Oxidation of *p*-Alkylphenols with Thallium Triperchlorate in Aqueous Media. An Effective Synthesis of *p*-Quinols

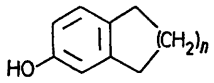
By YASUJI YAMADA,* KUNIO HOSAKA, HIDENAO SANJOH, and MICHIO SUZUKI
(*Tokyo College of Pharmacy, Kitashinjuku, Shinjuku-ku, Tokyo* 160, *Japan*)

Summary *p*-Alkyl phenols (**1**)—(**3**), on oxidation with thallium triperchlorate in aqueous perchloric acid, give the corresponding *p*-quinols (**4**)—(**6**) in good yield.

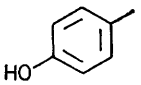
RECENTLY various reactions of thallium(III) salts with olefins and aromatic compounds have been reported,[1] but the use of thallium(III) triperchlorate (TTP) has been

limited.[2] We now report the reaction of *p*-alkyl phenols with TTP in aqueous perchloric acid leading regio-selectively to the corresponding *p*-quinols. This gives an efficient and simple synthesis of *p*-quinols.

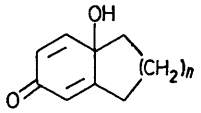
The reaction of 5-hydroxyindan (**1**) (100 mg) in methylene chloride (5 ml) and water (40 ml) with a solution (4·1 ml; *ca.* 1·5 equiv.) of TTP in 60% perchloric acid at 0° for 4·5 h (vigorous stirring) gave 6-hydroxybicyclo[4.3.0]nona-1,4-dien-3-one (**4**);[3] m.p. 71° in 80% yield. The TTP solution was prepared by dissolving 6·0 g of Tl_2O_3 in 100 ml of 60% $HClO_4$ with heating at 130° for 2 h, followed by filtration. Under similar heterogeneous conditions, 6-hydroxytetralin (**2**) and *p*-cresol (**3**) gave 6-hydroxybicyclo[4.4.0]deca-1,4-dien-3-one (**5**);[3] m.p. 125° (80% yield) and 4-hydroxy-4-methylcyclohexa-2,5-dienone (**6**);[4] m.p. 75° (50% yield), respectively, although slightly more vigorous conditions were required for the monocyclic phenol.



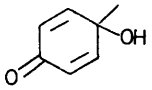
(1) $n = 1$
(2) $n = 2$



(3)



(4) $n = 1$
(5) $n = 2$



(6)

The application of this method to more complex molecules is in progress.

(*Received, 6th June* 1974; *Com.* 646.)

[1] A. McKillop and E. C. Taylor, *Chem. in Britain*, 1973, **4**; E. Hecker and R. Lattrell, *Annalen*, 1963, **662**, 48; M. M. Coombs and M. B. Jones, *Chem. and Ind.*, 1972, 169.
[2] P. Abley, J. E. Byrd, and J. Halpern, *J. Amer. Chem. Soc.*, 1973, **95**, 2591; D. Fărcasiu, P. v. R. Schleyer, and D. B. Ledlie, *J. Org. Chem.*, 1973, **38**, 3455.
[3] G. F. Burkinshaw, B. R. Davis, E. G. Hutchinson, P. D. Woodgate, and R. Hodges, *J. Chem. Soc.* (*C*), 1971, 3002.
[4] S. Goodwin and B. Witkop, *J. Amer. Chem. Soc.*, 1957, **79**, 179.