

# Introduction to Polymer Chemistry

## Ch/ChE 147

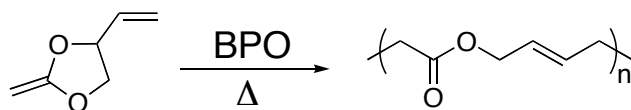
### Problem Set #5

Due 10:30 am, Tuesday, February 26, 2008

You may use your notes and any books that are on reserve for this course in the library (8<sup>th</sup> floor). Collaborating with other student is allowed, but each student should be able to work these problems individually. Some questions may have more than one possible answer: give all possible answers and indicate the methods and assumptions that you use to arrive at each answer.

Suggested reading: Odian sections 3-15b-3-15e (pages 316-330) and 5-3d - 5-3d6 (pages 422-435)

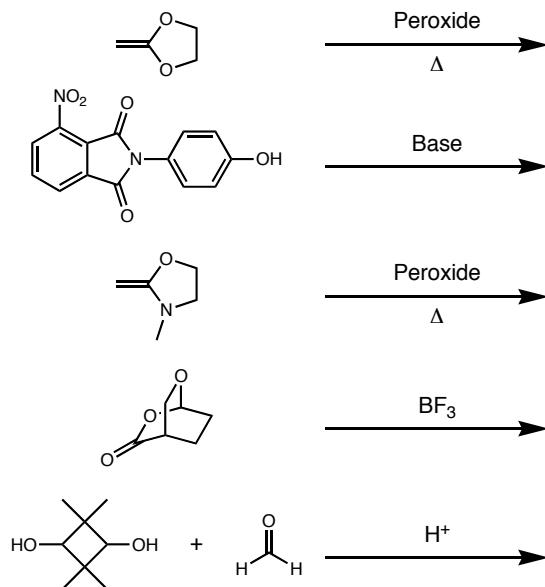
1. Suggest a detailed plausible mechanism for the polymerization reaction shown below.



2. Draw the structures of polystyrene (including both end groups) polymerized using each of the following living polymerization techniques:
- Atom transfer radical polymerization (ATRP)
  - Nitroxide-mediated radical polymerization (NMRP)
  - Reversible addition fragmentation transfer (RAFT)
  - Anionic polymerization

You may choose any previously reported initiators and/or chain-transfer agents. Include references if you choose uncommon initiators/CTAs.

3. Write down the structures of the polymers expected to form predominantly in the following reactions:



4. The cationic polymerization of  $\beta$ -pinene is shown below. Propose a mechanism to account for this reaction. Show initiation and propagation steps.

