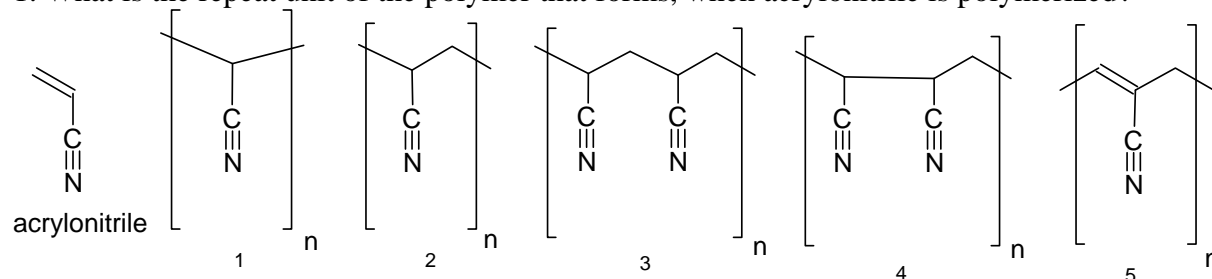


A

Student ID _____

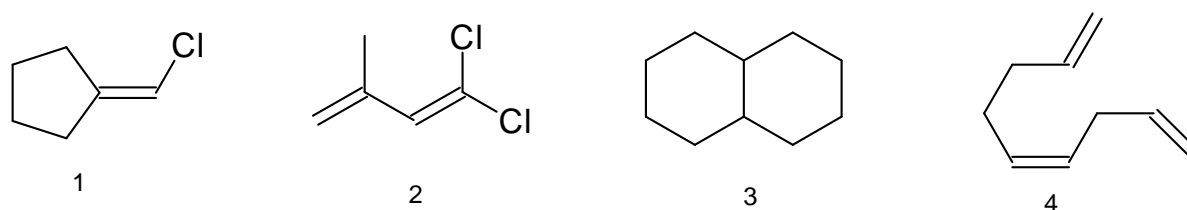
MARK ONE ANSWER FOR EACH QUESTION ON BOTH THE EXAM AND YOUR SCANTRON!

1. What is the repeat unit of the polymer that forms, when acrylonitrile is polymerized?



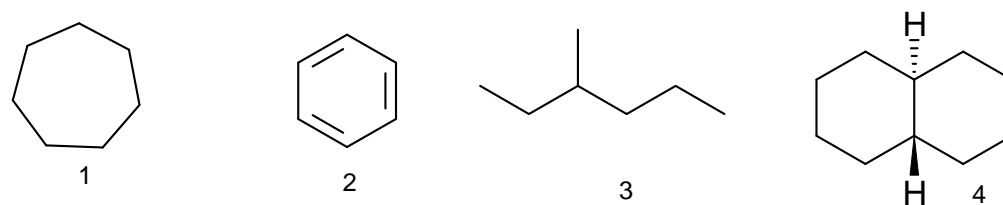
A. 1 B. 2 C. 3 D. 4 E. 5

2. Which of the compounds below can have both a *cis* and a *trans* isomer?



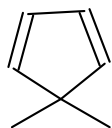
A. One of them B. Two of them C. Three of them D. None of them
 E. All of them

3. Which of the following molecules would you expect to have angle strain?



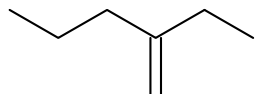
A. only 1 B. 1 and 2 C. 1, 2 and 3 D. None of them E. All of them

