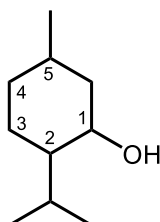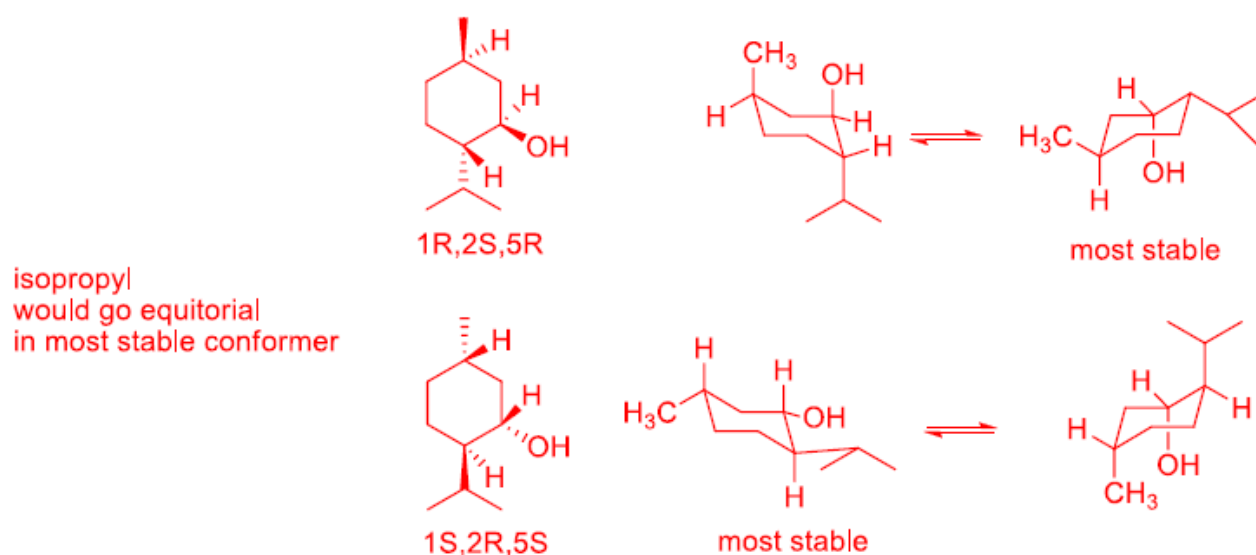# Tutorial 6

Q1. The molecule menthol exists naturally in a (*1R,2S,5R*) form and a (*1S,2R,5S*) form (ring numbering is shown). Draw the two molecules in their most stable chair conformer(s). Are these two compounds *enantiomers* or *diastereomers*?.
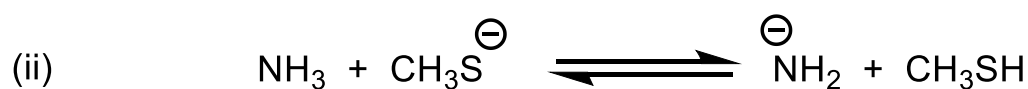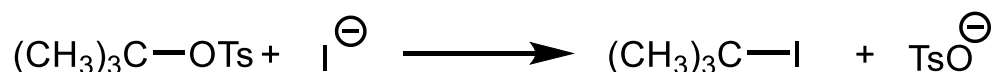

Answer:

The two molecules are enantiomers (it can be quickly concluded because all stereocenters have the opposite configuration)

Q2. Indicate whether equilibrium lies to the LEFT or to the RIGHT for the following reactions.

(i) $CH_3CH_2OH + CH_3S^{\ominus} \rightleftharpoons CH_3CH_2O^{\ominus} + CH_3SH$

(ii) $NH_3 + CH_3S^{\ominus} \rightleftharpoons NH_2^{\ominus} + CH_3SH$

(iii) $CH_3CH_2OH + {}^{\ominus}CN \rightleftharpoons CH_3CH_2O^{\ominus} + HCN$

Answer 2. The equilibrium lies to the LEFT for all the three reactions. (pKa of NH3 = 35-38; pKa of EtOH = 16; pKa of EtSH = 10.6; pKa of HCN = 9.31)

Q3. Consider the S_N1 reaction of tert-butyl chloride with iodide ion:

$$(CH_3)_3C-OTs + \quad I^{\ominus} \longrightarrow (CH_3)_3C-I \quad + \quad TsO^{\ominus}$$

If the concentration of iodide ion is doubled, the rate of forming *tert*-butyl iodide will:

(A) Double. (B) Increase 4 times. (C) Remain the same. (D) Decrease. (E) None of the above.

Answer: (C). The reaction rate will stay the same because for an S_N1 reaction, the concentration of nucleophile has no bearing on the rate.

