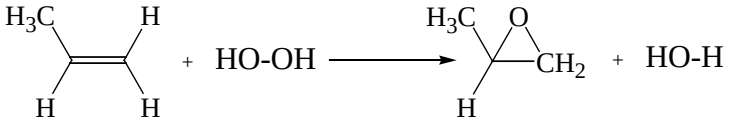
Chemistry 891G **CORE COURSE QUIZ #1 (100 points)** **Fall 2002**

NAME:_____

STUDENT ID #: _____

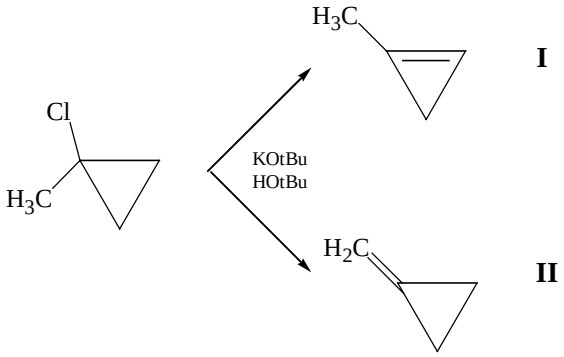
Answer all questions briefly but as clearly as you can. Clearly <u>show your work and reasoning</u>.

1. Epoxidation is a typical reaction of alkenes. Use the bond energies given below to estimate the exothermicity of a hypothetical catalytic epoxidation of an alkene by hydrogen peroxide. (50 pts)



ΔE(C-C) = 85 kcal/mol, ΔE(C-O) = 87 kcal/mol, ΔE(C=C pi only) = 65 kcal/mol, ΔE(O-O) = 51 kcal/mol, ΔE(O-H) = 119 kcal/mol, ΔE(C-H) = 98 kcal/mol, three-ring strain = 27.6 kcal/mol.

2. Use the Benson equivalent data to estimate the difference in energy between products **I** and **II.** (35 pts). Product **II** is isolated from the reaction. Does this fit the pseudothermodynamic model (briefly explain using a diagram that shows the relative energies of **I** and **II**)? (15 pts)



<u>Group Equivalents in kcal/mol</u>

C(H)3(Cd)	-10.1	C(H)2(C)2	-5.0
C(H)2(Cd)2	-4.3	C(H)2(C)(Cd)	-4.8
C(H)(C)3	-1.9	Cd(C)(C)	10.3
Cd(H)(H)	6.3	Cd(C)(H)	8.6

Cyclopropane strain energy with external sp^2 carbon	40.9
Cyclopropane with internal alkene C=C	53.7