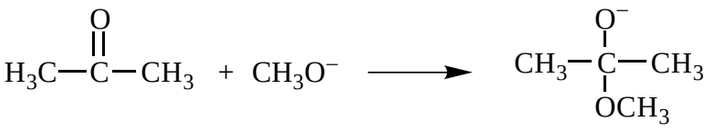
Chemistry 2321

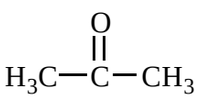
Test No. 2 **Professor M. Pomerantz**

OLD TEST QUESTIONS

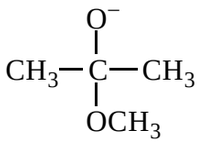
1. In the following reaction the electrophile is:



a) CH_3O^-

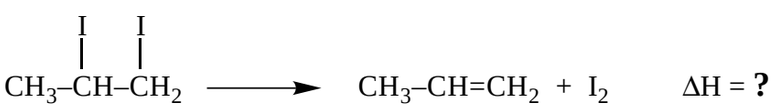
b) 

c) the CH_3 group

d) 

e) none of these

2. Given the reaction shown and the bond dissociation energies in the table, calculate the ΔH for the reaction (in kJ/mol).



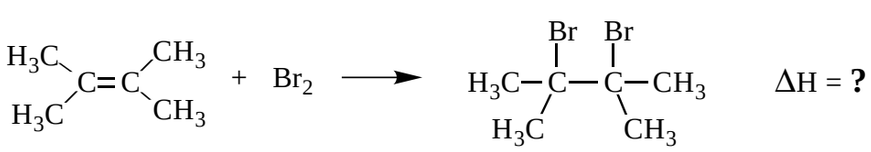
Bond	Bond Dissociation Energy (kJ/mol)
C–H	420
C–C	355
C=C	611
C–I	222
I–I	151

a) +37
b) –37
c) +185
d) –185
e) +188

3. Which of the following is the *strongest* C–C bond?

a) H_3C-CH_3
b) $(CH_3)_2CH-CH_3$
c) $(CH_3)_3C-CH_3$
d) $(CH_3)_3C-CH_2CH_3$
e) All are equal

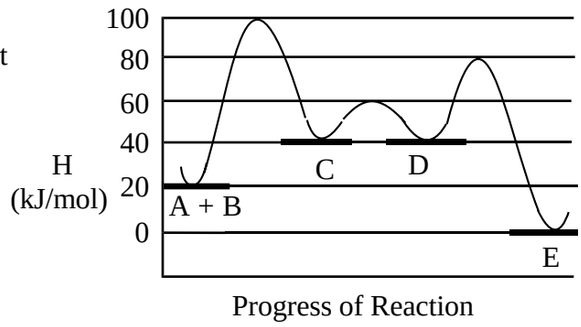
4. Calculate ΔH (in kcal/mol) for the reaction shown below from the given average bond dissociation energies.



Bond	Bond Dissociation Energy (kcal/mol)
C–H	100
C–C	85
C=C	146
C–Br	63
Br–Br	46

a) +66
b) +80
c) –18
d) –19
e) –44

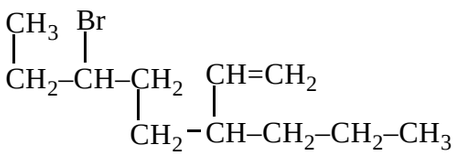
Given the energy profile diagram on the right for the reaction A + B → E.
(For questions 4 and 5)



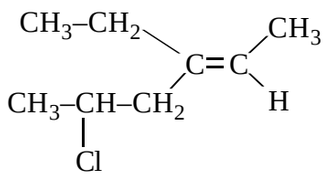
5. ΔH (in kJ/mol) for the reaction is:
   a) +20
   b) +80
   c) –40
   d) –20
   e) +40

6. The activation enthalpy, $\Delta H^{\ddagger}$ (in kJ/mol), for the reaction C → D is:
   a) +20
   b) +80
   c) –40
   d) –20
   e) +40

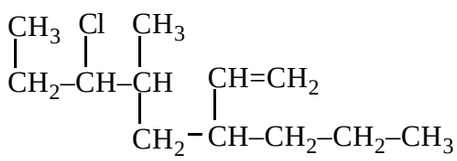
Select the correct IUPAC name for the compounds shown.

7. 

