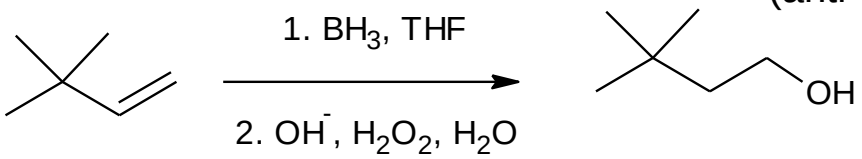
ChemV12A, Organic Chemistry I

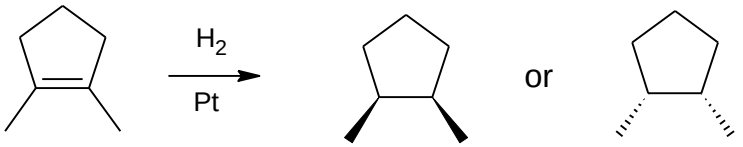
1.) Give the **major** product from each of the following reactions. If there is more than one likely isomer, draw **both**. Show stereochemistry (i.e., wedges and dashes) where applicable. (48 pts, 8 pts ea)

(anti-Markovnikov, no R/S)

a.)

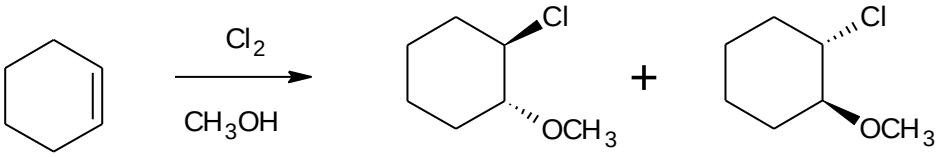


b.)



(CH_3OH has better overlap than Cl)

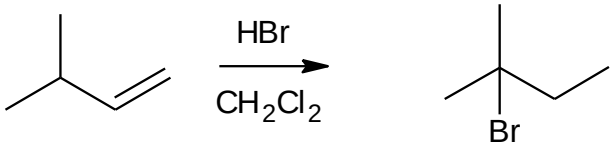
c.)



(anti addition--both enantiomers)

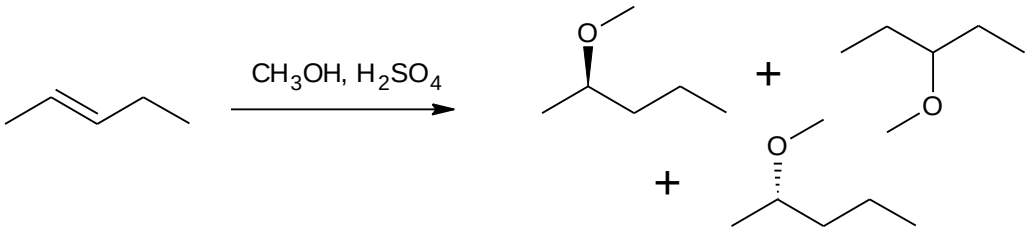
(solvent is unreactive)

d.)



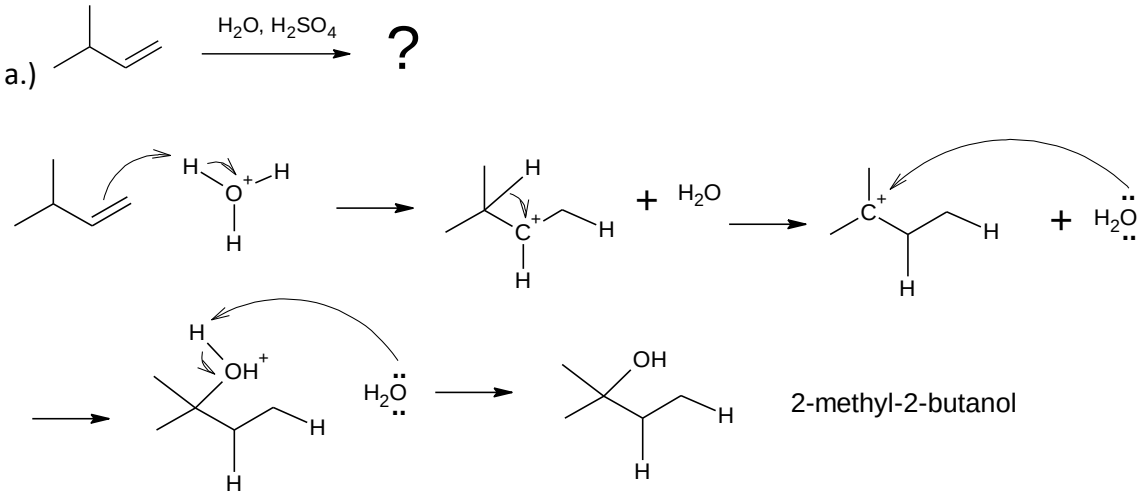
(Markovnikov, hydride shift to make 3° C^+)

e.)

