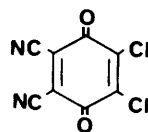
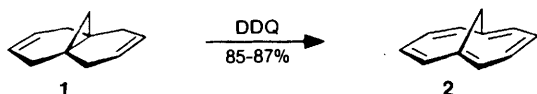




DDQ: more than an oxidizing agent!

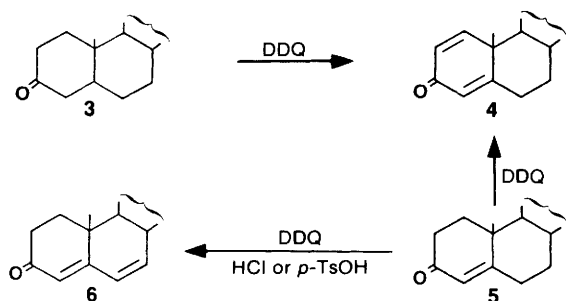


DDQ (2,3-dichloro-5,6-dicyano-1,4-benzoquinone), a quinone of high oxidation potential, is a versatile reagent with proven applications in synthesis.¹ It is often the reagent of choice for dehydrogenation and selective oxidation. Thus, **DDQ** effects the dehydrogenation of the methano-bridged hexahydronaphthalene **1** to give the 10- π -electron annulene **2** in excellent yield.²

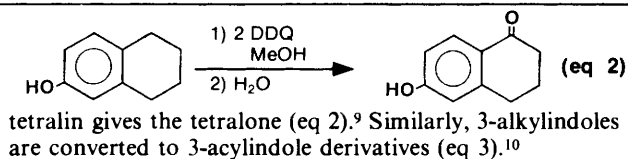
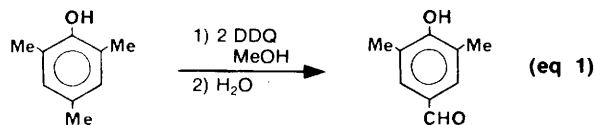


DDQ has recently been employed in the synthesis of diolepoxides of benz[*a*]anthracene, indicating its potential use in the synthesis of diolepoxides of other polynuclear aromatic hydrocarbons. These metabolites are currently of intense interest because of the proven muta- and carcinogenicity of a diolepoxide of benzo[*a*]pyrene.³

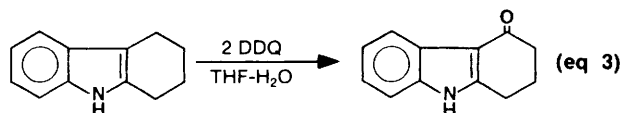
The dehydrogenation of 3-ketosteroids is only one example of the extensive use of **DDQ** in the steroid field.⁴ Saturated 3-ketosteroids (**3**) give the corresponding $\Delta^{1,4}$ -derivatives (**4**).^{5,6} Δ^4 -3-Ketosteroids (**5**) yield the same $\Delta^{1,4}$ product under aprotic conditions, but $\Delta^{4,6}$ -dienes (**6**) in the presence of hydrogen chloride⁷ or *p*-toluenesulfonic acid.⁶



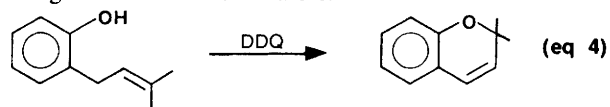
Many of the useful synthetic reactions of suitably substituted phenols with **DDQ** can be rationalized as proceeding through an intermediate quinone methide. Thus, mesitol is oxidized in methanol to the corresponding *p*-carboxaldehyde by two equivalents of **DDQ** (eq 1),⁸ and 6-hydroxy-



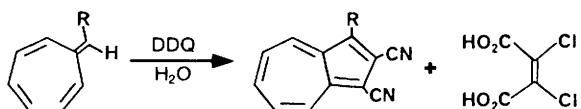
tetralin gives the tetralone (eq 2).⁹ Similarly, 3-alkylindoles are converted to 3-acylindole derivatives (eq 3).¹⁰



Upon treatment with **DDQ**, 2-(3,3-dialkylallyl)phenols undergo oxidative cyclization to 2,2-dialkylchromenes (eq 4).¹¹ Phenols with *o*-allyl groups unsubstituted in the 3-position undergo oxidation to coumarins.¹²



DDQ also functions as a component in cycloaddition reactions. Thus, **DDQ** and 8-substituted heptafulvenes yield 3-substituted 1,2-dicyanoazulenes, a result which can be rationalized as an ($8\pi + 2\pi$) cycloaddition.¹³



DDQ has also been employed as a spray reagent in the tlc analysis of carbazoles.¹⁴

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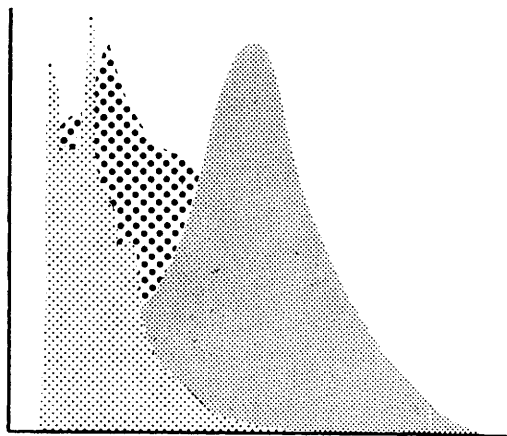
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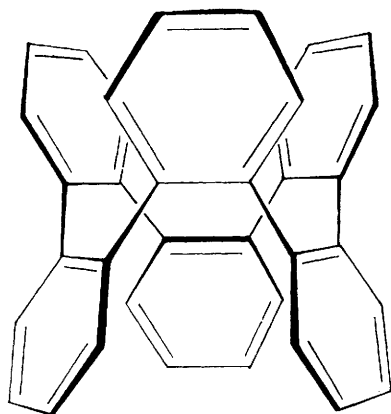
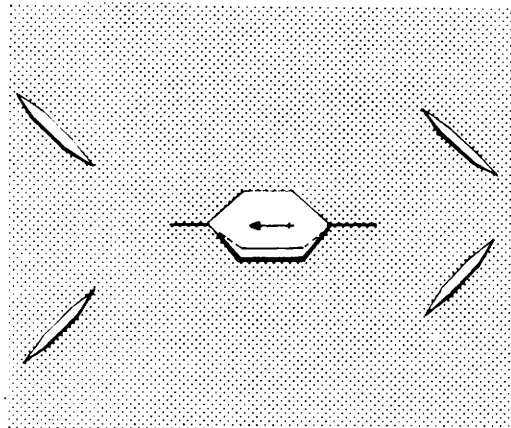
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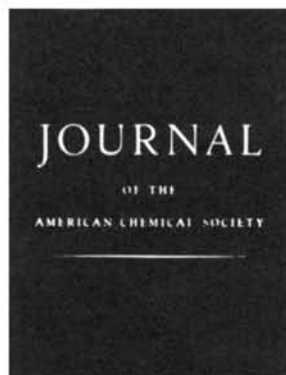
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