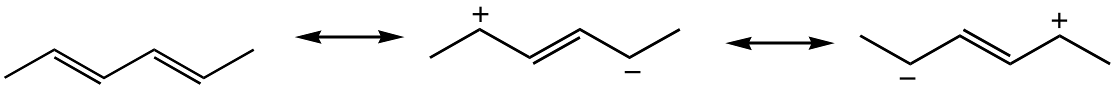
Test 1 Name______________________

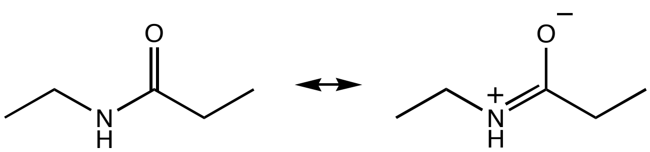
PHYS 0203 (Organic)

1. (12 pts.) Draw resonance structures for the following molecules

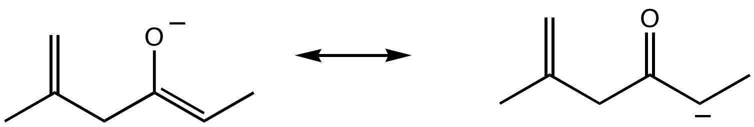
a.



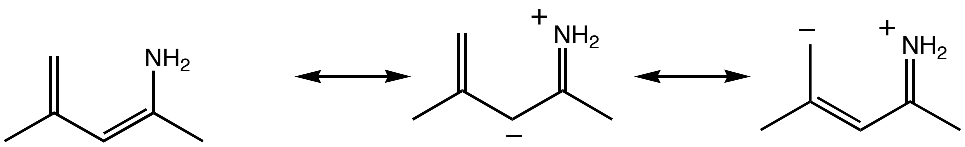
b.



c.

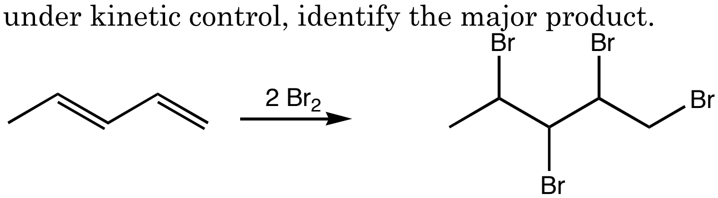


d.

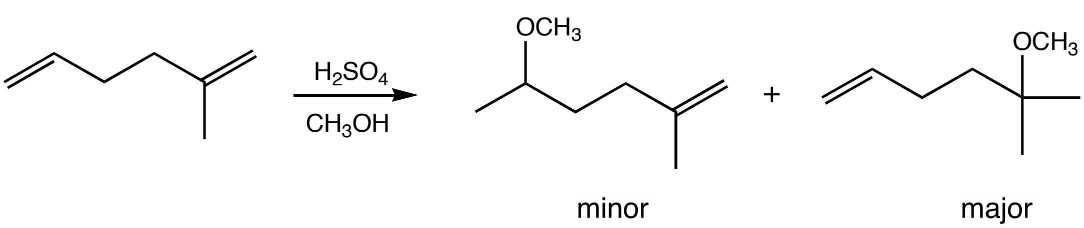


2. (12 pts.) Determine the product(s) of the following reactions. Assuming that reactions b, and c are under kinetic control, identify the major product.

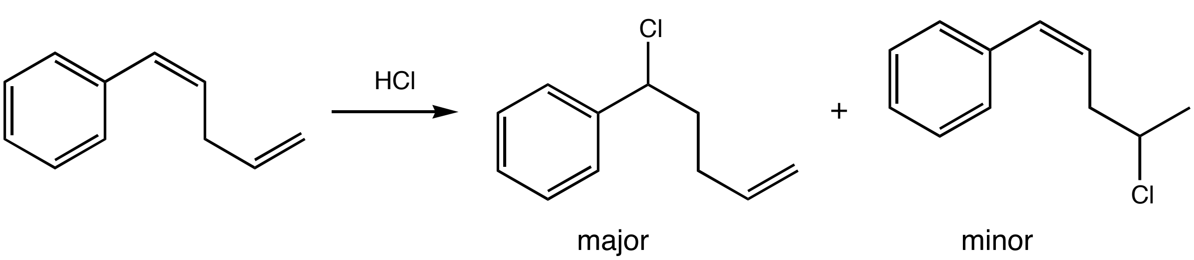
a.



