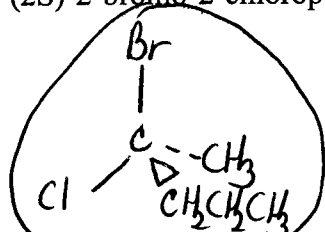


Blue (Version A)

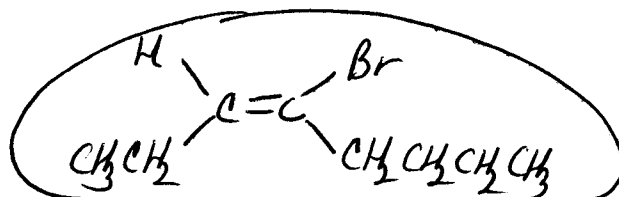
Partial Credit (Use a pen to fill out the remaining questions on the exam itself. Circle the answer to be graded.)

16. Give a structure (line or structural) for each of the following compounds. Where applicable (8) show the correct three-dimensional stereochemistry.

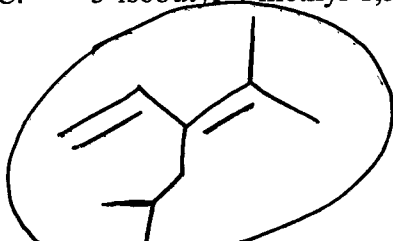
A. (2S)-2-bromo-2-chloropentane



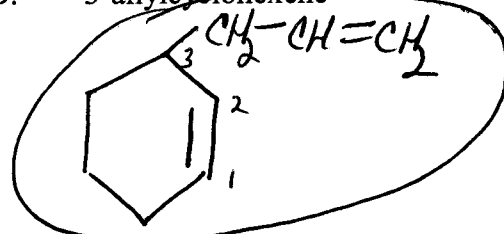
B. (3E)-4-bromo-3-octene



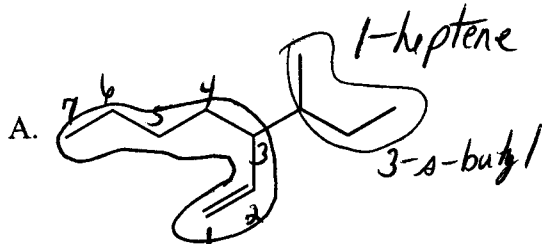
C. 3-isobutyl-4-methyl-1,3-pentadiene



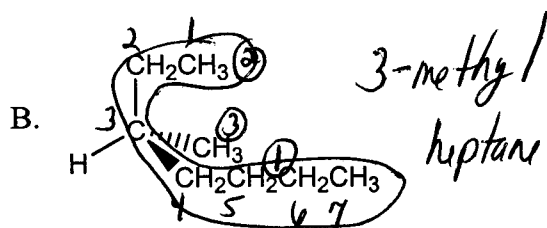
D. 3-allylcyclohexene



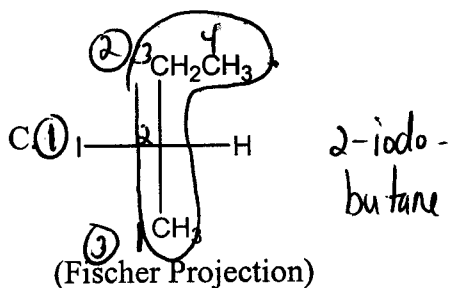
17. Give a correct IUPAC name for each of the following structures. Include stereochemistry (8) (cis/trans, E/Z, and R/S) where appropriate.



