Chem. 122, Sect 009,

Exam 1, 100 pts, Spring, 2012

ANSWER KEY

1. Identify the following molecules: (a) formula $(C_4H_8O_2)$. IR: 1745 cm⁻¹; ¹H NMR: δ 1.1, triplet, 3H; 2.1, singlet, 3H; 3.8, quartet, 2H. (b) formula $(C_{12}H_{15}O_2)$. IR: 3200 – 3500 and 1723 cm⁻¹. ¹H NMR: δ ; 1.0, doublet, 6H; 2.1, septet, 1H; 2.2, triplet, 2H; 2.4, triplet, 2H; 7.2, doublet, 2H; 7.4, doublet, 2H. (20 pts)

(a)
$$CH_3$$
— C — O — CH_2CH_3
(b) CH_2CH_2 — C — CH_3
 CH_3

2. Give the product of the following reactions. It is not necessary to show the full mechanism. Be sure to show the stereochemistry where appropriate. (20 pts)

3. For the following reactions, give the product(s) and the complete reaction mechanisms by which they are formed. (40 pts)

(c)
$$CH_2SH$$
 $NaOCH_2CH_3$ CH_3CH_2OH E CH_2S CH_2S CH_3 CH_3 CH_3 CH_3 CH_3

(d)
$$CH_3-Br$$
 Mg CH_3-MgBr $H-C \equiv C-CH_2CH_3$ $CH_4 + CH_3CH_2-C \equiv C$ H O CH_3 $CH_3-CH_2-C \equiv C-CH_2-C-CH_3$ $CH_3-CH_3-CH_3-C \equiv C-CH_2-C-CH_3$ $CH_3-CH_3-C \equiv C-CH_2-C-CH_3$ $CH_3-CH_3-C \equiv C-CH_2-C-CH_3$ $CH_3-CH_3-C \equiv C-CH_2-C-CH_3$ $CH_3-CH_3-C \equiv C-CH_3-CH_3$ $CH_3-C \equiv C-CH_3-C \equiv C-C$

4. Synthesize two of the following three molecules as shown. For extra credit do all three. (20 pts)

4. Synthesize **two** of the following three molecules as shown. For extra credit do all three. (20 p

(a) CH₃CH₂CH₂—Br
$$\xrightarrow{Mg}$$
 CH₃CH₂CH₂—MgBr \xrightarrow{O} CH₃CH₂CH₂—CH₂CH₂O· MgBr⁺

(b) $\xrightarrow{H_2CrO_4}$ CH₃CH₂CH₂—CH₂CH₂OH

(c) $\xrightarrow{CH_2CH_2OH}$ \xrightarrow{OH} $\xrightarrow{H_2SO_4}$ $\xrightarrow{OSO_4}$ $\xrightarrow{NaOH, H_2O}$ \xrightarrow{OH} $\xrightarrow{O$