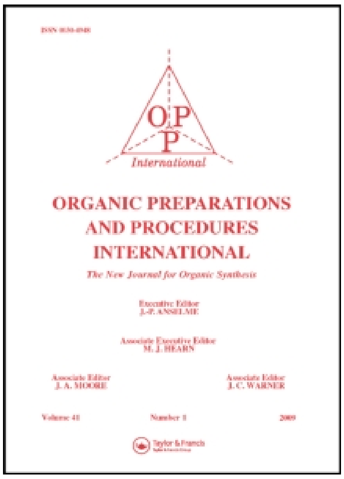

Organic Preparations and Procedures International
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t902189982

CHALCONES BY THE WITTIG REACTION OF A STABLE YLIDE WITH ALDEHYDES UNDER MICROWAVE IRRADIATION

Caiding Xu[a]; Guoying Chen[a]; Xian Huang[a]
[a] Department of Chemistry, Hangzhou University, Zhejiang, People's Republic of CHINA

To cite this Article Xu, Caiding , Chen, Guoying and Huang, Xian(1995) 'CHALCONES BY THE WITTIG REACTION OF A STABLE YLIDE WITH ALDEHYDES UNDER MICROWAVE IRRADIATION', Organic Preparations and Procedures International, 27: 5, 559 — 561

To link to this Article: DOI: 10.1080/00304949509458500

URL: http://dx.doi.org/10.1080/00304949509458500

16. J. A. Dale and H. S. Mosher, *J. Am. Chem. Soc.*, **95**, 512 (1973).

17. T. Fujisawa, E. Kojima, T. Itoh and T. Sato, *Chemistry Lett.*, 1751 (**1985**).

18. B. C. Newman and E. L. Eliel, *J. Org. Chem.*, **35**, 3641 (1970).

****

CHALCONES BY THE WITTIG REACTION OF A STABLE YLIDE WITH ALDEHYDES UNDER MICROWAVE IRRADIATION

Submitted by (12/05/94)

Caiding Xu, Guoying Chen and Xian Huang*

Department of Chemistry, Hangzhou University
Zhejiang 310028, People's Republic of CHINA

Microwave heating had been used for a variety of purposes such as moisture analysis,[1] the wet ashing of biological samples and dissolution of geological materials,[2] the regeneration of activated carbon,[3] the preparation of activated carbon from carbonaceous materials,[4] and treatment of sewage and sewage sludge.[5] It was, however, the pioneering papers of Gedye[6] and of Majetich[7] and their co-workers in 1986 that stimulated the interest of synthetic organic chemists in this new technique.

$$\mathrm{ArCHO} + \mathrm{Ph_3P{=}CHCOPh} \xrightarrow[\text{Silica gel, 5-6 min.}]{\text{microwave}} \mathrm{ArCH{=}CHCOPh}$$

Our interest in the development of thermal reactions using microwave heating led us to reinvestigate the Wittig reaction of the stable ylide, triphenylbenzoylmethylene phosphorane with aldehydes under microwave irradiation. This important reaction,[8] however, proceeds at a slow rate for example, between triphenylbenzoylmethylene phosphorane and benzaldehyde, requiring 3 days of reflux in benzene or 30 hours in THF (70% yield).[9-11] We now report that microwave irradiation for 5-6 min. effects this transformation in 82-96% yields. Remarkable rate enhancements and dramatic reductions of reaction times have been achieved and the yields have been improved.

EXPERIMENTAL SECTION

Melting points are uncorrected. The apparatus used in the experiment was a National NN-5252 domestic microwave oven.

TABLE. Reaction of Benzoylmethylene Triphenylphosphorane with Aromatic Aldehydes

Aldehyde	Time (min.)	Yield (%)	Product	mp. (°C)	lit. mp. (°C)
C_6H_5CHO	5	86	$C_6H_5CH{=}CHCOC_6H_5$	54-56	55-57[11]
4-BrC_6H_4CHO	5	84	4-$BrC_6H_4CH{=}CHCOC_6H_5$	121-122	123[12]
4-ClC_6H_4CHO	5	82	4-$ClC_6H_4CH{=}CHCOC_6H_5$	113-114	114[12]
4-MeC_6H_4CHO	6	90	4-$MeC_6H_4CH{=}CHCOC_6H_5$	94-95	94-96[13]
4-$MeOC_6H_4CHO$	6	92	4-$MeOC_6H_4CH{=}CHCOC_6H_5$	73-74	70-75[13]
3-BrC_6H_4CHO	5	85	3-$BrC_6H_4CH{=}CHCOC_6H_5$	82-83	84[12]
2-$MeOC_6H_4CHO$	6	96	2-$MeOC_6H_4CH{=}CHCOC_6H_5$	55-56	57[14]
3-MeC_6H_4CHO	5	90	3-$MeC_6H_4CH{=}CHCOC_6H_5$	66-67	67.5-68.5[15]

a) Only the trans products were obtained and they were identified spectroscopically and mixture mps with known compounds.

