Amidoalkylation of Olefins with 3-Benzyl-5-methoxyhydantoin

By D. BEN-ISHAI* and G. BEN-ET

(*Department of Chemistry, Technion—Israel Institute of Technology, Haifa, Israel*)

Summary 3-Benzyl-5-methoxyhydantoin alkylates olefins, in the presence of an acid catalyst, to give 5-alkylhydantoins with an unsaturated side chain.

THE reactions of 5-alkoxyhydantoin with aromatic compounds[1] and conjugated dienes[2] has now been extended to mono-olefins. It was found that 3-benzyl-5-methoxyhydantoin alkylates various olefins in boiling benzene and in the presence of naphthalene-2-sulphonic acid, to give one of the isomeric products (I), (II), or (III), or a mixture of products (see Table):

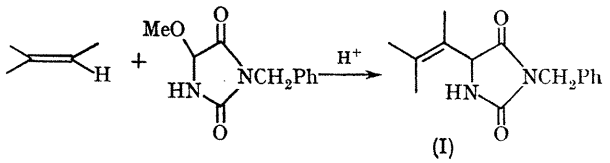
TABLE

Olefin	Product	M.p.	Yield (%)
1,1-Diphenylethylene ..	(I)	175°	78
1,1-Diphenylpropylene ..	(I)	190°	67
α-Methylstyrene	(I)	172°	36
β-Methylstyrene	(I) + (II)	oil	46[a]
Styrene	(II)	174°	36
2-Phenylbut-2-ene	(III)	137°	68
2-Methylbut-2-ene	(I) + (III)		73[a]
Tetramethylethylene ..	(III)	132°	75
Isobutene	(I) + (III)	oil	33[a,b]
Indene	(I)	167°	35

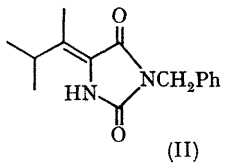
[a] The two isomers were eluted together from an alumina column.

[b] The major product was (I), according to the n.m.r. spectrum of the mixture.

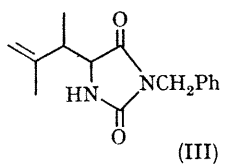
The structure of the products obtained depends on the nature of the olefins used. Tetraphenyl- and triphenylethylene as well as 2-methyl-1,1-diphenylpropene failed to react with the methoxyhydantoin under the conditions used. Isobutene reacted with 3-benzyl-5-methoxyhydantoin in benzene solution, in the presence of the acid catalyst, at 80° (sealed tube) to give a mixture of products (see Table). In methylene chloride, at room temperature and in the presence of boron trifluoride–ether complex as catalyst, isobutene reacted with 5-butoxyhydantoin to give a 44% yield of a product with a C_8 side-chain (IV, m.p.



(I)

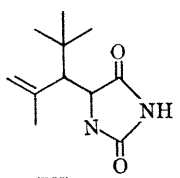


(II)

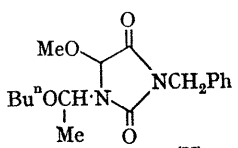


(III)

177°). Butyl vinyl ether and dihydropyran on the other hand, alkylated the hydantoin on the nitrogen to give oily products (*e.g.* V).



(IV)



(V)

The assignment of structures to the substituted hydantoins are based on their i.r., n.m.r., and mass spectra (molecular peaks).

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[1] G. Ben-Et and D. Ben-Ishai, *Chem. Comm.*, 1969, 376.

[2] E. Goldstein and D. Ben-Ishai, *Tetrahedron Letters*, 1969, 2631.