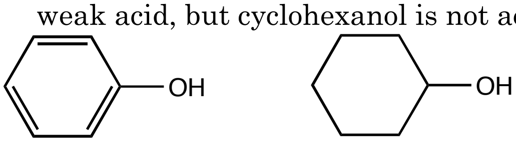
b.



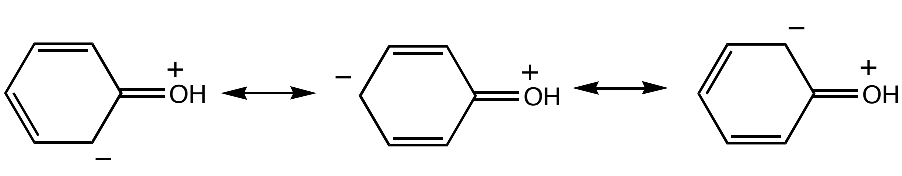
c.



3. (8 pts.) Using resonance structures (draw them where appropriate), explain why phenol is a weak acid, but cyclohexanol is not acidic at all.

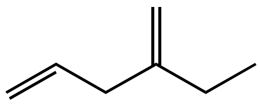


Because the oxygen atom's electrons are distributed around the benzene ring by reso

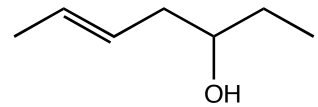


4. (8 pts.) Provide names for the following compounds

a. 2-ethyl-1,4-pentadiene

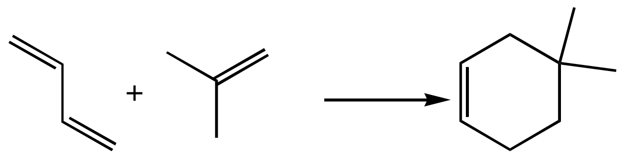


b. hetp-7-ene-3-ol

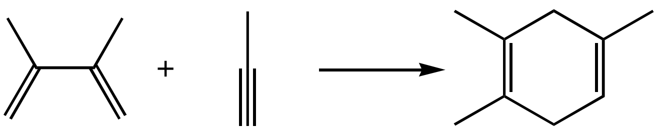


5. (10 pts.) Determine the product(s) of the following reactions.

a.

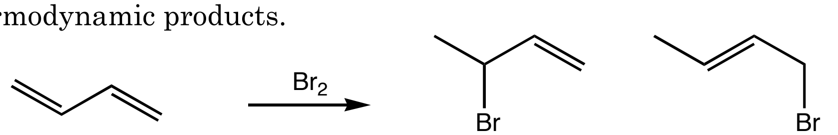


b.



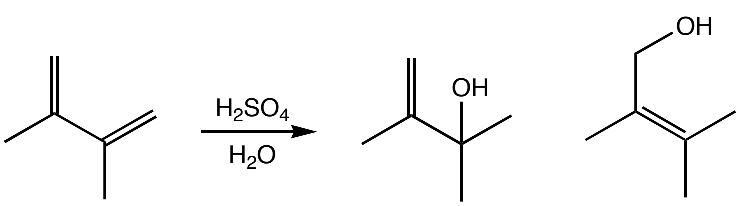
6. (12 pts.) Determine the products in the following reactions, and identify the kinetic and thermodynamic products.

a.



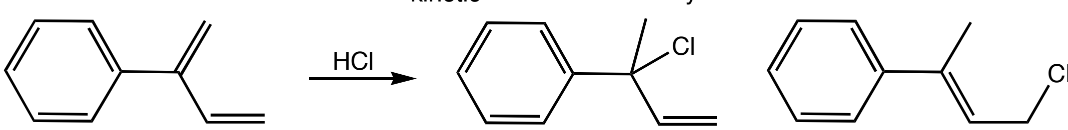
kinetic thermodynamic

b.



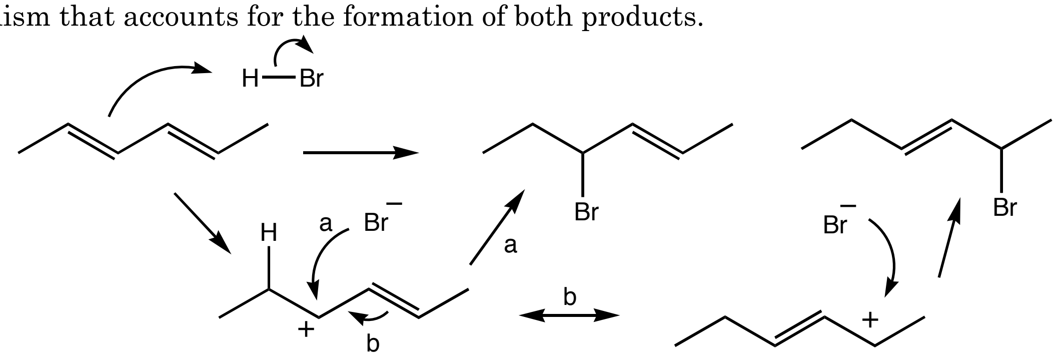
kinetic thermodynamic

c.



kinetic thermodynamic

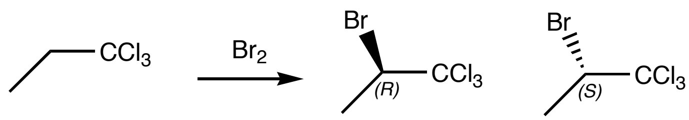
7. (8 pts.) HBr reacts with 2,4-hexadiene according to the reaction drawn below. Draw a mechanism that accounts for the formation of both products.



8. Br_2 undergoes a radical initiated bromine substitution reaction with 1,1,1-trichloropropane to form a racemic mixture of *R*- and *S*-2-bromo-1,1,1-trichloropropane.

a. (4 pts.) Draw and label *R*- and *S*-2-bromo-1-1-1-trichloropropane.

b. (6 pts.) Explain why both the *R* and *S* enantiomers form (is either enantiomer favored?).

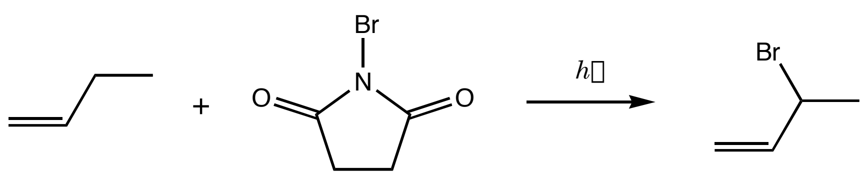


Both the *R* and *S* enantiomers form because the bromine (Br_2) can access either side of the radical intermediate because the radical rapidly inverts its configuration.

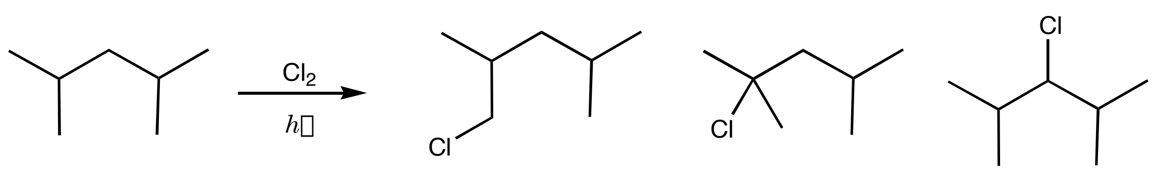
Alternate view that is somewhat deprecated by newer theoretical models that suggest that the radical intermediate is a shallow pyramid that rapidly inverts is presented below. The radical intermediate is planar; thus, the bromine molecule has equal access to either face of the reactive intermediate.

9. (14 pts.) Determine the products of the following reactions. Do not include products that account for less that 1% of the material produced. (Important ratios 1600:82:1 and 5:3.8:1)

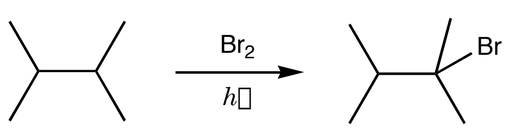
a.



b.



c.



10. (6 pts.) The reaction of 3-methyl-1,4-pentadiene with HCl produces 3-chloro-3-methyl-1-pentene. Draw a mechanism that accounts for the formation of the 3-chloro-3-methyl-1-pentene.