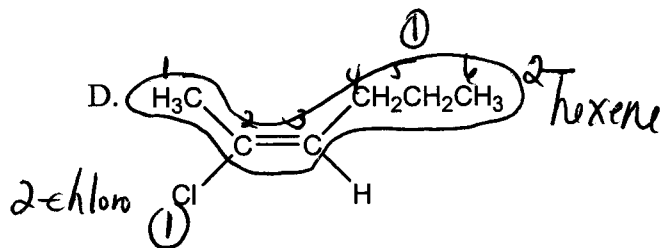
3-sec-butyl-1-heptene



(3R)-3-methylheptane
3 not needed

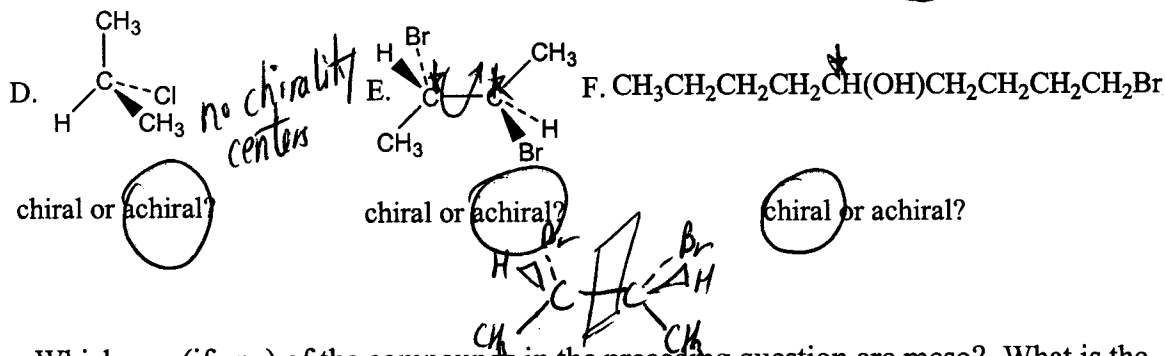
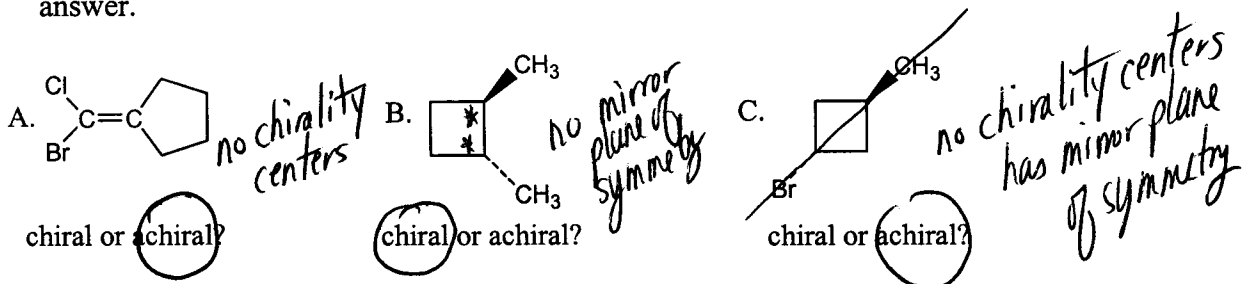


(2S)-2-iodobutane
2 not needed



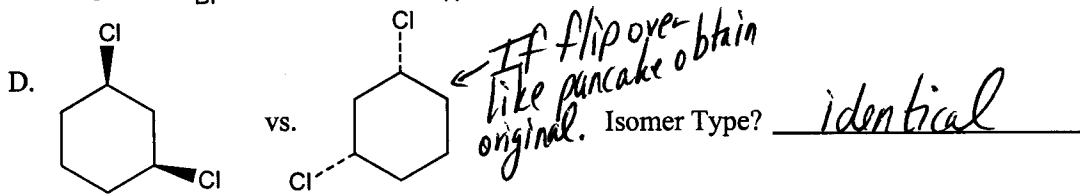
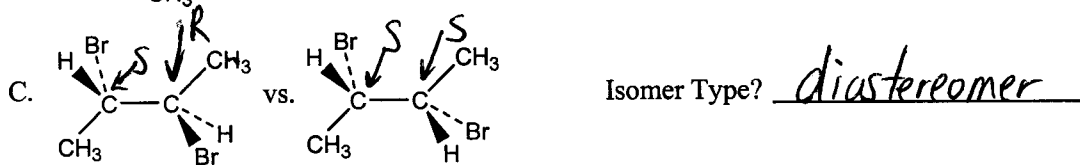
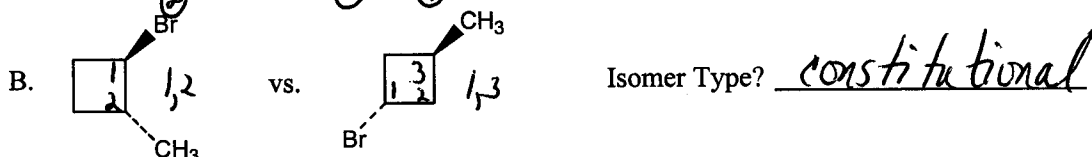
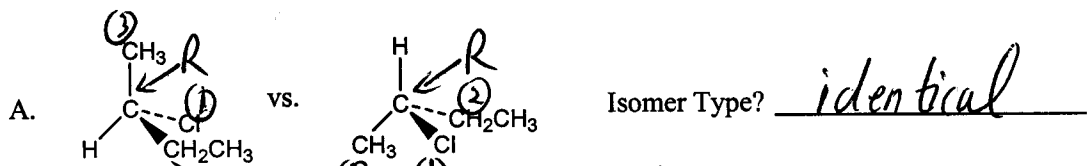
(2E)-2-chloro-2-hexene
2 not needed.

