CHM 1321 **First Midterm** **Feb 14 – 2008**

Your Name: _____ **Student #: _____**

Your course TA (Steve, Jenn-C, Jenn-P): _____

Exercise	key
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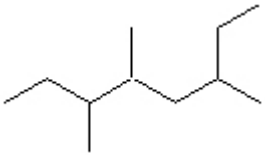
1. Deliver only the solution key in the above table. You can keep the text. The solution key will be posted today on the web.

2. You must respond to all exercises. Blank pages are at the end.

1. The IUPAC name for  is:

A. 6-Ethyl-3,4-dimethylheptane

B. 2-Ethyl-4,5-dimethylheptane

C. 3,4,6-Trimethyloctane

D. 3,5,6-Trimethyloctane

E. 2-(1-Methylpropyl)-4-methylhexane

2. Which of the following pairs of compounds represent pairs of constitutional isomers?

A. 2-Methylbutane and pentane

B. 2-Chlorohexane and 3-chlorohexane

C. sec-Butyl bromide and tert-butyl bromide

D. Propyl chloride and isopropyl chloride

E. All of the above

3. Select the systematic name for

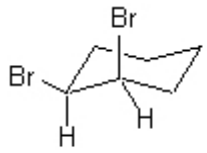
A. cis-1,3-Dichlorocyclopentane

B. trans-1,4-Dichlorocyclopentane

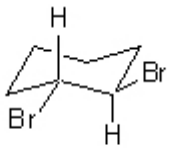
C. cis-1,2-Dichlorocyclopentane

D. trans-1,3-Dichlorocyclopentane

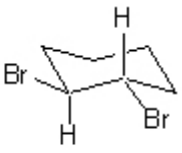
E. 1,1-Dichlorocyclopentane



I



II



III

Reference: Ref 4-2

4. trans-1,2-Dibromocyclohexane is represented by structure(s):

A. I

B. II

C. III

D. II and III

E. I and II

5. The preferred conformation of cis-3-tert-butyl-1-methylcyclohexane is the one in which:

A. the tert-butyl group is axial and the methyl group is equatorial.

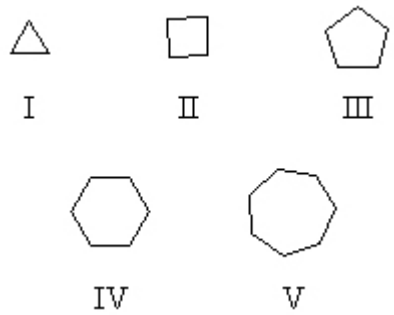
B. the methyl group is axial and the tert-butyl group is equatorial.

C. both groups are axial.

D. both groups are equatorial.

E. the molecule exists in a boat conformation.

6. Which cycloalkane has the largest heat of combustion per CH_2 group?



A. I

B. II

C. III

D. IV

E. V

7. The reaction of the Na salt of 3-methyl-1-pentyne with 1-bromo-3-methylbutane produces which of these?

A. 3,8-dimethyl-4-nonyne

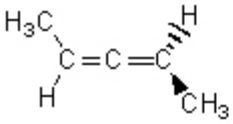
B. 2,7-dimethyl-4-nonyne

C. 3,8-dimethyl-5-nonyne

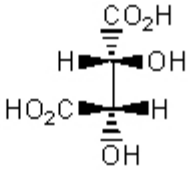
D. 3,7-dimethyl-4-nonyne

E. 3,7-dimethyl-5-nonyne

8. Which of the following molecules is achiral?



I



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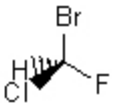
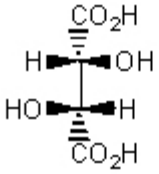
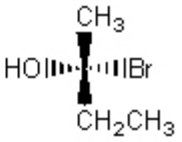


III



IV



V

A. I

B. II

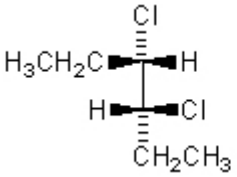
C. III

D. IV

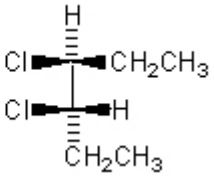
E. V

9. The

The molecules shown are:



and



are

A. enantiomers.

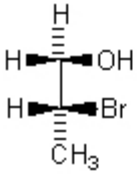
B. diastereomers.

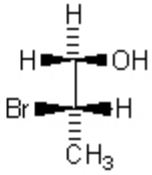
C. constitutional isomers.

D. two conformations of the same molecule.

E. not isomeric.

10. The molecules shown are:





A. constitutional isomers.

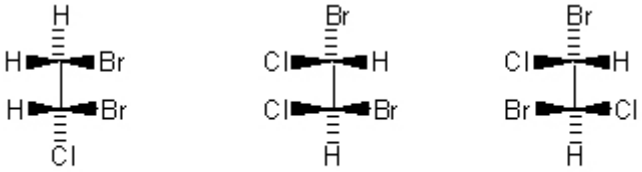
B. enantiomers.

