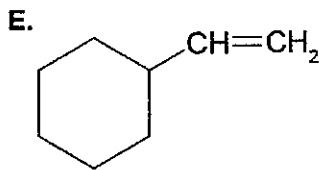
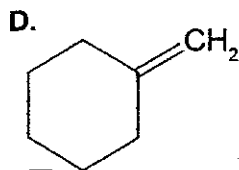
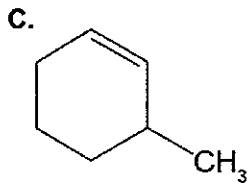
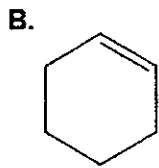
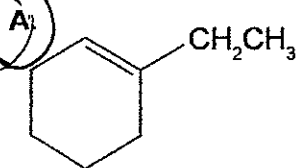


Student: Key1. (5 points) Which of the following alkenes is *most stable*?

A. A

B. B

C. C

D. D

E. E

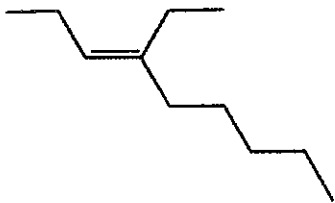
2. (5 points) You want a reaction that will afford the highest yield for the reaction that converts 2-bromopentane to 1-pentene. Which of the following sets of reagents would work the best?

A. $(\text{CH}_3)_3\text{CONa}$ and $(\text{CH}_3)_3\text{COH}$ B. NaOH and water

C. Ammonia and sodium metal

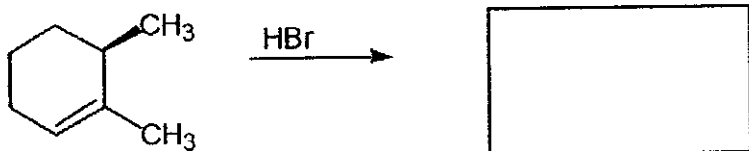
D. Ethanol and $\text{CH}_3\text{CH}_2\text{COH}$ E. Bromine and CCl_4

3. (5 points) Give the IUPAC name for the following compound.



- A. (E)-4-ethyl-3-octene
- B. (Z)-4-ethyl-3-nonene
- C. (E)-3-ethyl-4-nonene
- D. (E)-4-ethyl-3-nonene
- E. (E)-5-ethyl-6-nonene

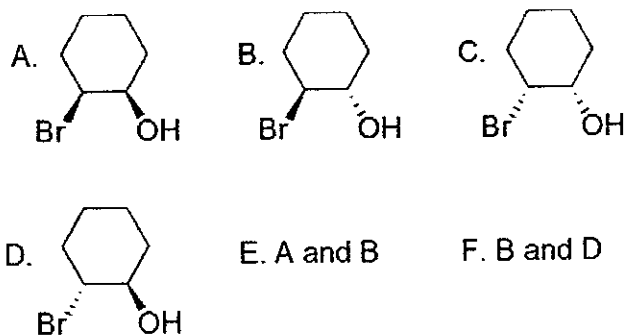
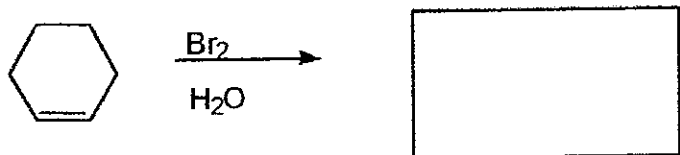
4. (5 points) Predict the product(s).



- A.
- B.
- C.
- D.
- E. A and B
- F. C and D

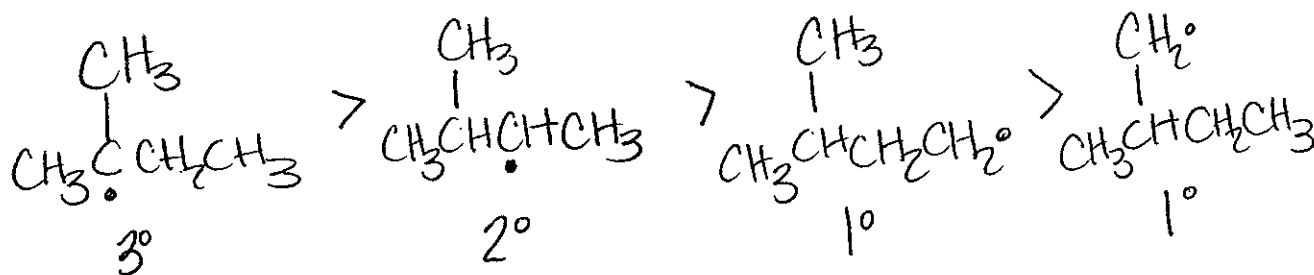
- A. A
- B. B
- C. C
- D. D
- E. E
- F. F

5. (5 points) Predict the product(s).