18. Determine whether each of the following compounds is chiral or achiral? Circle the correct answer.
(6)

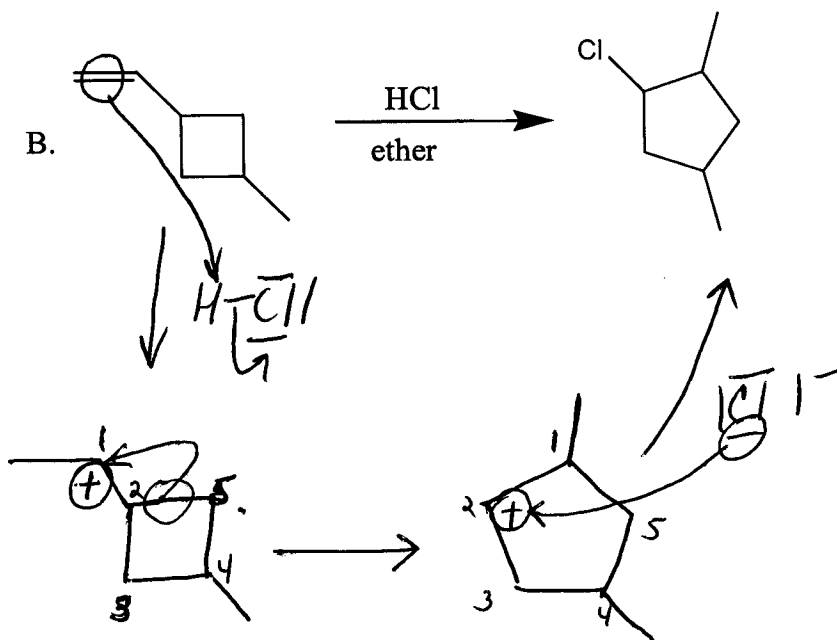
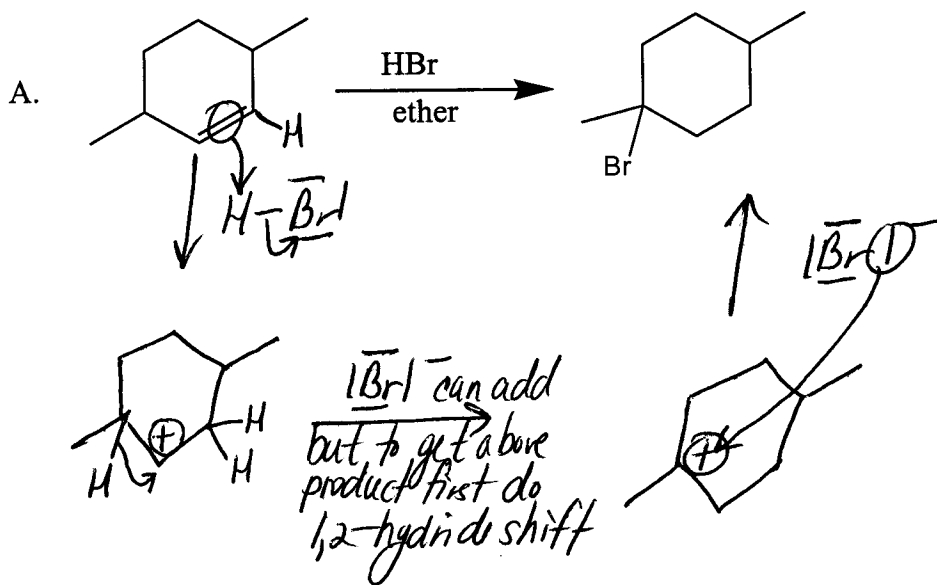


19. Which one (if any) of the compounds in the preceding question are meso? What is the definition of a meso-compound? *Cmpd E is meso. A meso compd has 2 or more chirality centers and is achiral due to the presence of a mirror plane of symmetry.*
(1)

