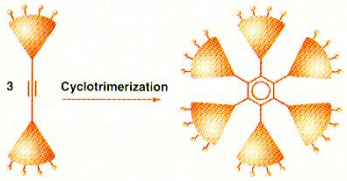
NOTA BENE: CHEMISTRY

Completing the Cycle

Dendrimers are treelike molecules that branch out from a central core and subdivide into hierarchical branching units (*1*). They are potentially useful for diagnostic and therapeutic applications, for example, as contrast agents in magnetic resonance imaging (*1*), because of their ability to anchor many substituents on their surface. Dendrimers can be synthesized in two ways. In the divergent method, the dendrimers are built up step by step from the core. With the convergent method, the dendrimer segments are constructed first and then assembled around the central core. Now, Hecht and Fréchet (*2*) report a new approach to convergent dendrimer synthesis. Previous studies reported trimerization via supramolecular interactions, based on the formation of metal complexes, ionic interactions, or hydrogen bonds (*3*). Hecht and Fréchet now achieve covalent cyclotrimerization of dendritic precursors. The alkyne spacers connecting two dendrimer branches (see figure) trimerize to form a benzene core with six dendrimer ligands.



Clean dendrimer synthesis. A benzene dendrimer core is formed in situ, catalyzed by a cobalt catalyst, from alkyne spacers between dendrimer units. [Adapted from (*2*)]

This approach is very clean, as no side products or partially reacted products are formed. Precise macromolecular structures can be constructed and easily purified. The method should prove particularly valuable for making hybrid dendrimers from differently substituted precursors. Such clean, versatile syntheses will greatly enhance the potential for successful applications.

References

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3. J. Issberner *et al.*, *Chem. Eur. J.* **3**, 706 (1997); M. Plevoets *et al.*, *New J. Chem.* 63 (1999); M. Kawa and J. M. J. Fréchet, *Chem. Mater.* **10**, 286 (1998); S. C. Zimmermann *et al.*, *Science* **271**, 1095 (1996).

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