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A NOVEL TYPE OF AROMATIZATION REACTION OF STEROIDS.

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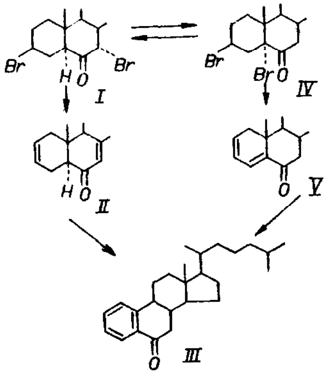
In the steroid field the partial aromatization with elimination of the angular methyl group is well known (1). We wish to report a case of a facile elimination of the C_{19} methyl group leading to 6-keto-A-aromatic unsubstituted steroids (2). Previously it has been reported that 3β,7α-dibromo-5α-cholestan-6-one (I) may be dehydrohalogenated with lithium bromide in N,N-dimethylformamide yielding cholesta-2,7-dien-6-one (II) (3). When the dibromoketone I was heated with quinoline a different reaction was observed. In addition to a smaller amount of cholest-2-en-6-one and cholest-4-en-6-one the compound melting at 110-111°, $[\alpha]_D$ +9° ($CHCl_3$) was isolated as the main component. The structure of 19-norcholesta-1,3,5(10)-trien-6-one (III) was derived from spectral data.



It can be supposed that under the influence of quinoline on the dibromoketone I hydrogen bromide is eliminated giving rise to the corresponding dienone, which is than aromatized with expulsion of the angular methyl group. The fact that in addition to the aromatic steroid the products of reduction (i.e. cholest-2-en-6-one and cholest-4-en-6-one) were also isolated, is indicative of the fact that equilibrium is attained between 5α and 7α-bromoderivatives. A similar reduction accompanying the rearrangement of 5α-bromo-6-ketone to 7α-bromo-6-ketone was described (4). When refluxing 3β,5α-dibromo-5α-cholestan-6-one (5) (IV) in quinoline the same aromatic ketone III is obtained along with the products of reduction. On the other hand the aromatization of both dienones II and V (6) (prepared by lithium bromide dehydrohalogenation of dibromoketone IV, m.p. 126-128°, $[\alpha]_D$ +24°) in boiling quinoline gives a much purer product and in a higher yield; however, the reaction rate is lower. Aromatization rate can be increased by addition of quinolinium salts of strong acids. Dienones II and V can be aromatized also in less polar medium, for example in xylene at 240°, under basic or acid catalysis. In the latter case the temperature can be decreased. In boiling xylene and in the presence of trace amount of p-toluenesulfonic acid the rate of aromatization of the dienones is still measurable. The fact that in this easy aromatization the C_{19} angular methyl group is expelled in the form of methane was proved by mass spectral analysis of gases escaping from the reaction mixture.

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