C. diastereomers.

D. identical.

E. None of these

11. Which molecule is achiral?



A. I

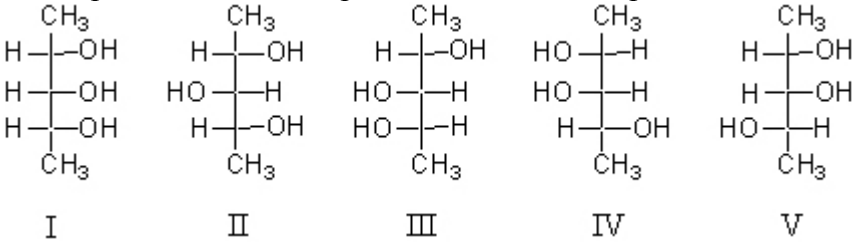
B. II

C. III

D. More than one of the above

E. None of the above

12. Which pair of structures represents the same compound?



A. I and II

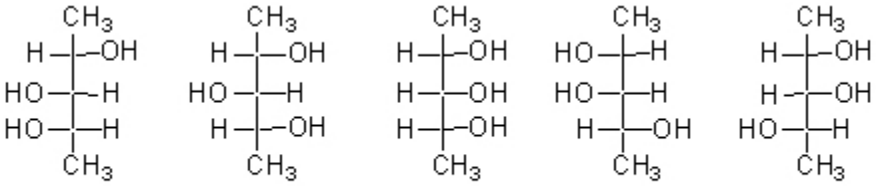
B. II and III

C. III and IV

D. III and V

E. IV and V

13. Which structure(s) represent(s) diastereomer(s) of I?



I II III IV V

A. II

B. II and III

C. II and IV

D. III and V

E. IV and V

14. (2R,4S) –2,4–Dichloropentane and (2S,4R)-2,4-dichloropentane are:

A. enantiomers

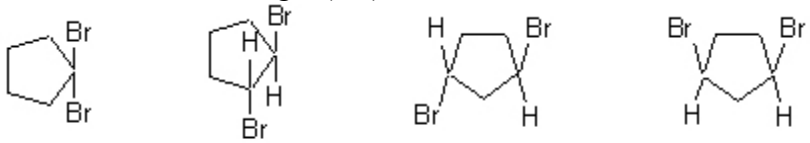
B. diastereomers

C. identical

D. conformational isomers

E. constitutional isomers

15. Which of the following is(are) *meso*?



I II III IV

A. I

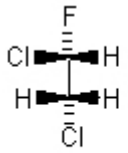
B. II

C. III

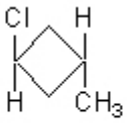
D. IV

E. Two of the above

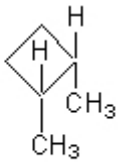
16. Which molecule has a plane of symmetry?



I



II



III

A. I

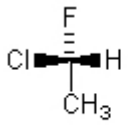
B. II

C. III

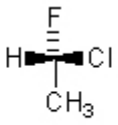
D. More than one of these

E. None of these

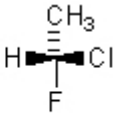
17. Which structure represents (S)-1-chloro-1-fluoroethane?



I



II



III

A. I

B. II

C. III

D. More than one of the above

E. None of the above

18. The free radical chlorination of pentane produces this number of monochloro compounds, including stereoisomers.

A. 2

B. 3

C. 4

D. 5

E. 6

19. Free radical chlorination will produce but one monochloro derivative in the case of:

A. Propane.

B. Butane.

C. Isobutane.

D. Isopentane.

E. Neopentane.

20. What is the total number of trichloropropanes which can be produced by free radical chlorination of propane? Include all stereoisomers.

A. 4

B. 5

C. 6

D. 7

E. 8

21. In the presence of light at 25°C, isobutane (1 mol) and bromine (1 mol) yield which monobromo product(s)?

A. 2-Methyl-1-bromopropane (almost exclusively)

B. 2-Methyl-2-bromopropane (almost exclusively)

C. A mixture of 50% (A) and 50% (B)

D. A mixture of 90% (A) and 10% (B)

E. Butyl bromide

22. For which of the following reactions would the transition state most resemble the products? The following bond dissociation energies may be useful.

$(CH_3)_2CH–H$	$CH_3CH_2CH_2–H$	H–F
(413 kJ mol^{-1})	(423 kJ mol^{-1})	(570 kJ mol^{-1})

H–Cl	H–Br
(432 kJ mol^{-1})	(366 kJ mol^{-1})

A. $CH_3CH_2CH_3 + F\cdot \longrightarrow CH_3\dot{C}HCH_3 + HF$

B. $CH_3CH_2CH_3 + F\cdot \rightarrow CH_3CH_2CH_2\cdot + HF$

C. $CH_3CH_2CH_3 + Cl\cdot \longrightarrow CH_3\dot{C}HCH_3 + HCl$

D. $CH_3CH_2CH_3 + Cl\cdot \rightarrow CH_3CH_2CH_2\cdot + HCl$

E. $CH_3CH_2CH_3 + Br\cdot \rightarrow CH_3CH_2CH_2\cdot + HBr$

23. Hydrogen atom abstraction from which position would yield the most stable free radical intermediate during the reaction of bromine with 2,2,3-trimethylpentane?

A. C1

B. C2

C. C3

D. C4

E. C5

Answer Key

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