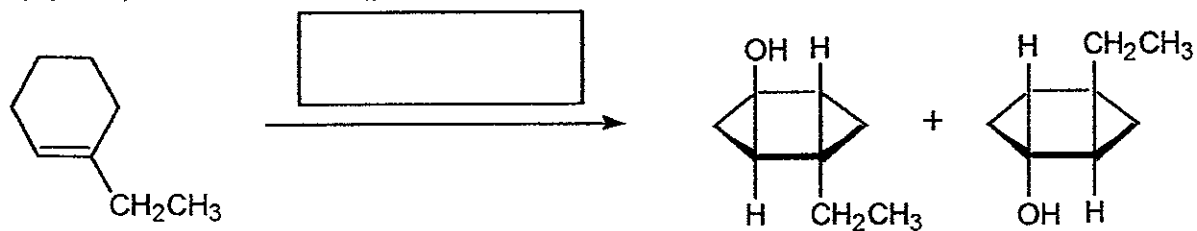


- A. A
- B. B
- C. C
- D. D
- E. E
- F. F

6. (5 points) Question #10.27 from homework: List in order of decreasing stability all of the radicals that can be obtained by abstraction of a hydrogen atom from 2-methylbutane.

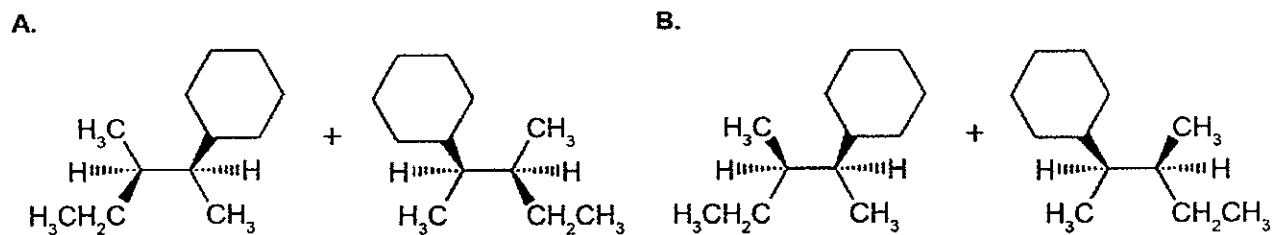
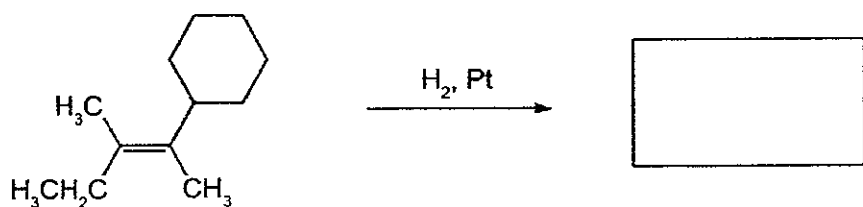


7. (5 points) What is the missing reagent in the reaction below?



- A. Br_2/CCl_4
- B. [1] BH_3 , [2] $\text{H}_2\text{O}_2/\text{OH}^-$
- C. 9-BBN
- D. NBS
- E. [1] Br_2 , [2] H_2O

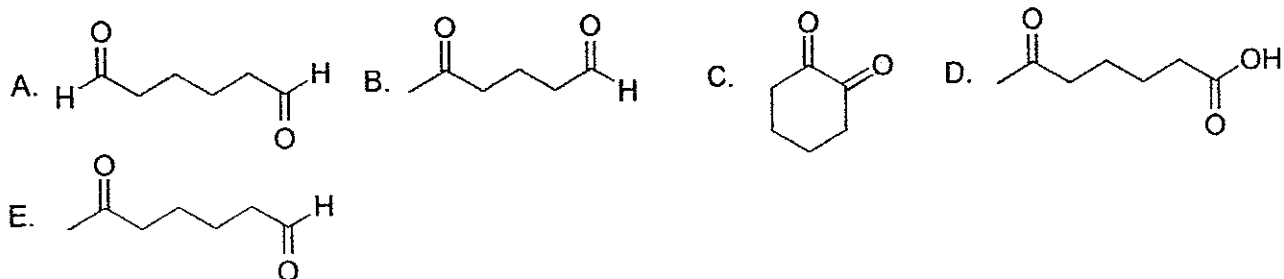
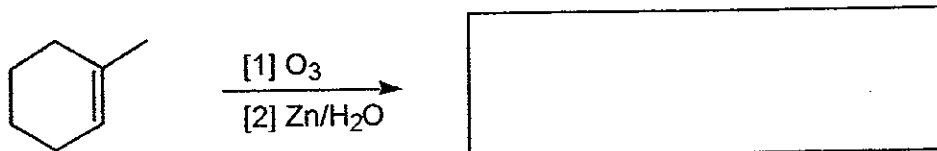
8. (5 points) Determine the products.



C. Both A and B

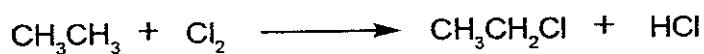
- A. A
- B. B
- C. C

9. (5 points) Determine the product.

