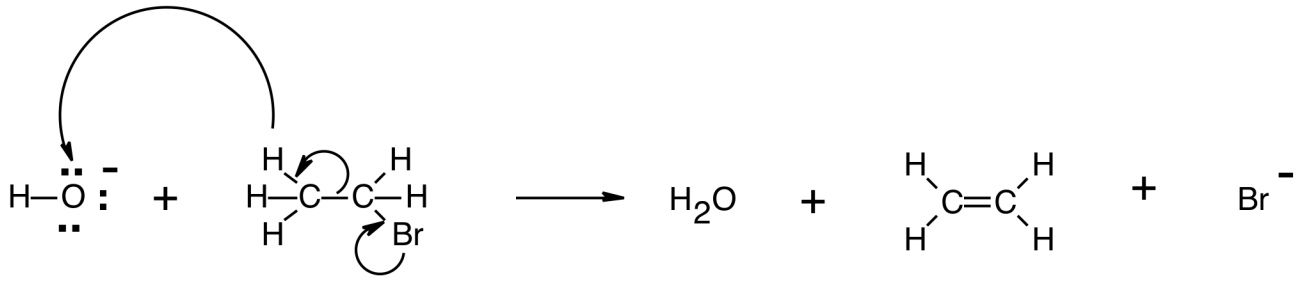
"Grade or Education" = 1

CHEM 2261/01
Summer 08
Exam 1
Chapters 1-3

1. What is WRONG with the curved-arrow mechanism shown below?



__ A. The curved arrows connect the wrong atoms; an arrow should connect the O atom in hydroxide with the Br atom in bromoethane, for example.

__ B. This mechanism should involve two steps and only one step is shown.

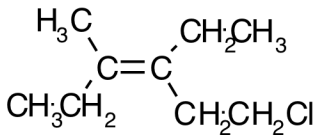
__ C. All of the arrows are drawn backwards (the points and tails are reversed).

__ D. The mechanism should only involve two curved arrows instead of the three which are drawn.

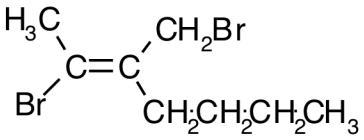
__ E. This mechanism shows the wrong reaction products; only ethanol can be produced from this reaction.

Rationale:
Chapter 3 Problem 42

2. Look at the four numbered structures below and pick the choice which designates one of these structures with its CORRECT E or Z configuration.



1



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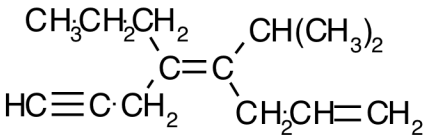
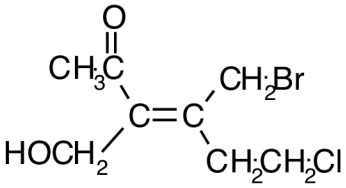


2



4

__ A. Structure 2 has the Z configuration.

__ B. Structure 4 has the E configuration.

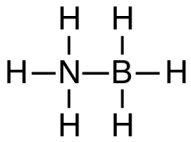
__ C. Structure 3 has the E configuration.

__ D. None of the choices gives the correct configuration for the corresponding numbered structure.

__ E. Structure 1 has the E configuration.

Rationale:
Chapter 3 Problem 48

3. Give each atom in the structure below its appropriate formal charge. Choose the CORRECT statement from the multiple choices.



__ A. The formal charge on B is -1.

__ B. The formal charge on N is -1.

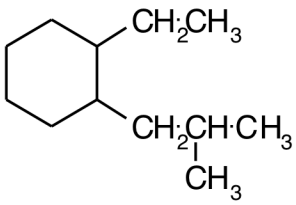
__ C. The formal charge on B is 0.

__ D. The formal charge on B is +1.

__ E. The formal charge on N is 0.

Rationale:
Chapter 1 Problem 13d

4. How many primary, secondary, and tertiary carbons does the following compound have?



__ A. This compound has 2 primary carbons, 7 secondary carbons, and 3 tertiary carbons.

__ B. This compound has 9 primary carbons, 12 secondary carbons, and 3 tertiary carbons.

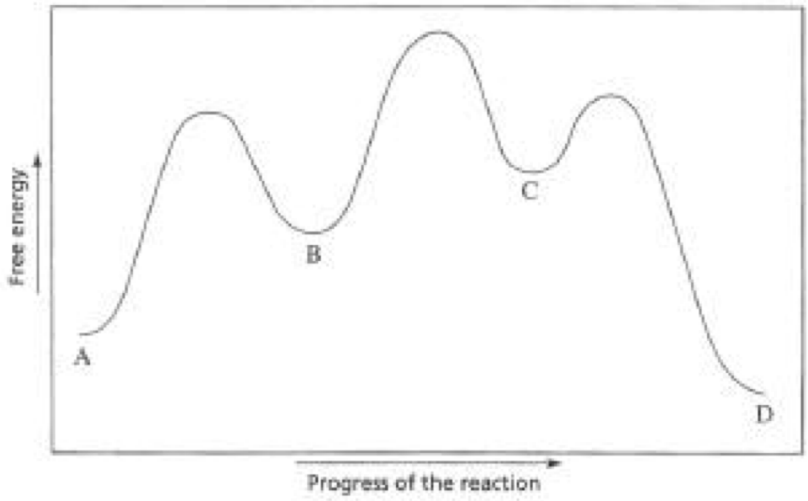
__ C. This compound has 1 primary carbons, 2 secondary carbons, and 3 tertiary carbons.