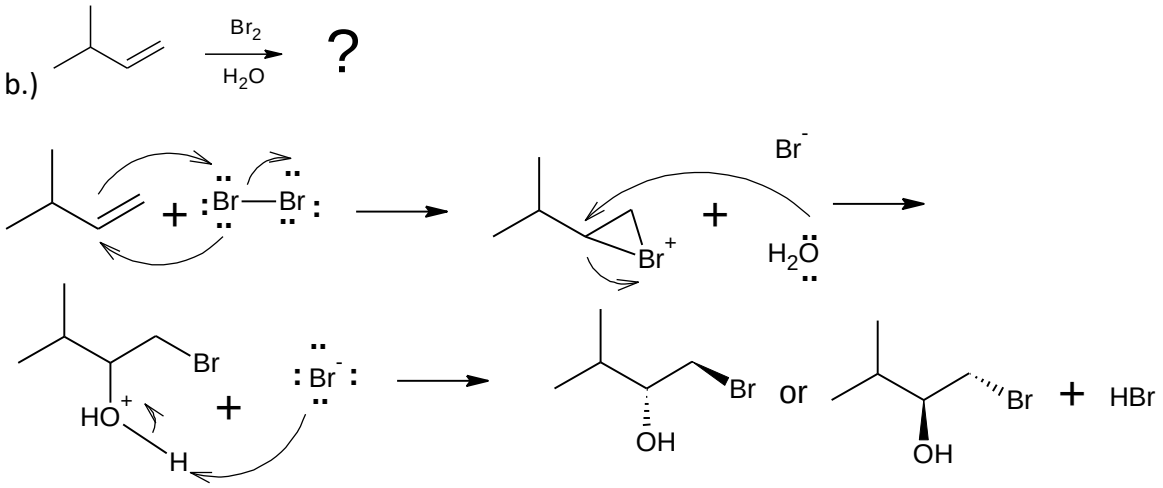


2.) Draw the arrow-pushing mechanisms for the following reactions. Show all formal charges, lone pairs, and compounds made or formed. (40 pts, 20 pts ea)

a.)

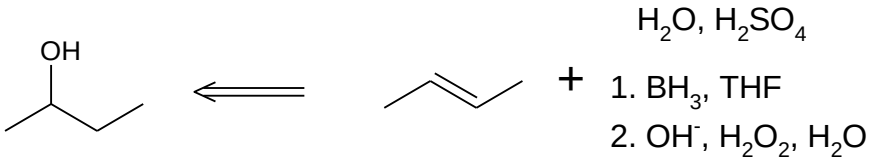


b.)

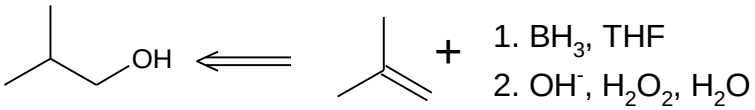


3.) Give ONE possible alkene and the reagents and conditions required to synthesize the following products. (27 pts)

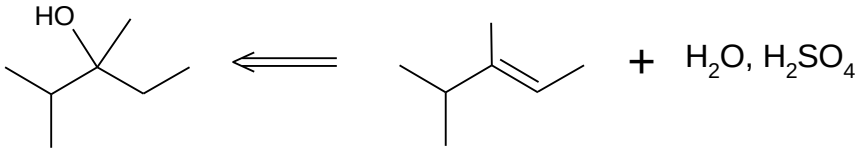
a.)



b.)



c.)