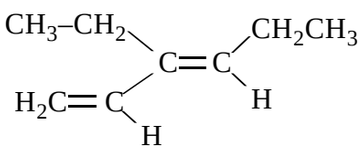
   a) 6-bromo-3-propyl-1-octene
   b) 3-bromo-6-vinylnonane
   c) 3-bromo-6-ethenylnonane
   d) 3-bromo-6-propyl-7-octene
   e) 2-bromo-1-methyl-5-propyl-1-heptene

8. 

   a) (E)-5-chloro-3-ethyl-2-hexene
   b) (Z)-5-chloro-3-ethyl-2-hexene
   c) (E)-2-chloro-4-ethyl-4-hexene
   d) (Z)-2-chloro-4-ethyl-4-hexene
   e) (E)-3-(2-chloropropyl)-2-pentene

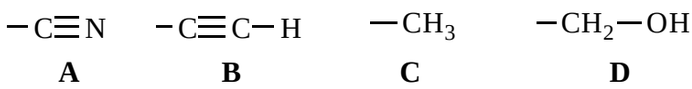
9. 

   a) 6-chloro-5-methyl-3-propyl-1-octene
   b) 3-chloro-4-methyl-6-vinylnonane
   c) 3-chloro-4-methyl-6-ethenylnonane
   d) 3-chloro-4-methyl-6-propyl-7-octene
   e) 2-chloro-1,3-dimethyl-5-propyl-1-heptene

10. 

    a) 3-vinyl-*cis*-3-hexene
    b) 3-vinyl-*trans*-3-hexene
    c) 3-ethyl-*trans*-1,3-hexadiene
    d) (Z)-3-ethyl-1,3-hexadiene
    e) (E)-3-ethyl-1,3-hexadiene

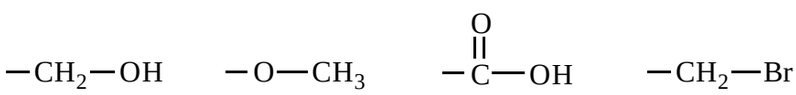
11. List the following in order of E-Z priorities.



A **B** **C** **D**

	Highest Priority						Lowest Priority
a)	D	>	A	>	B	>	C
b)	D	>	B	>	A	>	C
c)	A	>	B	>	C	>	D
d)	A	>	D	>	B	>	C
e)	A	>	B	>	D	>	C

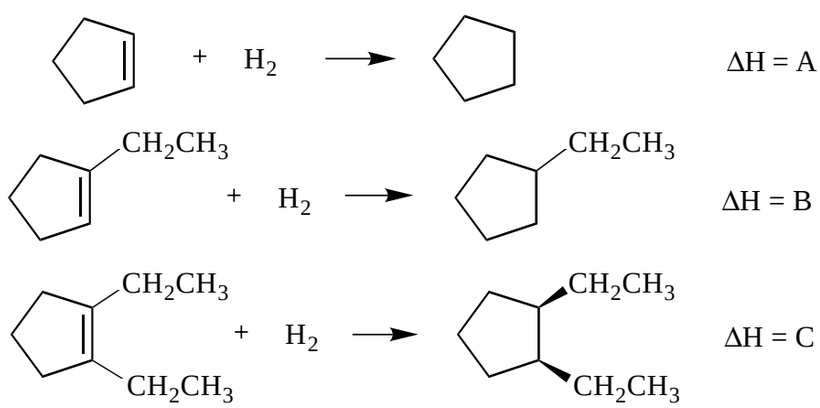
12. List the following in order of E-Z priorities.



A **B** **C** **D**

	Highest Priority						Lowest Priority
a)	D	>	B	>	A	>	C
b)	D	>	B	>	C	>	A
c)	A	>	C	>	D	>	B
d)	B	>	D	>	C	>	A
e)	B	>	C	>	D	>	A

13. List the following in order of decreasing negative enthalpies of hydrogenation.

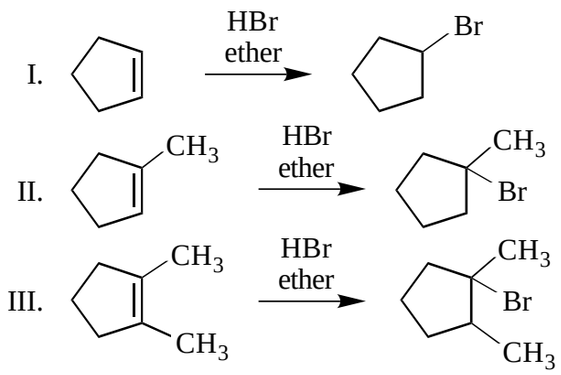


	Most negative ΔH				Least negative ΔH
a)	C	>	B	>	A
b)	C	>	A	>	B
c)	A	>	C	>	B
d)	B	>	C	>	A
e)	A	>	B	>	C

