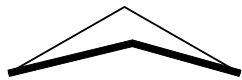


Problem Set 2 Chem 230

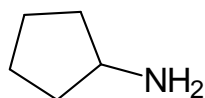
1. The cyclobutane molecule is not planar as might be expected, but bent or “roof-shaped”, as shown below:



Select one of the following explanations:

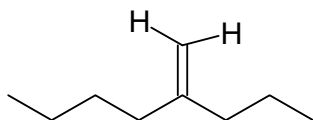
- A. This relieves angle strain, but increases torsional strain.
- B. This increases angle strain, but relieves torsional strain.
- C. This relieves both angle strain and torsional strain.
- D. This shape increases all C-C-C bond angles to more than 90°.
- E. This molecule occurs as two isomers, cis or trans, as a result of its shape

2. What is the degree of unsaturation for the molecule below?



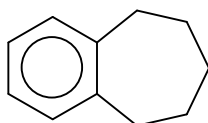
- A. Zero
- B. 1
- C. 1.5
- D. 2
- E. This concept doesn't apply here

3. Consider the molecule below and select the best answer:

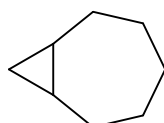


- A. This is a substituted octane
- B. This is 4-octene
- C. This is trans-4-octene
- D. This is 2-propyl-1-hexene
- E. This is a derivative of 1-pentene

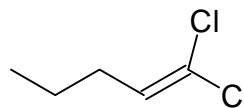
4. Consider the molecules below and select the best answer:



1



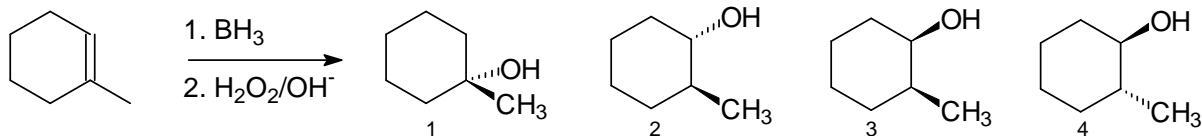
2



3

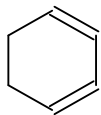
- A. All of them can have cis and trans isomers.
- B. Only 2 can have cis and trans isomers
- C. Both 1 and 2 can have cis and trans isomers
- D. Only 3 can have cis and trans isomers
- E. None of them can have cis and trans isomers

5. Which ones are valid representations of major product(s) for the reaction below?



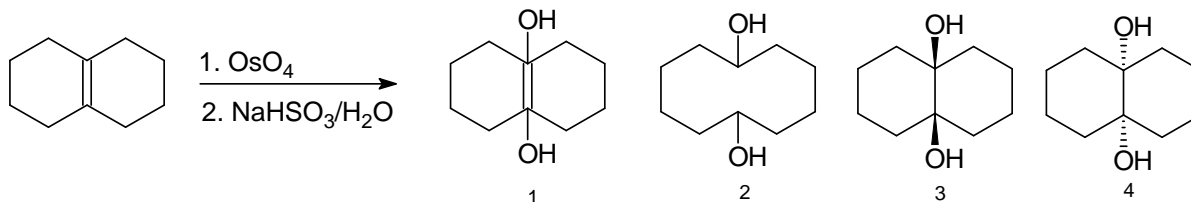
- A. 1
- B. 2
- C. 3
- D. 4
- E. 2 and 4

6. What is the best name for the molecule below?



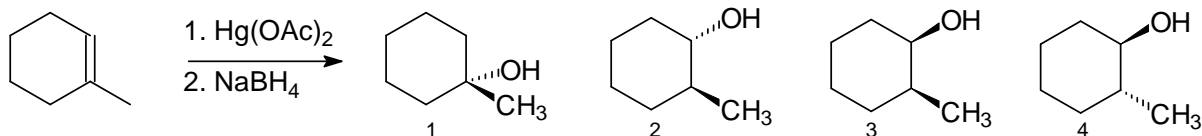
- A. cyclohexadiene B. cis, cis-1,3-cyclohexadiene C. 1,3-cyclohexadiene
 D. cyclohexa-1,5-diene E. benzene

