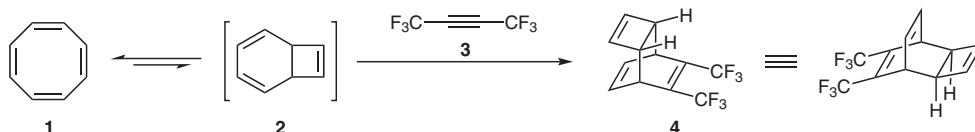
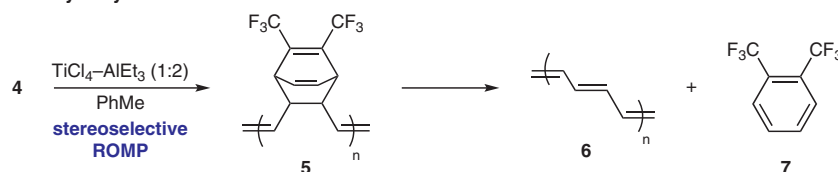


Heat On, Heat Off: A Synthesis of Polyacetylene Revisited

Monomer synthesis:



trans-Polyacetylene formation:



Significance: Polyacetylene (**6**) is the simplest organic conducting polymer and was pivotal to the development of the field organic electronics, an impact that was recognized with a Nobel prize in 2000. Sensitivity to atmospheric conditions stymied early efforts towards the investigation and application of this material. Edwards and Feast provided a method for the casting and controlled formation of *trans*-polyacetylene using a creative ROMP and thermal cycloreversion of polymer **5**.

Comment: Monomer **4** was prepared by the cycloisomerization of cyclooctatetraene (**1**) and subsequent Diels–Alder reaction with perfluorobutyne (**3**). Ring-opening metathesis of **4** with a titanium tetrachloride/trimethylaluminum catalyst, stereoselectively provides polymer **5**. At room temperature, this polymer decomposed to provide *trans*-polyacetylene (**6**) and 1,2-bis(trifluoromethyl)benzene (**7**) over several days. Heating under vacuum accelerates this process, providing **6** in three hours.

Category

Synthesis of
Materials and
Unnatural Products

Key words

polyacetylene
conducting polymers
ROMP
polymerization
retrocyclization

Synfact
Classic