Typical Procedure.- A mixture of benzoylmethylene triphenylphosphorane (1 mmol), benzaldehyde (1 mmol), and silica gel 200-300 mesh (2g) was introduced into a domestic microwave oven (National NN-5252) in an open round-bottomed flask, microwave irradiation was carried out at an output of about 400w (medium power level) for 5 minutes. Then 30 mL of methylene chloride was added to the mixture at room temperature and the extract was concentrated and chromatographed on silica gel to give 0. 167g (86%) of pale yellow prisms of chalcone, mp. 55-57°.[11]

Acknowledgement.-This research was supported by the Natural Science Foundation of Zhejiang Province and by the Education Committee of Zhejiang Province.

REFERENCES

1. J. A. Hesek and R. C. Williams, *Anal. Chem.*, **46**, 1160 (1974).
2. A. Abu-Samra, J. S. Morris, S. R. Koirtyohann, *ibid.*, **47**, 1475 (1975); T. N. Cooley, D. F. Martin, R. F. Quincel, *J. Environ. Sci. Health*, **A12**, 15 (1977); L. B. Fischer, *Anal. Chem.*, **58**, 261 (1986).
3. A. Katsuta, Japan Kokai JP 51027893 (1976); Chem. Abstr., **87**, 70374v (1977).
4. A. Mukai, M. Tanaka and A. Ikeda, Japan Kakai JP 51037890 (1976); Chem. Abstr., **85**, 35167s (1976).
5. D. J. Goerz, Jr., and B. H. Leonard, Jr., US 3523076 (1970); *Chem. Abstr.*, **73**, 91064v (1970).
6. R. Gedye, F. Smith, K. Westaway, H. Ali, L. Baldisera, L. Laberge and J. Rousell, *Tetrahedron Lett.*, **27**, 279 (1986).
7. R. J. Giguere, T. L. Bray, S. M. Duncan, G. Majetich, *ibid.*, **27**, 4945 (1986).
8. G. Wittig and G. Geissler, *Ann.*, **44**, 580 (1953).

9. H.J. Bestmann and B. Arnason, *Chem. Ber.*, **95**, 1513 (1962).

10. F. Ramirez and S. Dershowitz, *J. Org. Chem.*, **22**, 41 (1957).

11. *Org. Synth.* Coll. Vol. **1**, p. 78.

12. W. Davey and J. R. Gwilt, *J. Chem. Soc.*, 1008 (**1957**).

13. W. Davey and D. J. Tivey, *ibid.*, 1230 (**1958**).

14. G. A. Holmberg and J. Axberg, *Acta. Chem. Scand.*, **17**, 967 (1963).

15. W. B. Black and R. E. Lutz, *J. Am. Chem. Soc.*, **77**, 5134 (1955).

****

A NEW, VERY SHORT PREPARATION OF 3-BENZOYLCYCLOHEXANONE, A KEY BUILDING BLOCK IN KETOPROFEN SYNTHESIS

Submitted by Roberto Ballini* and Giovanna Bosica
(11/07/94)

Dipartimento di Scienze Chimiche dell' Università
Via S. Agostino 1, 62032 Camerino, ITALY

Non-steroidal antiinflammatory (NSAI) agents are one of the largest class of drugs both due to their high number and their therapeutic interest.[1] NSAI can be classified according their chemical structure and most of the more studied are α-arylpropionic acid derivatives. Ketoprofen **1** (Profenid®) is one of the most prominent modern anti-inflammatory drug,[2] and its synthesis has stimulated the interest of several researchers.[1] 3-Benzoylcyclohexanone **2** is a key building block of one of the most practical preparation of **1** (Eq. 1) reported by Sagami Chemical Research Center as a patent.[3] Compound **2** was first prepared from cyclohexenone and α-morpholinobenzyl cyanide with a tedious method,[3] while, Bennetau *et al.*[4] recently described a multistep, alternative route to **2** *via* 5-trimethylsilyl-3-cyclohexenone. Based in our previous experience in the chemistry of nitroalkanes[5] and in order to devise a new synthesis of the title compound, we now present a convenient, very short preparation of **2** using the easily available phenylnitromethane[6] **5** as starting material.

Our procedure (Fig. 1) starts by the conjugate addition of **5** to 2-cyclohexen-1one **6** on basic alumina as heterogeneous catalyst,[7] to give γ-nitro ketone **7** in 92% yield, which can be converted into the 1,4-diketone **2**, in 80% yield, by the Nef reaction.[8] The reaction is performed by addition of the corresponding nitronate to a mixture of methanol and concentrated sulfuric acid at -35°. Alternatively,