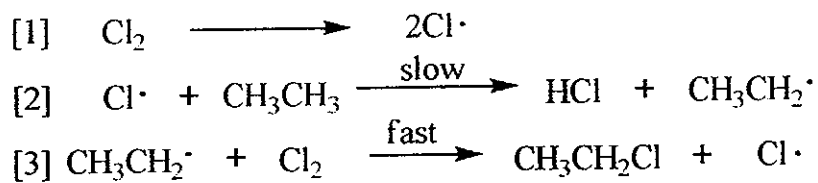


- A. A
 B. B
 C. C
 D. D
 E. E

10. (5 points) A possible reaction of ethane with chlorine:

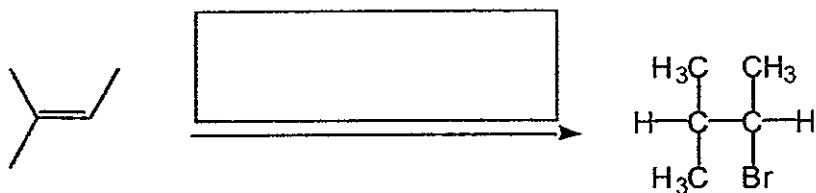


This reaction could conceivably occur by the following chain mechanisms [1], [2], and [3]. The chain propagating step(s) is (are) _____.



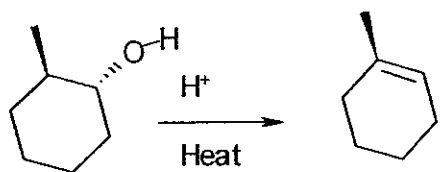
- A. [1]
 B. [2]
 C. [3]
 D. [1] and [2]
 E. [2] and [3]

11. (5 points) What is the missing reagent in the reaction below?

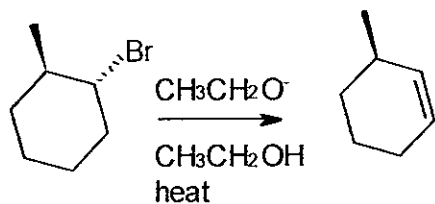


- A. NBS
- B. HBr/ ROOR
- C. HBr/ heat

12. (10 points) Problem 7.26 from homework. Account (provide a detailed explanation) for the different alkene products of these two reactions. When trans-2-methylcyclohexanol (Reaction 1) is subjected to acid-catalyzed dehydration, the major product is 1-methylcyclohexene. However, when trans-1-bromo-2-methylcyclohexane (Reaction 2) is subjected to dehydrohalogenation, the major product is 3-methylcyclohexene.



Reaction 1 proceeds through the formation of a carbocation (E1 rxn) & prefers more stable alkene

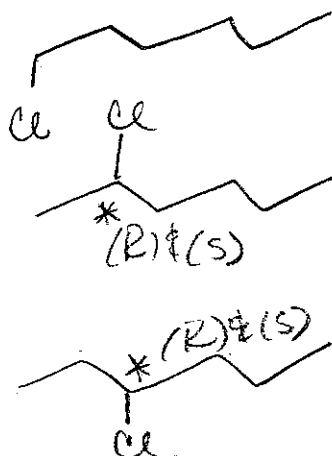


Reaction 2

↳ proceeds through an E₂ mechanism through an anti coplanar transition state. This transition state results in 3-methylcyclohexene only.

13. (5 points) Free radical chlorination of hexane produces this number of monochloro derivatives (including stereoisomers):

- A) 3
 B) 4
 C) 5
 D) 7
 E) 8



14. Matching (16 points)

homolytic cleavage	When a covalent bond is broken to produce two atoms with unpaired electrons (free radicals)
E1	Mechanism of dehydration of secondary and tertiary alcohols
1,2-alkyl shift	A mechanism for the generation of a more stable carbocation from a less stable one
vicinal	A compound bearing identical substituents on adjacent carbons
syn	Addition reaction that takes place on the same side (or face) of the reactant
endergonic	A reaction for which $\Delta G(\text{reaction})$ is positive
elimination	A reaction which produces an alkene and another small molecule, such as HBr
nucleophile	Has electrons to share

You may select from the following terms: syn; nucleophile; elimination; terminal alkyne; endergonic; vicinal; E1; homolytic bond cleavage; SN2; 1,2-alkyl shift; heterolytic bond cleavage; SN1; geminal; hydrogen atom; catalyst; exergonic; anti; E2; addition; electrophile

15. True/False (14 points)

T	Reactivity and selectivity of free radicals are inversely proportional – as one becomes more reactive it is therefore less selective
F	Increasing substitution with alkyl groups (R) decreases alkene stability
T	Radicals are created in the chain-initiation step of the free radical chain reaction
T	The reaction of alkenes in the presence of HBr and peroxides produces an anti-Markovnikov addition product
F	The function of a catalyst in a reaction is to increase the energy barrier and change the product distribution of a reaction
T	A π bond results from the overlap of two adjacent p orbitals containing 1 electron each
F	In an addition reaction of alkenes, such as $C=C + HBr$, the hybridization of the double bond carbons changes from sp^3 to sp^2 hybridized

