The synthesis begins with the mono bromination of 9 which was a good staging point to use the sonogashira coupling; the coupling between alkynes and vinyl halides to yield 3 which is saved to be used convergently with the product from reaction c later in the synthesis. Reaction d was a lithium catalyzed reduction followed by an alkylation of 7 with 6 to yield 5. The double bond of 5 was then reduced to an alkane. Reaction b was the convergent point where 3 alkylated at the carbonyl carbon of 4. The alkyne...
of 2 was then reduced to yield an E enolate. References and further details of the reaction will be explained in the forward synthesis on page 3.

**Retrosynthesis 2**

7 was made in the same way as in retrosynthesis 1. The difference was the nucleophilic attack of cyanide at the carbonyl carbon of 7, reaction n also contained TMS which was used to protect the hydroxyl group. Reaction m; involved the reduction of cyanide to an aldehyde with Dibal-H. The hydroxyl was deprotected to yield 14 which would be used at the convergent point of the synthesis reaction g. In the literature, the deprotection of the hydroxyl gave a 60% yield.
which was one reason why I prefer retrosynthesis 1. In the second portion of the convergent synthesis 9 was created in same way as seen in retrosynthesis 1. \[1\] The 1 bromo pyrene was then converted to 13 \[3\] followed by a bromination to yield 12. \[10\] The bromine was displaced by P(OCH2CH3)2O via Michaelis-Arbuzov rearrangement \[11\] to setup for a nice horner Emmons reaction between 11 and 10 combines them at the newly formed trans alkene to yield 1. \[7\] The extra steps to yield 12 seemed less efficient giving another nod to retrosynthesis 1.

**Forward synthesis of Retrosynthesis 1**

9 was mixed in solution with hydrobromic acid in methyl alcohol-ether and hydrogen peroxide was then slowly added and then left at room temperature for 12 hours. \[1\] 8 was then subjected to a standard sonogashira reaction displacing the bromine with the addition of an alkyne attached to TMS at 110°C for 36 hours to yield 3. \[2\]
7 was reduced via birch reduction and then was used to alkylate 6 following its addition to the reaction. [3] 5 was then reduced via catalytic amounts of the diimide with 1 equivalent of hydrazine and 1 equivalent of O₂. [4] The stereochemistry of the hydrogenation can be controlled when looking at spatial considerations when thinking of trying to hydrogenate from the concave side of 5. The carbonyl carbon of 4 was then attacked nucleophilically by the alkyne carbanion of 3. [5] The stereochemistry was also controlled when looking at spatial considerations from the attack of a nucleophile which is far easier on the convex side of 4 as opposed to the concave side. Finally the alkyne was reduced by Red-Al which was efficient in producing a good yield (86%) of E alkene to yield 1. [6]

As stated previously, Retrosynthesis 2 seemed less efficient in the synthesis of 1. Its use of protecting groups is always something that one should avoid when trying to synthesize a compound and its relatively low yield after deprotection made it quite unfavorable. Also there were overall more reactions in the entire synthesis compared to Retrosynthesis 1 which leads to a greater use of time, money etc.

Bibliography


Note: I could not find a copy of reference 10, it was not in CP nor did UK have an online subscription. I relied on the information Scifinder gave me; I know better!