7. Which ones are valid representations of major product(s) for the reaction below?



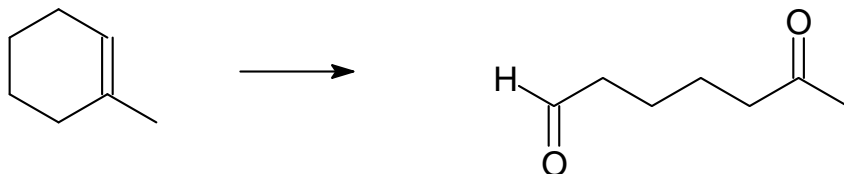
- A. 1 B. 2 C. 3 D. 4 E. Both 3 and 4

8. Which ones are valid representations of major product(s) for the reaction below?



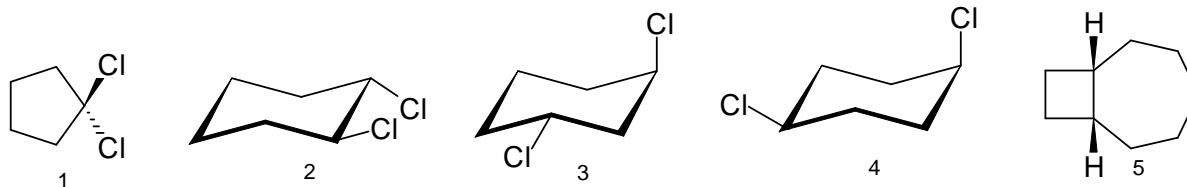
- A. 1 B. 2 C. 3 D. 4 E. 1 and 2

9. Which reaction sequence(s) could achieve the following transformation?



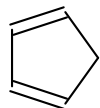
- A. Hydroboration
 B. Treatment with ozone, followed by reductive workup with zinc
 C. Treatment with osmium tetroxide, followed by reductive workup
 D. Treatment with hot aqueous permanganate solution
 E. Two of the previous choices A-D

10. Which compounds below are cis isomers?



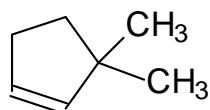
- A. 1, 4, and 5 B. 2, 3 and 5 C. 4 and 5 D. 1, 2 and 3 E. 3 and 4

11. Select the best name for the molecule below:



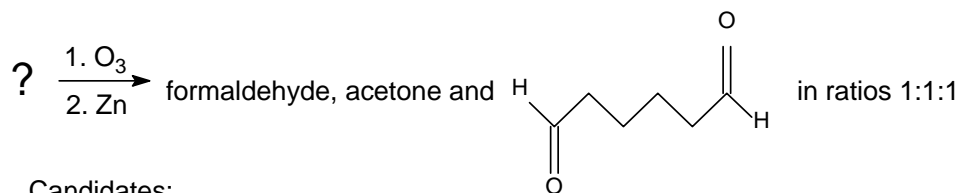
- A. cyclopenta-1,3-diene B. 1,2-cyclopentadiene C. *cis, cis*-1,3-cyclopentadiene
 D. cyclopentadiene E. 1,3-dicyclopentene

12. Select the best name for the molecule below:

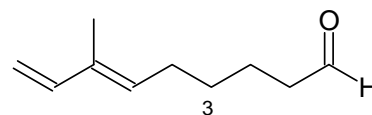
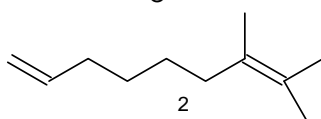
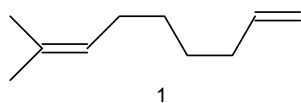


- A. 2,2-dimethylcyclopentene B. 1,1-dimethyl-2-cyclopentene C. *cis*-1,1-dimethyl-2-pentene
 D. 3,3-dimethylcyclopentene E. 3,3-dimethylcyclopent-1-ene

13. Three structures were proposed for an unknown compound. Subsequently, an ozonization was carried out to determine which one is correct. Select the best answer:

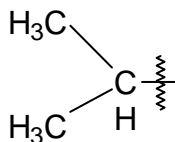
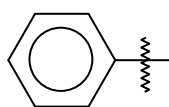


Candidates:



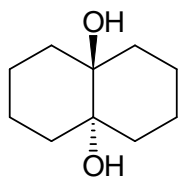
- A. Structure 1 is correct B. Structure 2 is correct C. I can't be 1, but could be 2 or 3
 D. I can't be 2, but could be 1 or 3 E. We still don't know, could be any of them

14. Which groups are shown below?



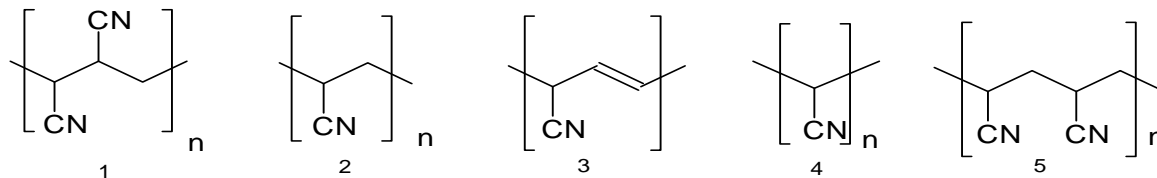
- A. benzyl, allyl and *tert*-propyl
 B. phenyl, vinyl and isopropyl
 C. benzyl, ethynyl and neopropyl
 D. cyclohexyl, vinyl and *i*-propyl
 E. phenyl, ethanyl and 2-propyl

15. The periodic acid cleavage of the diol below was attempted. Select the best answer:



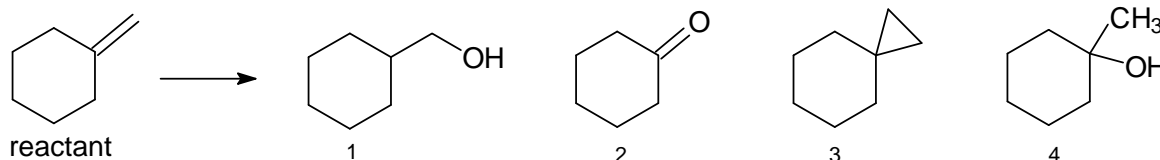
- A. This reaction should work just fine and generate a di-ketone
- B. This won't work because the compound is not a 1,2-diol
- C. This won't work because no cyclic periodate intermediate can form
- D. This won't work because tertiary alcohols don't react in this fashion
- E. This reaction should work just fine and generate two moles of a ketone

16. What is the repeat unit of the polymer that forms when acrylonitrile (see book!) is polymerized?



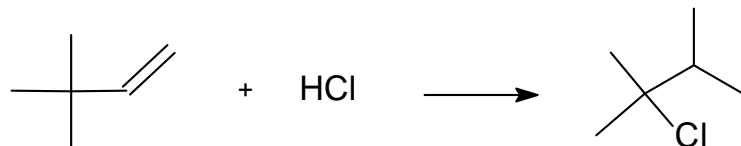
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

17. Products 1-4 are needed. Can this be done, starting with the same reactant?



- A. 1 by oxymercuration, 2 by ozonization, 3 by hydrogenation, 4 by acid catalyzed hydration
- B. 1 by hydroboration, 2 by permanganate oxidation, 3 by Simmons-Smith, 4 by oxymercuration
- C. 1 by acid catalyzed hydration, 3 by treatment with chloroform and a base, 4 by acid catalyzed hydration (2 cannot be made easily from this reactant)
- D. 1 by periodate oxidation, 2 by permanganate oxidation, 3 by Simmons-Smith, 4 by oxymercuration
- E. Two of the previous choices A-D are valid

18. Select the most appropriate statement about the following reaction:



- A. A hydride shift occurred
- B. An alkyl shift occurred
- C. This reaction is not possible
- D. This is a nucleophilic addition
- E. This is a halohydrin reaction

Key:

1 B

2 B

3 D

4 B

5 E

6 C

7 E

8 A

9 B

10 C

11 D

12 D

13 A

14 B

15 C

16 B

17 B

18 B