Organic Nano-Materials Engineering

Quiz #2 May. 19, 2009

1. Define the following terms and suggest synthesis route(s) of each (by using a example). (20)
   (a) Block copolymer
   (b) Dendrimer

2. Copolymer can be applied to many research areas. Give some examples of the applications and explain the details. (20)

3. AAO had irregular nanohole array when it was made at the first time. In 1997, Masuda reported very well aligned pore growth, leading to a densely packed hexagonal pore. Describe the method that Masuda used. (20)

4. Describe the definition, feature and advantage of porous silica. (20)

5. Explain the following terms: (20)
   (a) Sol
   (b) Gel
   (c) Xerogel
   (d) Aerogel
   (e) Cryogel

6. In preparation of various types of nanoscale materials based on silicon alkoxide, there are two common major reactions involved, i.e. hydrolysis and condensation reactions. These reactions are influenced by many experimental parameters. Discuss the effects of each of the following parameters on (i) the reaction rates and (ii) the reaction mechanism of (I) the hydrolysis and (II) the condensation reactions, respectively. (30)

7. Please suggest or comment how we can make this lecture more interesting, enjoyable, and fruitful. (10)