Tetrahedron Letters No.36, pp. 3457-3458, 1967. Pergamon Press Ltd. Printed in Great Britain.

HYDROGENATION OF SOME QUINONES TO ENEDIONES

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(Received in UK 21 June 1967)

The properties of the Wilkinson soluble catalyst as a pure donor of hydrogen[1] led us to hope that reduction of quinones to enediones might be possible, in contrast to electron addition methods which frequently give aromatic products.

1,4-Naphthoquinone in benzene rapidly absorbed one molecular proportion of hydrogen (30 min.) and the almost colourless product, 1,2,3,4-tetrahydro-1,4-dioxonaphthalene, after recrystallization from hexane had m.p.95-97° (pyrex capillary) (yield 70%), $\nu_{max.}$ 1683, 1590, 974, 794, 735 cm^{-1}; τ 6.93s (4H), 2.15m (4H); literature: m.p.[2] 98°; τ 6.92s, 2.10m[3]. The only other methods reported give yields of 6-10.5%[2,4]. Juglone similarly gave β-hydrojuglone (72%), m.p. 96-97°, $\nu_{max.}$ 1690, 1644, 1601 $cm.^{-1}$; τ 6.91s (4H), 2.5m (3H), -2.07s (1H) (lost with D_2O); literature[2] m.p.96-97°. This can be efficiently prepared by zinc reduction of juglone[5].

2,3-Dimethoxybenzoquinone was hydrogenated in benzene, the solvent removed at low temperature and the residue taken up in pentane and filtered. Removal of the solvent gave an unstable oil having $\nu_{max.}$ ($CHCl_3$) 1677, 1592, 1342, 1295 $cm.^{-1}$. The p.m.r. spectrum is in accord with the expected 2,3-dimethoxy-1,4-dioxocyclohex-2-ene: τ (CCl_4) 7.34s (4H), 6.12s (6H) differing completely from the spectrum of 2,3-dimethoxyhydroquinone into which it changed on keeping.

Reduction of benzoquinone itself occurred, but only quinhydrone was obtained after a short time and quinol after a longer time. Other quinones of high oxidation potential, diphenoquinone, β-naphthoquinone and 2,6-naphthoquinone, appeared to cause destruction of the catalyst.

The method therefore has a restricted usefulness.

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