14. How many unsaturations (π-bonds or rings) are there in the compound with the formula $C_7H_{16}ONBr$?

a) 4
b) 3
c) 2
d) 1
e) 0

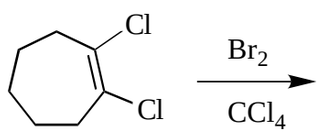
15. List the following in order of decreasing ***rate*** of reaction.



	fastest				slowest
a)	II	>	III	>	I
b)	III	>	I	>	II
c)	I	>	III	>	II
d)	III	>	II	>	I
e)	II	>	I	>	III

What is the <u>major</u> organic product from the following reactions?

16.



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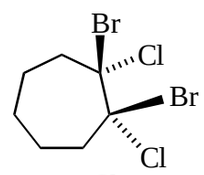

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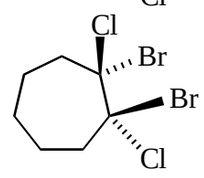

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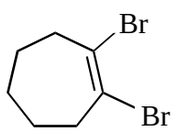

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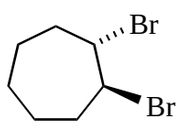

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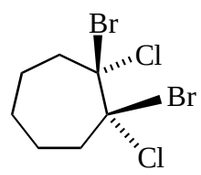

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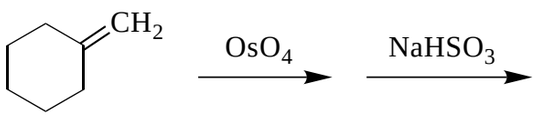
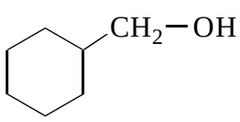


a)



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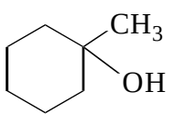

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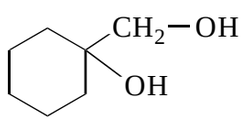

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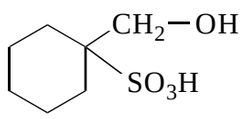

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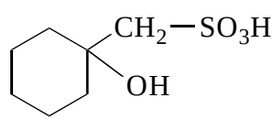

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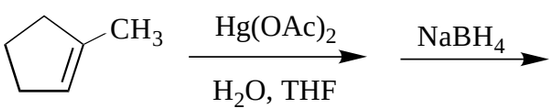

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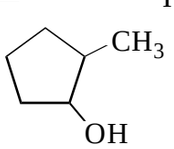

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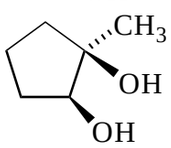

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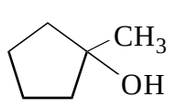

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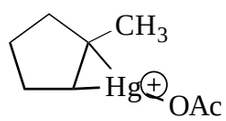

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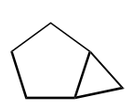
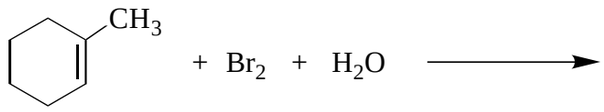
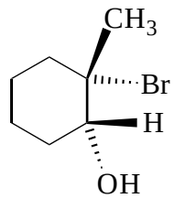
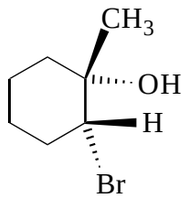
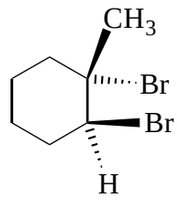
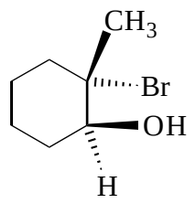


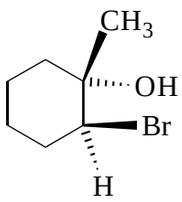
19. 

