Name .....

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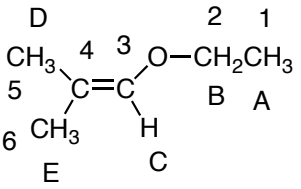
Chem. 122, Sect 008, Quiz 1, 50 pts, Spring, 2011

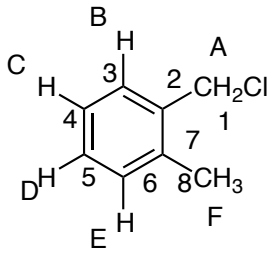
1. For the following molecules identify (a) the number of carbon signals (b) the number of proton signals (c) the spin-spin splittings or multiplicities of the proton signals. (10 pts)

(a)



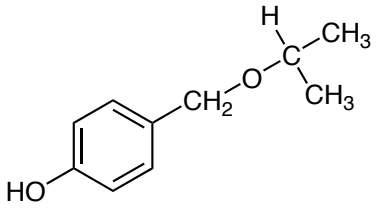
There are5 proton signals and 6 carbon signals. H_A triplet, 3H; H_B quartet, 2H; H_c singlet, 1H, H_D and H_E are both singlets for 3H.

(b)

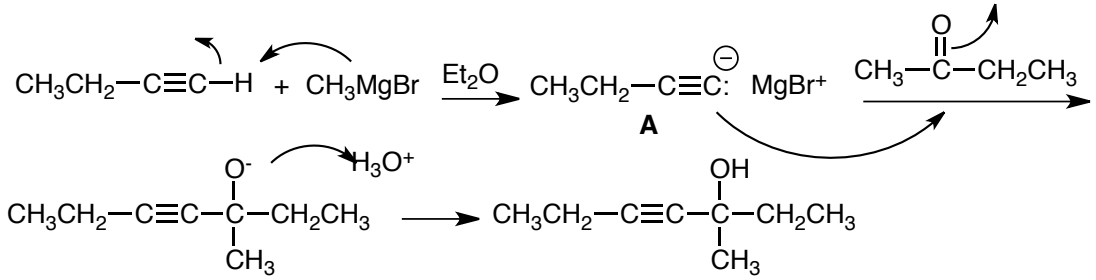


There are 8 carbon and 6 proton signals. H_A and H_F are sinnglets; H_B and H_E are doublets, H_C and H_D are triplets.

2. Identify the following molecule of formula $C_{10}H_{14}O_2$; IR: 3200-3500 cm^{-1}; ^1H: δ 1.2, doublet, 6H; 3.4, septet, 1H; 3.7, singlet, 2H; 4.1, broad singlet, 1H; 7.2, doublet, 2H; 7.4, doublet, 2H. (10 pts)



3. Give the product of the following reactions. (10 pts)



4. In the recrystallization of aspirin from hexane and ethyl acetate, the general procedure is to transfer the solid aspirin to a medium test tube, cover the solid with ethyl acetate and hexane and heat the test tube to boiling in a water bath. (a) Is it a safe alternative to use a Bunsen burner to heat the test tube directly? Briefly explain why/why not. (b) What would be the best substitute for ethyl acetate to use as a co-solvent with hexane? (i) water (ii) heptane (iii) acetone (CH_3COCH_3). Explain briefly. (c) What should you do if you do not get any crystals after cooling down your test tube in an ice bath? (10 pts)

ANS: (a) No, the hexane and ethyl acetate are flammable (b) Acetone is the best choice; it is moderately polar, like ethyl acetate. (c) You can scratch the sides of the test tube and if this does not work, reduce the volume of solvent by evaporative heating.

5. In the preparation of triphenylcarbinol from bromobenzene, magnesium and methyl benzoate ($C_6H_5CO_2CH_3$) in THF (a) what was the purpose of the drying tube? (b) Was it still necessary to have the drying tube attached when adding the HCl? Explain briefly. (c) The stockroom ran out of methyl benzoate and so it gave one student ethyl benzoate (($C_6H_5CO_2CH_2CH_3$) to use instead. Would this student get the correct product? Explain. (10 pts)

ANS: (a) Remove the moisture form the air while still allowing a system that is open to the atmosphere. (b) No, the reaction is done at this stage and the HCl is an aqueous solution. (c) Yes, there would be no problem and the student would get the correct product. The ethoxy group is lost anyway.