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



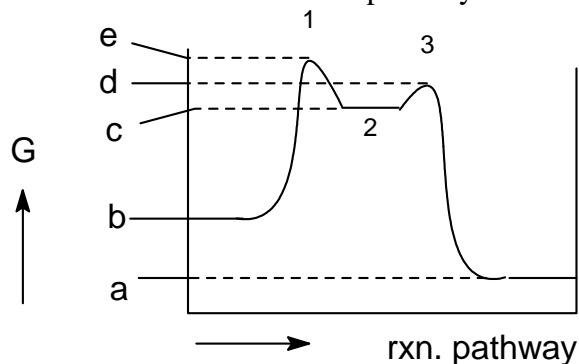
A. 3,3-dimethylcyclopentadiene B. 5,5-dimethylcyclopentadiene
 C. 3,3-dimethylcyclopenta-1,4-diene D. 1,1-dimethylcyclopenta-3,5-diene
 E. 3-methyl-1,4-cyclopentadiene

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



- A. 3-methylenehexene B. 2-ethyl-2-pentene C. (E)-2-ethylpentene
 D. cis-3-methylhexene E. 2-ethyl-1-pentene

6. What statement best matches the reaction pathway vs. energy diagram below?



- A. The difference between positions *a* and *b* on the energy axis is called “activation energy”
 B. The difference between positions *b* and *c* on the energy axis is called “activation energy”
 C. This reaction violates Hammond’s postulate
 D. This reaction is in agreement Hammond’s postulate
 E. The difference between positions *b* and *e* on the energy axis is called “activation energy”

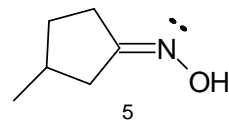
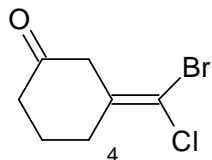
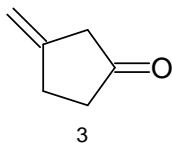
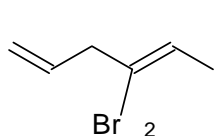
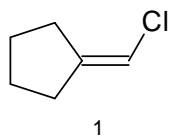
7. What statement can you make about carbenes?

- A. They violate the octet rule
 B. They are radicals
 C. They are electron-rich
 D. They are positively charged
 E. They react with alkenes to generate *anti* addition products

8. Only one of the following statements about bromonium ions is **incorrect**. Which one?

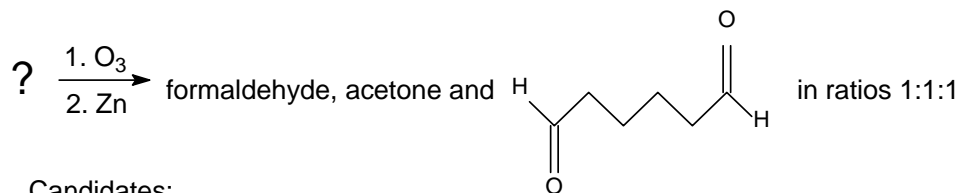
- A. They are cations B. They have angle strain C. They are highly reactive
 D They attract nucleophiles E. They have torsional strain

9. How many of the compounds below are Z isomers?

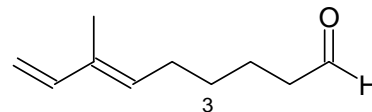
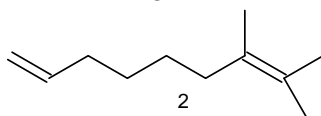
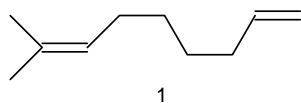


- A. one B. two C. three D. four E. all of them

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

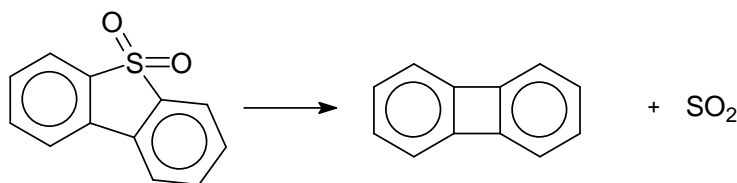


Candidates:



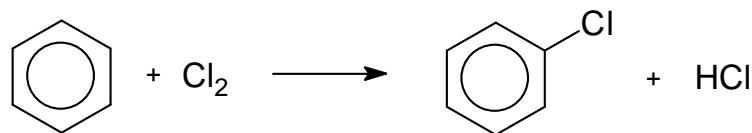
- A. Structure 1 is correct B. Structure 2 is correct C. I can't be 1, but could be 2 or 3
 D. I can't be 2, but could be 1 or 3 E. We still don't know, could be any of them

11. What is the reaction below?



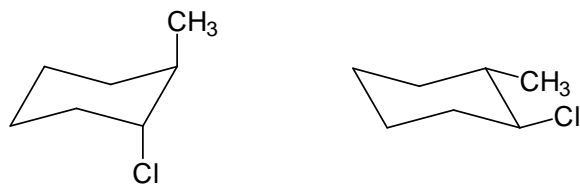
- A. an addition B. an elimination C. a substitution D. a rearrangement
 E. none of the previous

12. What is the reaction below?



- A. an addition B. an elimination C. a substitution D. a rearrangement
 E. a conformational change

13. What best describes the relationship between the two structures below?



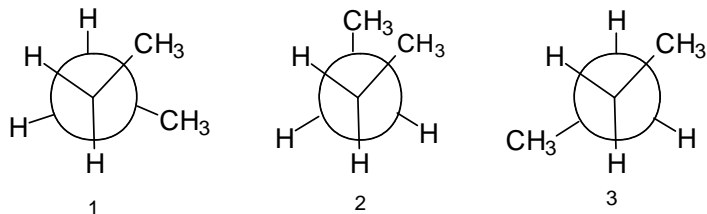
- A. resonance forms B. stereoisomers C. they are identical D. conformers
 E. constitutional isomers

14. What best describes the relationship between the two structures below?



- A. resonance forms B. stereoisomers C. they are identical D. conformers
 E. constitutional isomers

15. Consider the Newman projections below. They represent different conformations for butane. Select the proper assignments:



- A. Conformations 1 and 2 are called *gauche*, 3 is called *anti*
 B. Conformation 1 is called *gauche*, 3 is called *anti*, 2 doesn't have a name
 C. Conformation 1 is called *gauche*, 2 is called *syn*, 3 is called *anti*
 D. Conformation 1 is called *cis*, 2 is called *gauche*, 3 is called *anti*
 E. Conformations 1 and 2 are called *gauche*, 3 is called *trans*

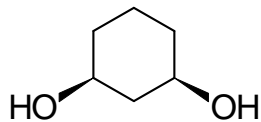
16. What can we state about the reaction of osmium tetroxide with alkenes?

- A. It violates Markovnikov's rule
 B. It follows Markovnikov's rule
 C. It converts alkenes to halohydrins
 D. It converts alkenes to ketones
 E. This is a *syn* addition

17. How many isomeric cyclopentadienes exist?

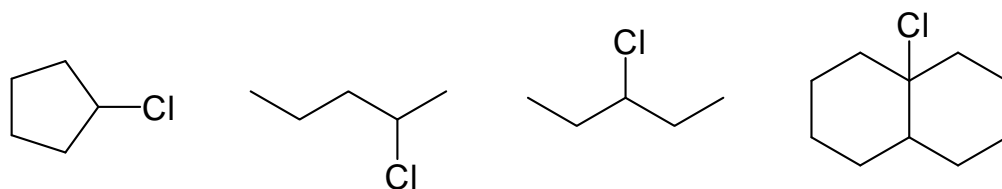
- A. Five: 1,2-cyclopentadiene, (E, E)-1,3-cyclopentadiene, (E, Z)-1,3-cyclopentadiene, (E, E)-1,4-cyclopentadiene, and (E, Z)-1,4-cyclopentadiene
 B. Four: (E, E)-1,3-cyclopentadiene, (E, Z)-1,3-cyclopentadiene, (E, E)-1,4-cyclopentadiene, and (E, Z)-1,4-cyclopentadiene
 C. Three: 1,2-cyclopentadiene, (E, E)-1,3-cyclopentadiene, and (E, Z)-1,3-cyclopentadiene
 D. Two: (E, E)-1,3-cyclopentadiene and (E, Z)-1,3-cyclopentadiene
 E. There is only one cyclopentadiene