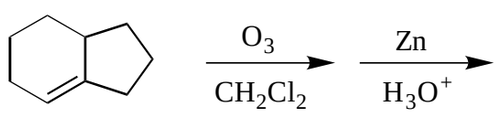
a) 

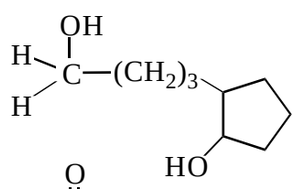
c) 

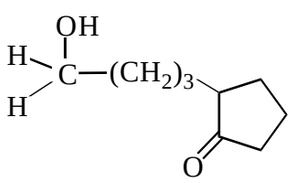
e) 

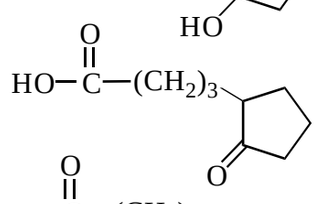
b) 

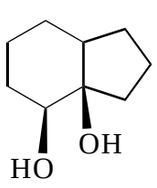
d) 

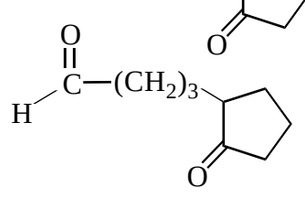
20. 

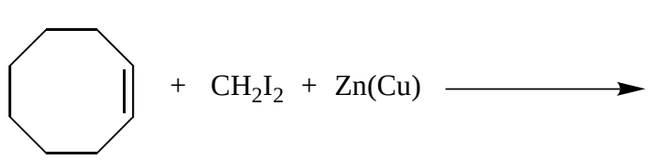
a) 

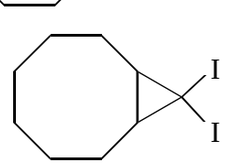
d) 

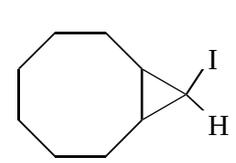
b) 

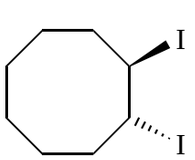
e) 

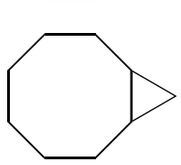
c) 

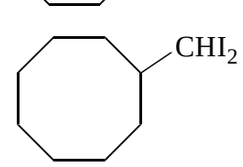
21. 

a) 

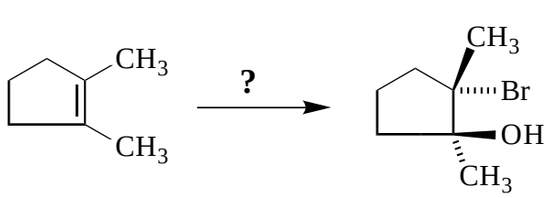
c) 

e) 

b) 

d) 

What reagent(s) can be used to carry out the reactions shown?

22. 

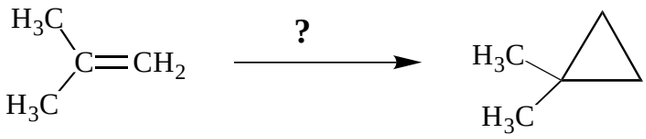
a) Br_2 / CCl_4

b) 1) Br_2; 2) O_3

c) 1) H_2 / Pt; 2) Br_2 / H_2O

d) NBS / DMSO / H_2O

e) both a and d are correct

23. 

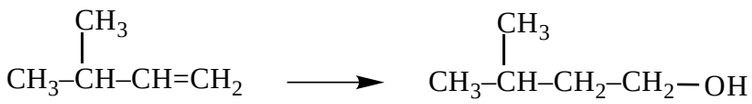
a) 1) BH_3•THF; 2) H_2O_2 / OH^-

b) CH_2I_2 / Zn-Cu

c) HBr / C_6H_5–C(=O)–O–O–C(=O)–C_6H_5

d) NBS / DMSO / H_2O

e) $CHCl_3$ / KOH

24. 

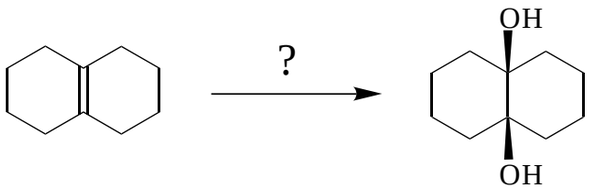
a) H_2O / H_2SO_4

b) 1) O_3; 2) Zn/H^+

c) 1) OsO_4; 2) $NaHSO_3$

d) NBS / DMSO / H_2O

e) 1) BH_3•THF; 2) H_2O_2 / OH^-

25. 