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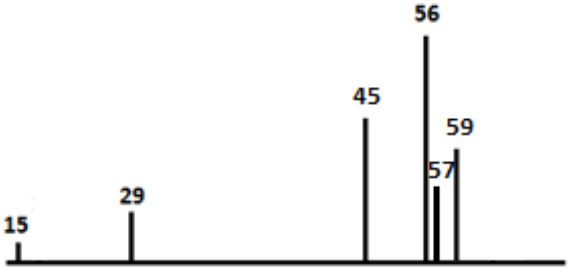
4.) Identify the functional groups and fragments causing **all labeled** peaks from the following IR and MS data and determine the **most likely** structure(s). (50 pts, 25 pts ea)

a.) IR Bands: 3400 cm^{-1} (strong)--**alcohol**

2900 cm^{-1} (strong)—**C-H bends**

(NOT aldehyde, no 1700)

MS: molecular ion is 74 amu



74 amu – 16 amu (oxygen) = 58 amu

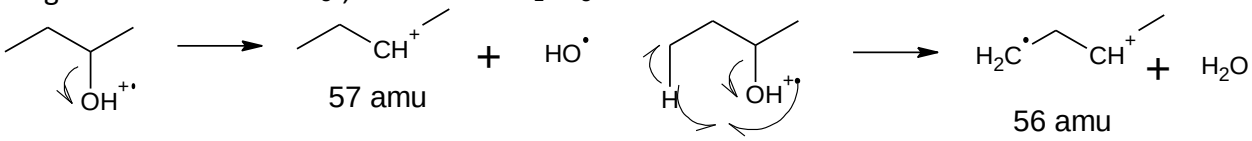
58 amu ÷ 12 amu = 4 C's

4 C's x 12 amu = 48

58 – 48 = 10 H's

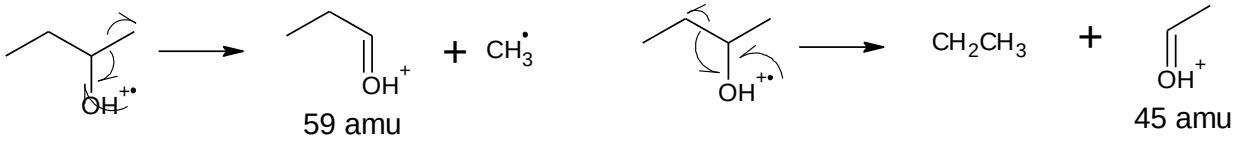
$C_4H_{10}O \rightarrow$ 0 degrees of unsaturation

Fragments: 15 amu = CH_3^+, 29 amu = $^+CH_2CH_3$



57 amu

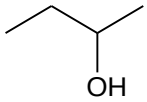
56 amu



59 amu

45 amu

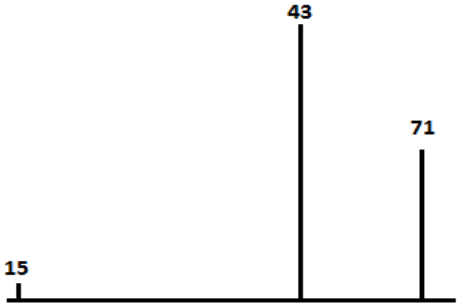
MOST LIKELY:



b.) IR Bands: 2900 cm^{-1} (strong)—C-H bends

1700 cm^{-1} (strong)—C=O

MS: molecular ion is 86 amu

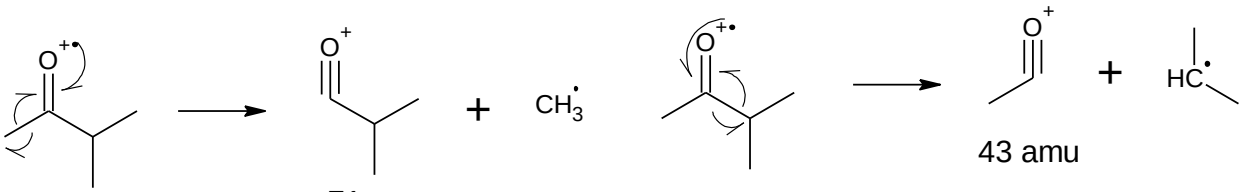


86 amu – 16 amu (oxygen) = 70 amu

70 amu ÷ 12 amu = 5 C's (60 amu total), 70 amu – 60 amu = 10 H's

$C_5H_{10}O \rightarrow$ 1 degree of unsaturation (C=O)

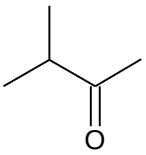
Fragments: 15 amu = CH_3^+, 43 amu = $+CH_2CH_2CH_3$ (strong) $\rightarrow$ secondary, $CH_3CH^+CH_3$



71 amu

43 amu

MOST LIKELY:



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