18. Periodate oxidation **fails** for the diol below. What is the most plausible explanation for this?



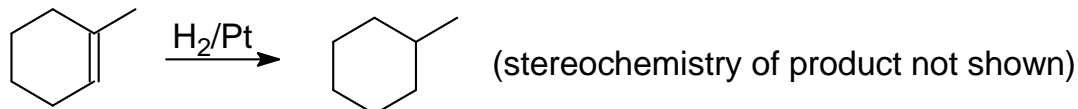
- A. Only non-cyclic diols can be oxidized with periodate
 B. Only geminal diols can be oxidized with periodate
 C. Only vicinal diols can be oxidized with periodate
 D. Only trans diols can be oxidized with periodate
 E. Only diols with -OH groups in primary positions can be oxidized with periodate

19. How many of the alkyl halides below are tertiary alkyl halides?



- A. none B. one of them C. two of them D. three of them E. all of them

20. What can you say about the reaction below?

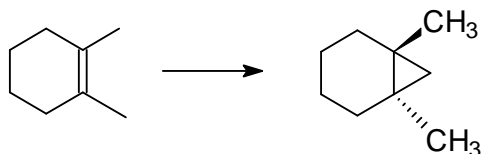


- A. This is an example of a hydration reaction
 B. This experiment will generate *trans*-methylcyclohexane
 C. This reaction follows Markovnikov's rule
 D. This experiment will generate *cis*-methylcyclohexane
 E. This reaction follows a *syn* mechanism

21. Complete the following sentence: During the conversion of alkenes to chlorohydrins using chlorine in water, the water..."

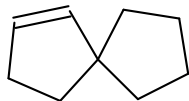
- A. is a nucleophile
 B. is an electrophile
 C. is a catalyst
 D. forms cyclic intermediate
 E. accepts an electron pair

22. What can you state about the transformation below?



- A. It could be accomplished with chloroform and potassium hydroxide
 B. It could be accomplished with diiodomethane and Zn(Cu) alloy
 C. It could be accomplished with osmium tetroxide
 D. It could be accomplished with N-bromosuccinimide (NBS)
 E. It **cannot** be accomplished by any of the conditions described in A-D.

23. What is the degree of unsaturation of the compound below?

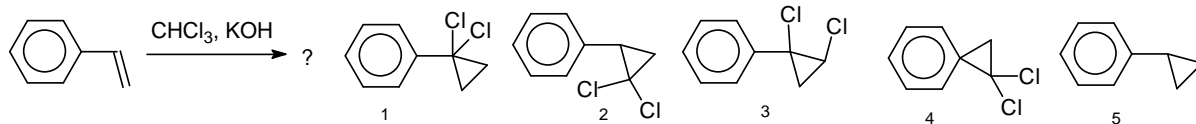


- A. 1 B. 2 C. 3 D. 4 E. 5

24. What is the correct molecular formula for N-bromosuccinimide (NBS)?

A. $C_4H_4BrNO_2$ B. C_4H_2BrNO C. $C_4H_2BrNO_2$ D. $C_4H_4BrNO_3$ E. none of the previous

25. What is the most plausible product for the reaction below?



A. compound 1

B. compound 2

C. compound 3

D. compound 4

E. compound 5

26. This is version A. Please mark A on your scantron!

Key chem230-01_2_101a:

1. B
2. B
3. A
4. B
5. E
6. E
7. A
8. D
9. C (2, 4 and 5)
10. A
11. B
12. C
13. D
14. C
15. A
16. E
17. E
18. C
19. B
20. E
21. B
22. E
23. C
24. A
25. B