Reactions of 2-Arylindan-1,3-diones with 1,4-Naphthoquinones

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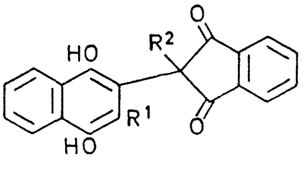
Summary Dehydrogenated Michael adducts were obtained by the uncatalysed reactions of 2-arylindan-1,3-diones with 1,4-naphthoquinones.

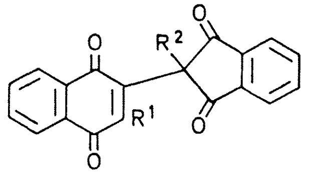
Preliminary work with anticoagulant 1,3-diketones (indandiones and 4-hydroxycoumarins) showed that 2-phenylindan-1,3-dione (phenindione) reacts quantitatively with 1,4-naphthoquinone in either polar or non-polar solvents in the absence of a catalyst to yield the oxidised Michael adduct (IIa), m.p. 290—292°, the initial adduct (Ia) being dehydrogenated by the molar excess of 1,4-naphthoquinone used. 2-(4-Methoxyphenyl)indan-1,3-dione also reacted with 1,4-naphthoquinone under the same conditions, but less readily than 2-phenylindan-1,3-dione, to give the quinone (IIb), m.p. 210—211°.

Uncatalysed additions occurred between 2-phenylindan-1,3-dione and 2-acetoxy- and 2-benzoyloxy-1,4-naphthoquinone. In the former case the products were the dehydrogenated Michael adduct (IIc), m.p. 253—255°, and the quinone (IIa) formed by the elimination of acetic acid from the initial adduct (Ic). In the latter case elimination of benzoic acid from the adduct (Id) alone occurred and the product (IIa) was obtained.

Mild basic conditions were required to effect the addition of 2-phenylindan-1,3-dione to 2-methyl-1,4-naphthoquinone (menadione) to yield the product (IIe), m.p. 194—195°, and of 2-(1-naphthyl)indan-1,3-dione to 1,4-naphthoquinone to give the quinone (IIf), m.p. 264—265°.



(I)



(II)

a; $R^1 = H, R^2 = Ph$
b; $R^1 = H, R^2 = p\text{-}MeO\cdot C_6H_4$
c; $R^1 = OAc, R^2 = Ph$
d; $R^1 = OBz, R^2 = Ph$
e; $R^1 = Me, R^2 = Ph$
f; $R^1 = H, R^2 = 1\text{-Naphthyl}$

The spectroscopic and analytical data for all new compounds are consistent with the assigned structures.

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