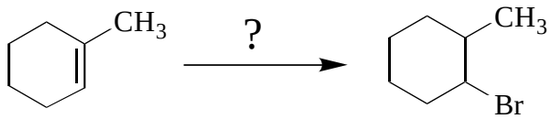
a) 1) O_3 / CH_2Cl_2; 2) Zn / H_3O^+

b) 1) OsO_4 / pyridine; 2) $NaHSO_3$

c) 1) $Hg(OAc)_2$ / H_2O; 2) $NaBH_4$

d) $KMnO_4$ / H_3O^+

e) 1) THF-BH_3; 2) H_2O_2 / OH^-

26. 

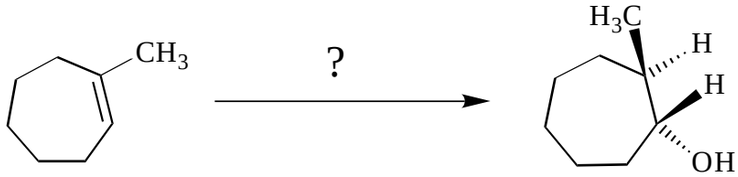
a) Br_2 / H_2O

b) HBr / $(C_2H_5)_2O$

c) HBr / C_6H_5–C(=O)–O–O–C(=O)–C_6H_5

d) Br_2 / CCl_4

e) NBS / DMSO / H_2O

27. 

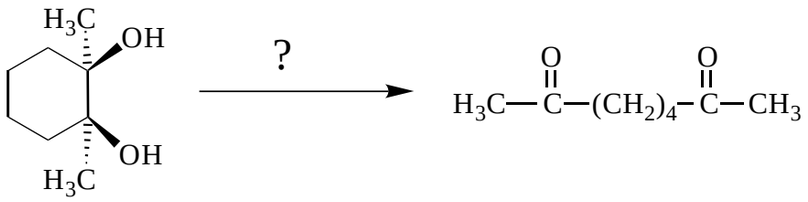
a) H_2O + H_2SO_4

b) 1) $Hg(OAc)_2$ / H_2O / THF; 2) $NaBH_4$

c) 1) BH_3–THF; 2) H_2O_2 / OH^- / H_2O

d) Br_2 + H_2O

e) 1) OsO_4 / pyridine; 2) $NaHSO_3$ / H_2O

28. 

a) 1) THF–BH_3; 2) H_2O_2 / OH^- / H_2O

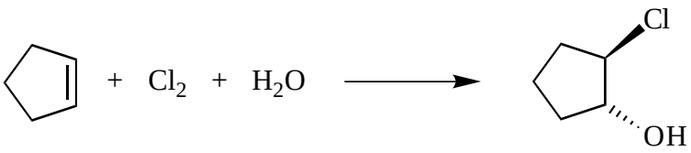
b) 1) $Hg(OAc)_2$ / THF / H_2O; 2) $NaBH_4$

c) H_2 / Pd / C / C_2H_5OH

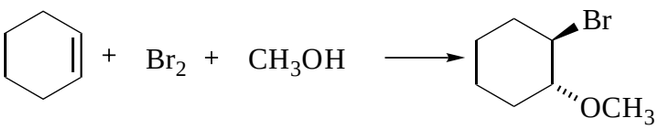
d) 1) OsO_4 / pyridine; 2) $NaHSO_3$ / H_2O

e) HIO_4 / H_2O / THF

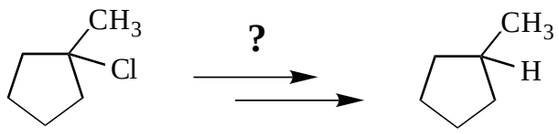
29. Provide a ***step-by-step*** mechanism (***one step at a time***) for the reaction shown. Used curved arrows to show electron flow and remember to pay attention to stereochemistry. BE NEAT! Remember, if I can not read it it will be counted wrong.

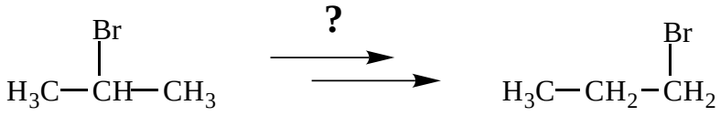


30. Provide a ***step-by-step*** mechanism (***one step at a time***) for the reaction shown.



Show ***step-by-step*** (include reagents and solvents where important) how you would carry out the following conversions. (Note: Do not include any mechanisms!)

31. 

32. 

33.