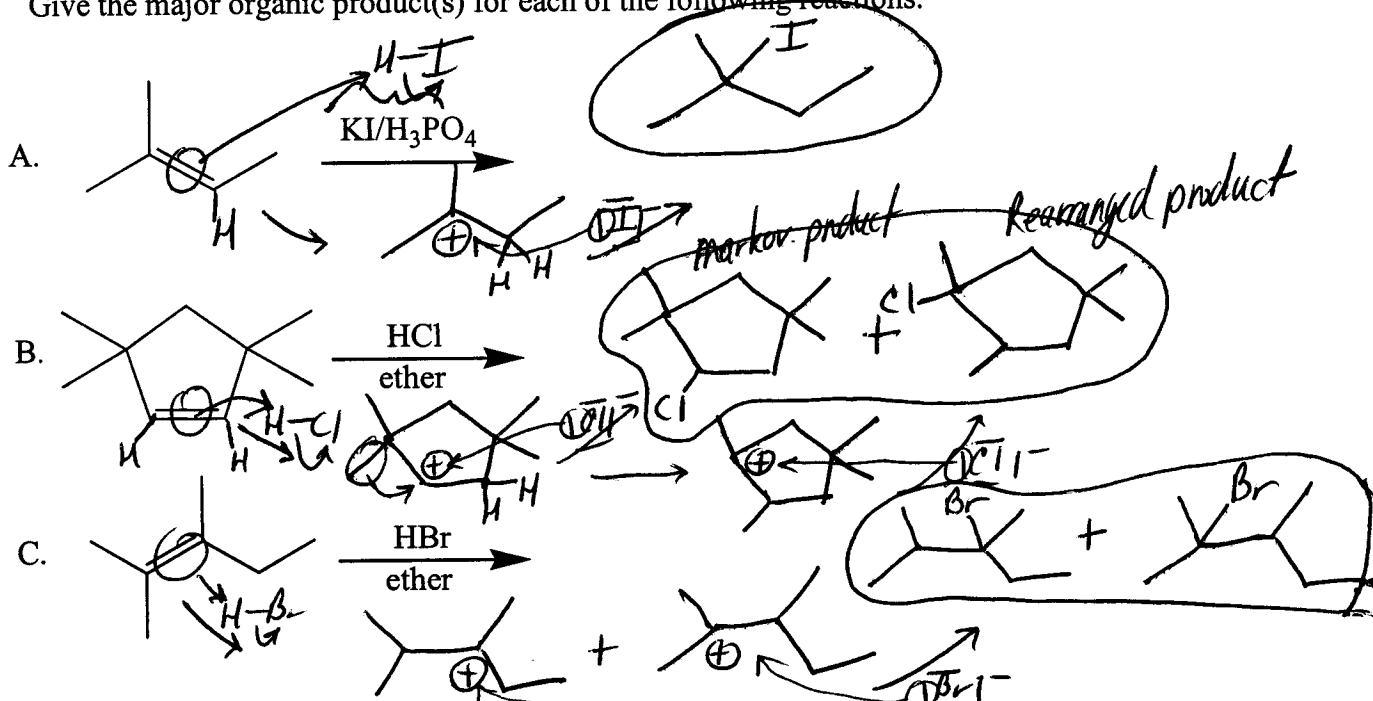
20. Consider the following pairs of compounds. Label what type of isomers (constitutional, diastereomers, enantiomers, or identical) each pair represents.
(5)



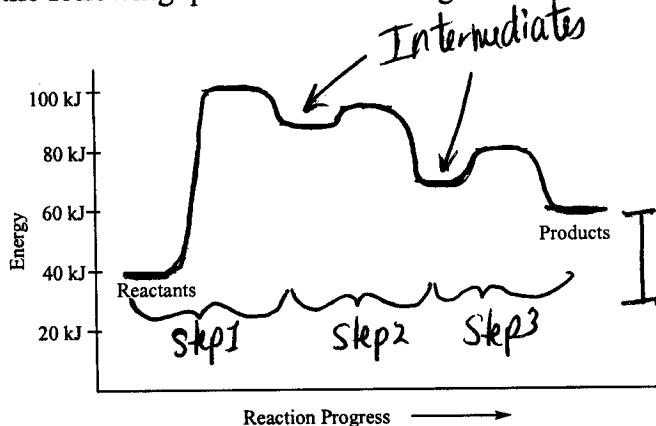
21. Provide detailed step-by-step mechanisms for the following reactions. Your detailed mechanism should include arrows designating movement of electrons and correct charges.
- (10)



22. Give the major organic product(s) for each of the following reactions.
(10)



23. Answer the following questions concerning the reaction energy diagram shown below.
(5)



$$\Delta G = G_{\text{prod}} - G_{\text{react}} = 60 \text{ kJ} - 40 \text{ kJ} = 20 \text{ kJ}$$

- A. How many steps are involved in this reaction? 3
- B. How many intermediates are involved in this reaction? 2
- C. What is the numerical value of ΔG° ? +20 kJ
- D. Is this reaction endergonic or exergonic? endergonic
- E. Which step is the slow step? 1st step (because it has highest activation energy or ΔG^\ddagger)
24. At 298 K, a certain reaction has $K=8.6 \times 10^{-16}$. How far to completion (~100%, hardly at all, ~50%, etc.) does this reaction proceed? At equilibrium, are products or reactants favored?

$K < 10^{-3}$ so rxn proceeds hardly at all to completion.
 $= \frac{[\text{Prod}]}{[\text{React}]}$
Reactants are favored at eq.