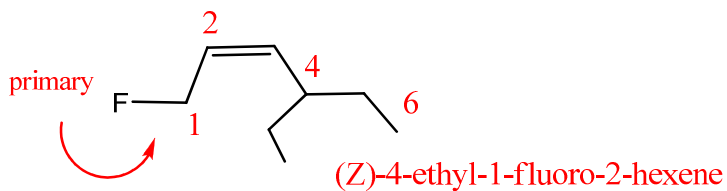
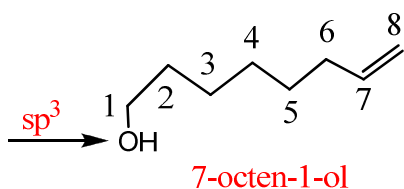


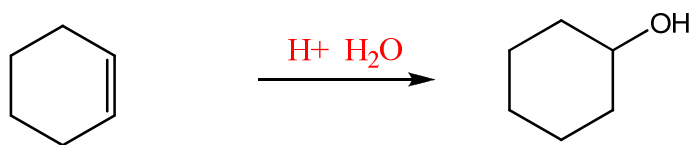
1. (6) For the molecules below, provide a systematic name (2 x 2 marks) and indicate the hybridization state of the atom indicated by an arrow (1 mark); Is the halogen on the halocycloalkane primary, secondary or tertiary (1 mark)?



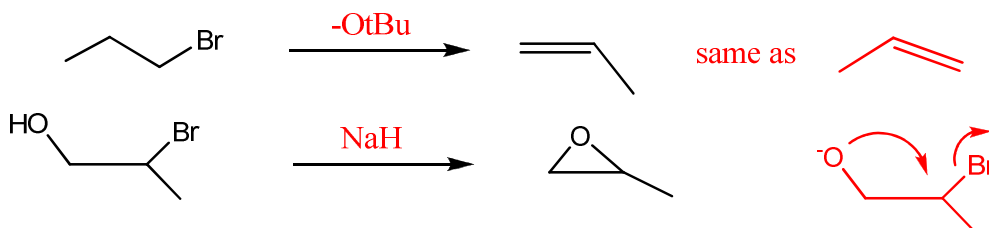
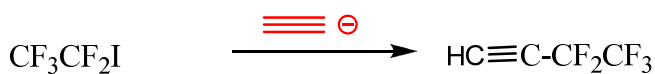
2a. (1) Why is methanol soluble in water whereas pentanol is not? The latter bears too many hydrophobic (water-repelling). methylene groups

2b. (1) Carbon tetrachloride and water are immiscible. Which solvent has a **higher** density? CCl_4

3a. (8) Show the **reagents** required to execute the reactions shown below.

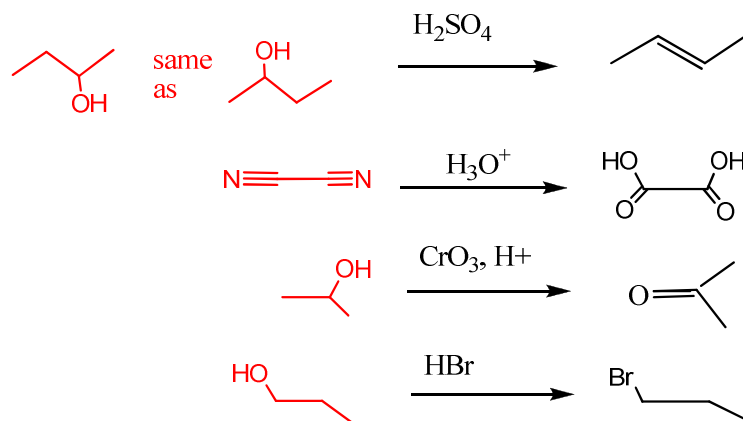


This is reverse of dehydration of alcohol

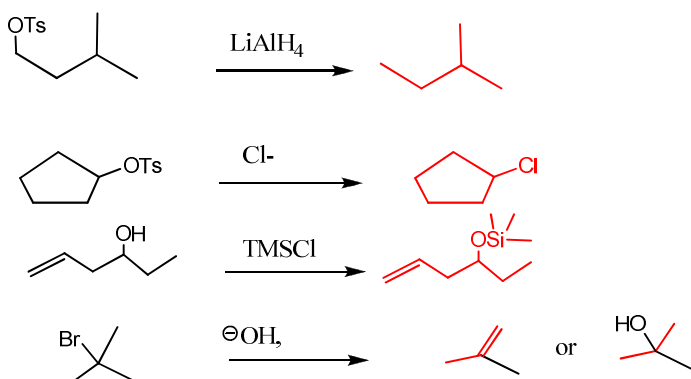


This is an example of an intramolecular Williamson ether synthesis

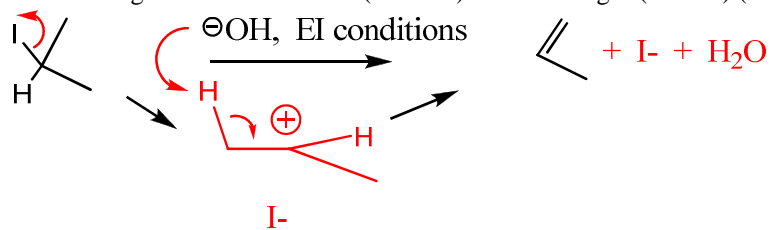
3b. (8) Show the **starting material** required to give the product(s) shown below.



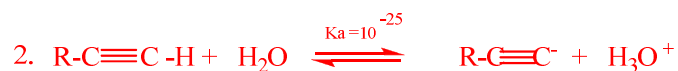
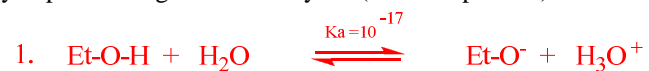
3c. (8) Show the expected organic **product(s)** for each of the reactions shown below.



4a. (6) MECHANISM. Draw a mechanism for the following reaction, showing all intermediates (1 mark), all curly arrows describing electron movement (4 marks) and all charges (1 mark) (if applicable).

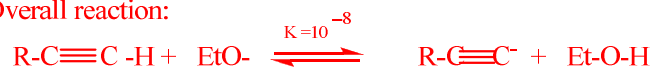


4b.(6) Use the appropriate chemical equations to show why ethoxide (EtOH, pKa 17) is not capable of quantitatively deprotonating terminal alkynes (RC≡CH pKa 25).



Add equation 2 and reverse of equation 1, water and hydronium cancel

Overall reaction:



$K = 10^{17} 10^{-25} = 10^{-8}$: $K \ll 1$ so reaction is very unfavourable!

5. (6) **Stereochemistry**. Indicate which of the molecules shown below is chiral. Assign the absolute configuration to any of the chiral centres. The case of 1R,2S-difluorocyclopentane is an example of a "meso" molecule - containing two "identical" chiral centres of opposing chirality - these cancel out and the molecule is overall achiral. Note the internal reflectional symmetry bisecting all achiral molecules.