Q4. Draw the organic product expected from each of the following reactions. Be sure to indicate stereochemistry where appropriate and to include stereoisomers if any. In case two or more stereoisomers are formed, label their relationship as diastereomers, enantiomers, structural isomers, or conformers.
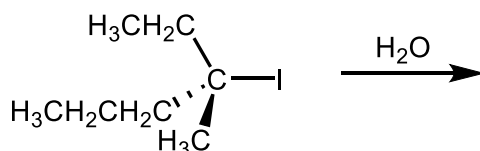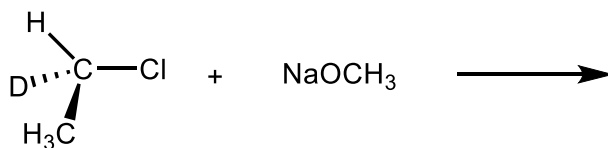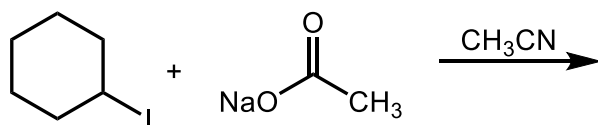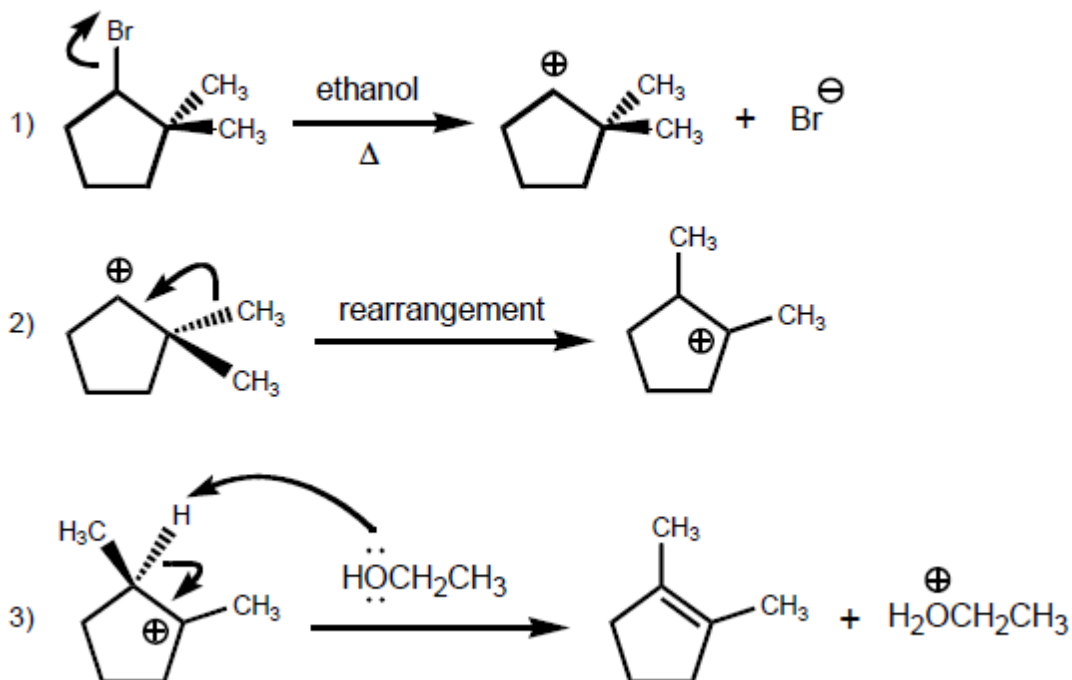

Answer:
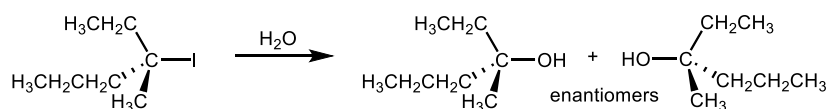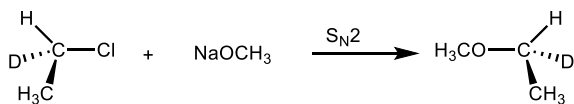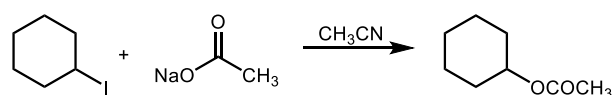
Q5. One of the products that results when 1-bromo-2,2-dimethylcyclopentane is heated in ethanol is shown below. Give a mechanism by which it is formed and give the name of this mechanism.
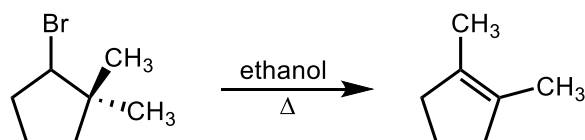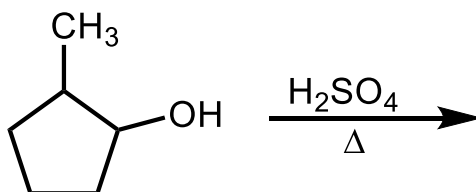

Answer:

E1 mechanism with carbocation rearrangement

1)

2)

3)

Q6. Draw all likely products of the following reaction and indicate the product you expect to predominate.

Answer: