

1. Calculate the unsaturation number for each of the following compound. (6 pts).

A) C_6H_7N

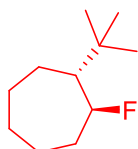
$$(2C+2-H+N)/2 = (6*2+2-7+1)/2 = 4$$

B) $C_6H_9O_2NBr_2$

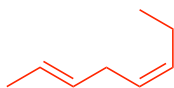
$$(2C+2-H+N-X)/2 = (6*2+2-9+1-2)/2 = 2$$

2. Draw the structure of the following compounds (6 pts).

A) (1*R*, 2*S*)-1-*tert*-butyl-2-fluorocycloheptane

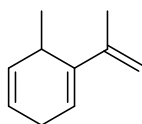


B) (2*E*, 5*Z*)-2,5-octadiene



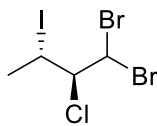
3. Provide the IUPAC names for the following compounds (6 pts).

A)



1-isopropenyl-6-methyl-1,4-cyclohexadiene

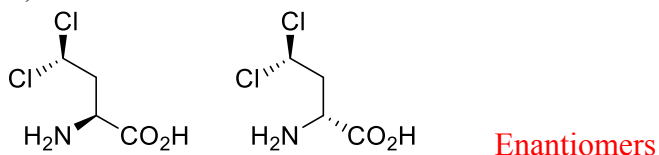
B)



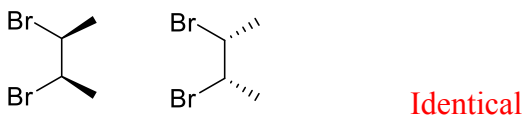
(2*R*, 3*S*)-1,1-dibromo-2-chloro-3-iodobutane

4. Determine the relationship between two given structures in each pair (16 pts).

A)



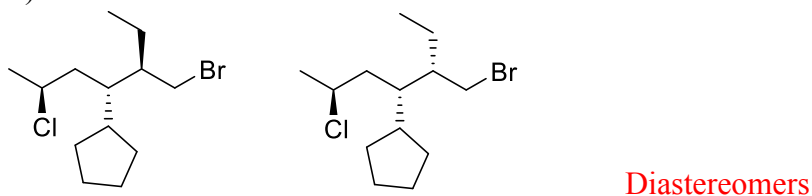
B)



C)

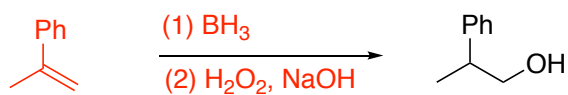


D)

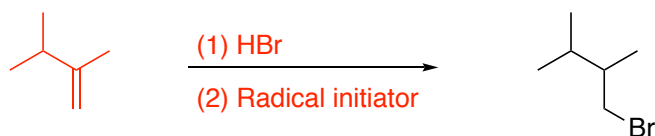


5. Provide an alkene reactant (**ONLY** contains carbons and hydrogens) and necessary reagent(s) for each reaction. (12 pts).

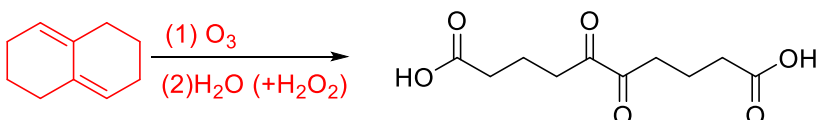
A)



B)

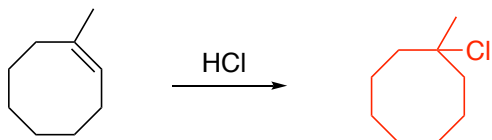


C)

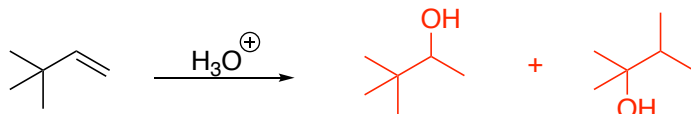


6. Draw the structure of the major product(s) expected in each of the following reactions (30 pts).

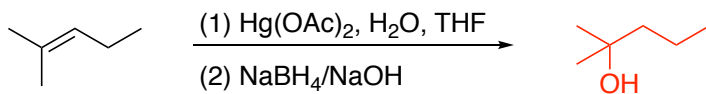
A)



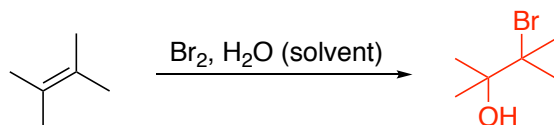
B)



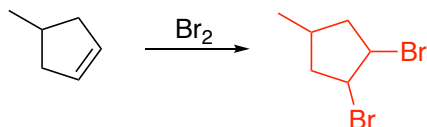
C)



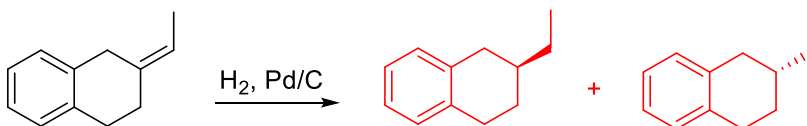
D)



E)

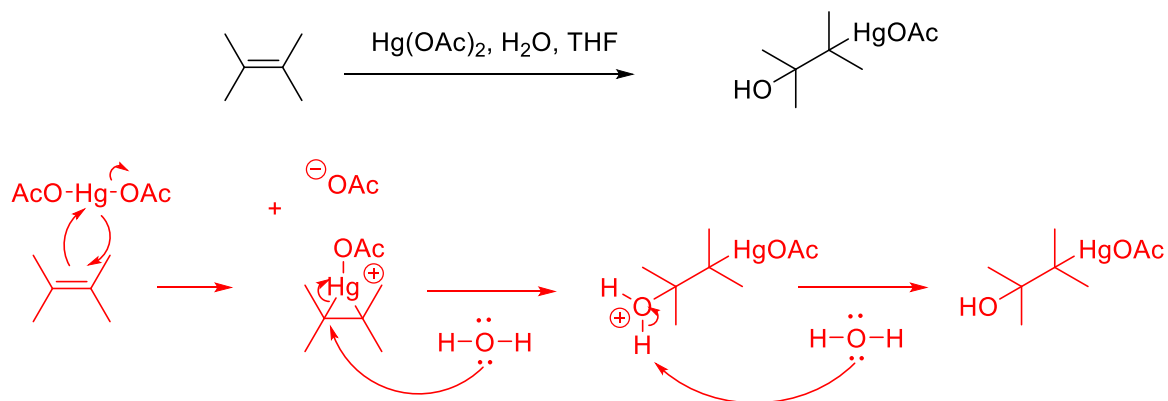


F)

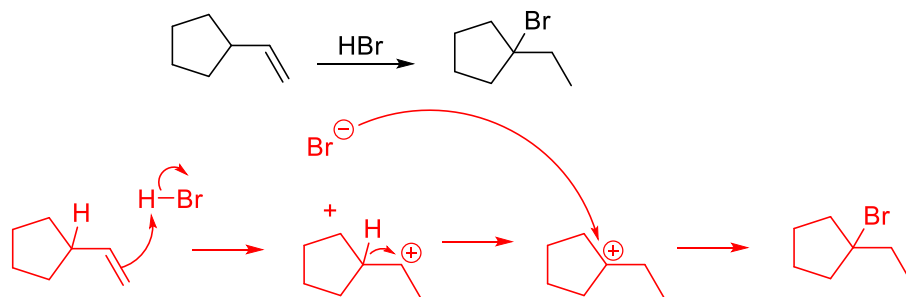


7. Provide the mechanisms for the following reactions. Show every intermediate and all the arrows required for each step of the reaction (24 pts).

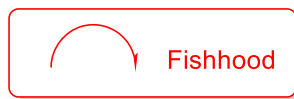
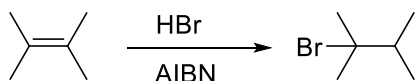
A)



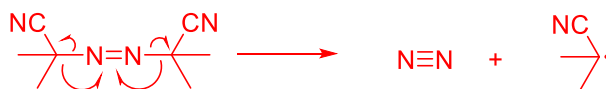
B)



C)



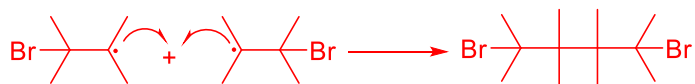
Initiation:



Propagation:



Termination:



At least include
this 4 steps for
full point