

## Synthesis and Reactions of Bis(*p*-methoxyphenyl)tellurone

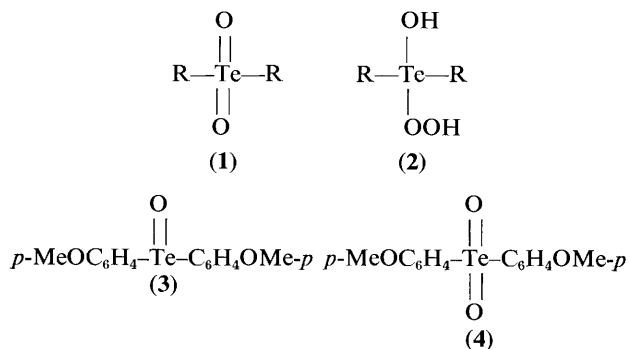
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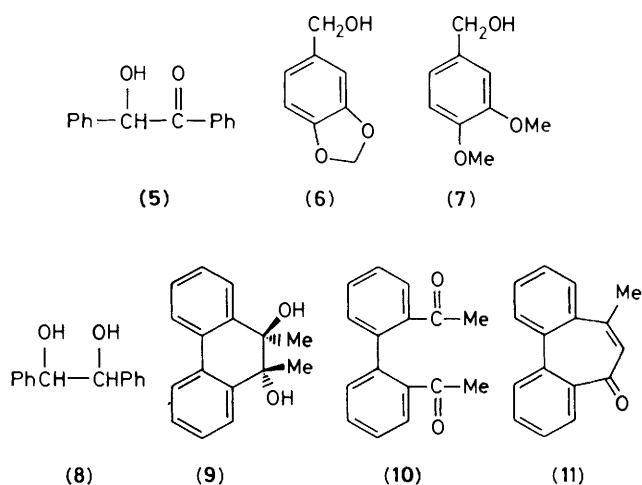
Bis(*p*-methoxyphenyl)tellurone, the first definitely characterized tellurone, has been prepared by periodate oxidation of the corresponding telluroxide and its oxidizing properties have been studied.

Diaryl and dialkyl tellurones,  $R_2TeO_2$  (1), the tellurium analogues of the well known sulphones, are ill defined substances. It is doubtful whether a substance corresponding to the formula  $R_2TeO_2$  has ever been obtained in pure form.<sup>1</sup> Early attempts to oxidize diaryl and dialkyl tellurides and telluroxides with hydrogen peroxide,<sup>2,3</sup> probably resulted in formation of 'hydroxy-perhydrates' (2), instead of the purported tellurones. These compounds possessed all the characteristics of a peroxide; thus they had explosive properties and oxidized halogen acids to the corresponding halogen.<sup>4</sup>

Recent interest in the mild oxidizing properties of bis(*p*-methoxyphenyl)telluroxide (3),<sup>5,6</sup> prompted us to investigate its further oxidation to the tellurone. We have found that this transformation can be effected readily using  $NaIO_4$ , to give bis(*p*-methoxyphenyl)tellurone (4) in 82% yield as a high-melting white material giving satisfactory analytical data.†



†  $NaIO_4$  (8.4 mmol) in  $H_2O$  (50 ml) was added dropwise at room temperature to a solution of bis(*p*-methoxyphenyl)telluroxide (8.4 mmol) in MeOH (50 ml). After 3 h the white product was filtered and dried at 70 °C. The crude tellurone was then dissolved in boiling  $CHCl_3$  (150 ml) and filtered from some insoluble material. Evaporation, recrystallization from MeOH- $H_2O$ , and drying at 70 °C afforded 2.59 g (82%) of bis(*p*-methoxyphenyl)tellurone, m.p. > 300 °C. The material gave satisfactory analytical data (C, H, Te  $\pm$  0.4%).



Further evidence for the structure was obtained by reduction of the tellurone with methanolic hydrazine hydrate to give bis(*p*-methoxyphenyl)telluride (87%).

We have found that bis(*p*-methoxyphenyl)tellurone is a relatively mild oxidant, capable of effecting a variety of organic transformations. These reactions were typically carried out in refluxing toluene and the products isolated by column chromatography. Thus, benzenethiol was oxidized to diphenyl disulphide (97%) and hydroquinone converted into *p*-benzoquinone (39%). Bis(*p*-methoxyphenyl)telluroxide (3) does not react with simple alcohols.<sup>5</sup> However, the corresponding tellurone (4) oxidizes benzylic alcohols to the corresponding carbonyl compounds. Benzoin (5), piperonyl alcohol (6), and veratryl alcohol (7) could be oxidized to benzil (89%), piperonal (72%), and veratraldehyde (79%), respectively.

Attempted oxidation of hydrobenzoin (8) with the tellurone (4) gave, surprisingly, a 79% yield of benzaldehyde. The formation of a substantial amount of bis(*p*-methoxyphenyl)telluride in this experiment, indicated that the telluroxide (3) also might be capable of effecting this cleavage reaction. That

this is indeed the case was shown in a separate experiment (75% yield of benzaldehyde).

The diol (**9**) was cleaved by the tellurone (**4**) to give a mixture of 2,2'-diacetylbiaryl (**10**) (38%) and the unsaturated ketone (**11**) (51%), a secondary cyclization product.

The recently postulated thermal rearrangement of an alkyl aryl tellurone (or its hydrate), to a tellurinic ester (**12**)  $\rightarrow$  (**13**),<sup>7</sup> was not observed for bis(*p*-methoxyphenyl)tellurone (boiling 24 h in *N,N*-dimethylformamide followed by NaBH<sub>4</sub>-reduction gave no phenolic products).

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