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A NEW ROUTE TO NEZUKONE[1)]

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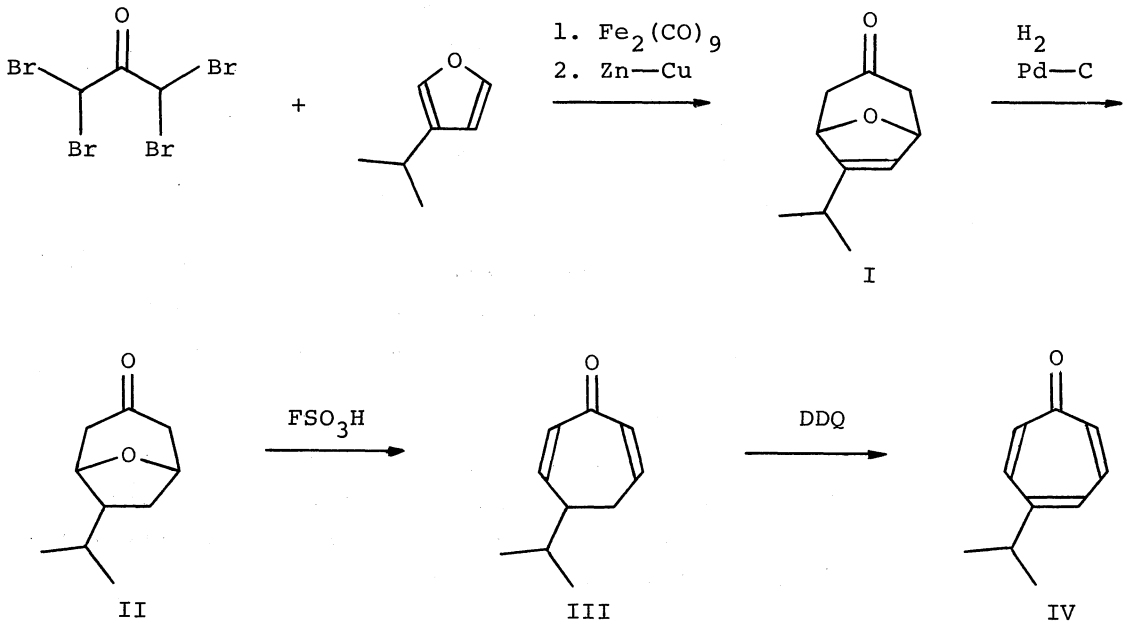
A simple synthesis of nezukone based on the iron carbonyl-promoted coupling between α,α,α',α'-tetrabromoacetone and 3-isopropylfuran is described.

Oxyallyl—iron(II) species[2)] produced from α,α'-dibromo ketones and iron carbonyls are versatile three-carbon intermediates in organic synthesis, and trapping with 1,3-dienes leads to the formation of 4-cycloheptenone derivatives in moderate to good yields.[3)] The recent success in generating an unsubstituted oxyallyl equivalent[4)] has opened a new route to various naturally occurring troponoid[4)] and tropane derivatives.[5)] We here report a synthesis of nezukone (IV) based on this bromo ketone—iron carbonyl reaction.



A mixture of α,α,α',α'-tetrabromoacetone, 3-isopropylfuran, and diiron nonacarbonyl (2:1:1.5 mol ratio) in benzene was heated at 60°C for 2.5 hr under nitrogen atmosphere. The resulting crude product was treated with a large excess of Zn—Cu couple in 3:8 methanol—benzene saturated with ammonium chloride at room temperature for 20 min to give the bicyclic ketone I in 57% overall yield.[6] Catalytic hydrogenation of I on 10% Pd—C in methanol containing sodium hydrogencarbonate afforded the saturated ketone II, mp 22—25°C, in 77% yield, which in turn was allowed to stand in 1:1 fluorosulfonic acid—methylene chloride at room temperature for 13 min to produce the cross-conjugated dienone III in 59% yield.[7] Ether cleavage of the unsaturated bicyclic ketone I was attempted in a similar manner but failed. When a mixture of III, 2,3-dichloro-5,6-dicyanobenzoquinone (1.1 equiv), and p-toluenesulfonic acid (trace) in benzene was heated at 100°C for 30 min, the desired tropone IV was obtained in 54% yield. The identity was established by comparison of the semicarbazone with that of the naturally occurring specimen, mp and mmp 170—173°C (uncorrected).[8,9]

ACKNOWLEDGMENT

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6) Ir (CCl_4) 1718 cm^{-1} (C=O); nmr (CCl_4) δ 5.73 (triplet-like signal, J = 1.5 Hz, 1 H, =CH); mass m/e 166 (M^+).
7) Ir (CCl_4) 1650 (C=O) and 1615 cm^{-1} (C=C); nmr (CCl_4) δ 5.58 (d, J = 12 Hz, 2 H, COCH=CH) and 6.46 (br d, J = 12 Hz, 2 H, COCH=CH); mass m/e 150 (M^+).
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