Epoxide Ring Opening: Acidic vs Basic Conditions

STUDENT PRACTICE WORKSHEET

Name: _____ Date: _____

Instructions: Select the best answer for questions 1–8 and briefly justify your choice using substrate, reagents, or reaction conditions. For 9–10, explain your reasoning in complete sentences.

1. **Basic nucleophile attack on propylene oxide usually occurs at:**

   A. Less substituted carbon B. More substituted carbon C. Epoxide oxygen D. No carbon

   Reasoning: _____

2. **When one epoxide carbon is tertiary, acid-catalyzed opening often favors attack at:**

   A. More substituted carbon B. Less substituted carbon exclusively C. No carbon D. O atom only

   Reasoning: _____

3. **After hydrolysis/workup, the epoxide oxygen typically becomes:**

   A. An alcohol OH B. A ketone O automatically C. CO_2 D. An ether absent any nucleophile

   Reasoning: _____

4. **A basic epoxide opening is generally:**

   A. SN2-like and backside B. SN1 with free long-lived carbocation C. E2 always D. Radical chain

   Reasoning: _____

5. **Propylene oxide + $NaOCH_3$/MeOH predominantly gives:**

   A. $CH_3CH(OH)CH_2OCH_3$ B. $CH_3CH(OCH_3)CH_2OH$ C. CH_3COCH_3 D. $CH_3CH_2CH_3$

   Reasoning: _____

6. **2-Methyl-1,2-epoxypropane + MeOH/H^+ often gives:**

   A. $(CH_3)_2C(OCH_3)CH_2OH$ B. $(CH_3)_2C(OH)CH_2OCH_3$ C. 2-Methylpropene D. Acetone

   Reasoning: _____

7. **Epoxide ring opening is driven in part by:**

   A. Relief of ring strain B. Creation of a more strained ring C. Loss of all oxygen D. An aromaticity gain

   Reasoning: _____

8. **Stereochemical attack at the reacting epoxide carbon tends to:**

   A. Invert configuration B. Retain via front-side attack always C. Erase stereochemistry at all centers D. Give only radicals

   Reasoning: _____

9. **Compare basic and acid-catalyzed methanol opening of 2-methyl-1,2-epoxypropane.**

10. **Does protonated epoxide opening always involve a freely rearranging carbocation?**