



## CHAPTER II

### [SUPPL Chapter II # 4]

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Arabic compound numbers in TAPSOC,  
Roman numerals in Supplementary material

#### Remote activation of aliphatic C-H bonds

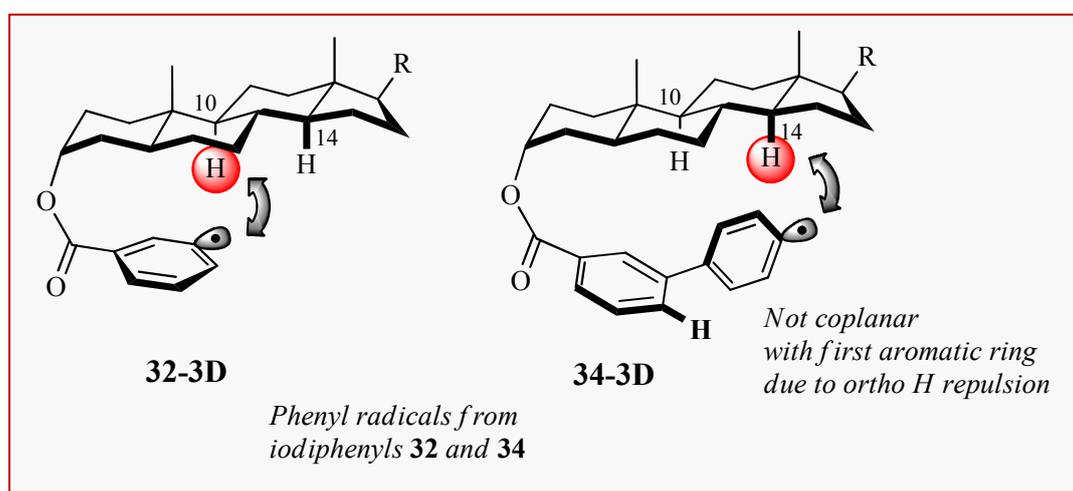
When an apparently unreactive C-H center becomes functionalized, either as a C-X derivative or activated for C-C bond formation, there ought to be some other functionality within the molecule impinging on this C-H in the manner of removing the H atom. A radical or a carbanion may emerge at the formerly inactive carbon, but other reactions involve more subtle transition states without charge development. Carbene C-H insertions are of this type. Problems > N°50 may include such a process.

External C-H activation from highly reactive species in the reaction medium may also occur. The radical formation from hydrocarbons and chlorine or bromine at high temperature reviewed in freshman chemistry (via Cl or Br atoms and radical formation on the carbon scaffold) is an early example, with industrial applications in the manufacture of halogenated solvents, for instance. As well, other radical propagation reactions in more complex systems exist, although little control over particular sites in the hydrocarbon can be expected.

However, when the activator is tethered to the molecular backbone and so designed to reach only certain parts of the molecule, activation of specific C-H bonds can be realized. Several examples exist and continue to appear with practical application in organic synthesis.

In the case of compounds **32** and **34** of Scheme II.7 (TAPSOC), your molecular models will give you a hand-held picture of how this activation comes about.

An idealized three dimensional rendering of these compounds (**32-3D** and **34-3D**, shown in Scheme S(II)4.1, below) depicts one particular rotamer adequately positioned to influence specific H atoms on the  $\alpha$  face of the molecular plane, taking advantage of the all trans chair conformation of the rigid steroidal scaffold. The axially oriented benzoic ester revolves around the underside of the molecular plane like a rotating blade, reaching close to hydrogens on C<sup>9</sup> or C<sup>14</sup> according to its arm length. Intramolecular regioselective radical transfer is thus made possible.



SCHEME S(II)4.1