__ D. This compound has 4 primary carbons, 4 secondary carbons, and 4 tertiary carbons.

__ E. This compound has 3 primary carbons, 6 secondary carbons, and 3 tertiary carbons.

Rationale:
Chapter 2 Problem 52-1

5. Given the reaction-coordinate diagram shown below for the reaction of A to give D, choose the statement which is CORRECT about this reaction.



__ A. The first step of the reaction is exergonic.

__ B. There are three intermediates involved in this reaction.

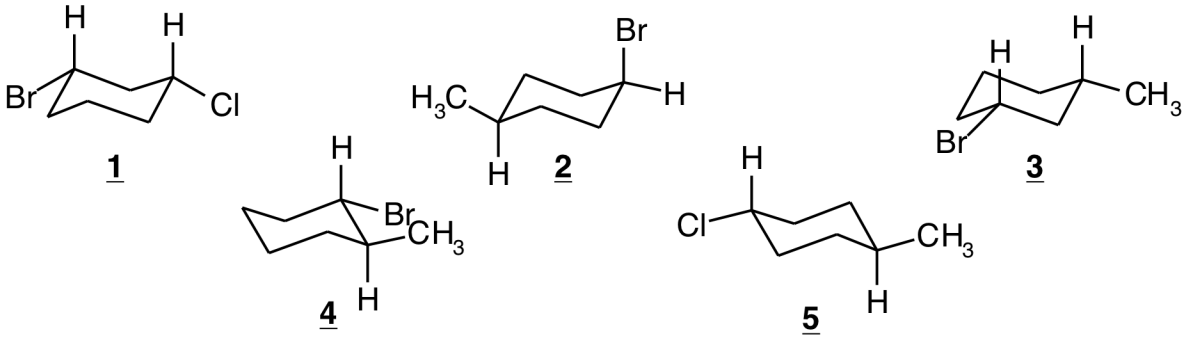
__ C. A is more stable than D.

__ D. There are three transition states involved in this reaction.

__ E. The step which converts B to C is the fastest step in the reaction.

Rationale:
similar to Chapter 3 Problem 55

6. Determine whether each of the following is a cis isomer or a trans isomer. Choose the CORRECT statement from the multiple choices.



__ A. The structure labelled 5 is a cis isomer.

__ B. The structure labelled 4 is a cis isomer.

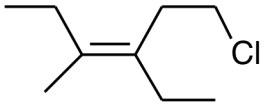
__ C. The structure labelled 3 is a cis isomer.

__ D. The structure labelled 2 is a trans isomer.

__ E. The structure labelled 1 is a trans isomer.

Rationale:
Chapter 2 Problem 43

7. Choose a CORRECT name for the compound whose structure is shown below.



__ A. (E)-3-(2-chloroethyl)-4-methyl-3-hexene

__ B. (E)-1-chloro-3-ethyl-4-methyl-3-hexene

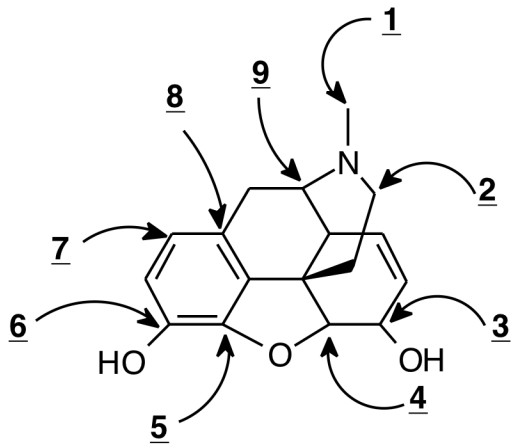
__ C. (Z)-2,3-diethyl-5-chloro-2-pentene

__ D. (Z)-1-chloro-3-ethyl-4-methyl-3-hexene

__ E. (E)-2,3-diethyl-5-chloro-2-pentene

Rationale:
Chapter 3 Problem 14c

8. Figure out the number of hydrogens attached to each of the numbered carbon atoms in the following compound. Choose the CORRECT statement from the multiple choices.



morphine

__ A. The carbon atom numbered 3 has 2 hydrogens attached to it.

__ B. The carbon atom numbered 5 has 0 hydrogens attached to it.

__ C. The carbon atom numbered 2 has 1 hydrogen attached to it.

__ D. The carbon atom numbered 1 has 4 hydrogens attached to it.

__ E. The carbon atom numbered 9 has 3 hydrogens attached to it.

Rationale:
Chapter 2 Problem 11

9. Water and diethyl ether are immiscible liquids. In a vessel containing both water and ether charged compounds dissolve in water, and uncharged compounds dissolve in ether. Given that $C_6H_{11}COOH$ has a pKa of 4.8 and $C_6H_{11}NH_3^+$ ion has a pKa of 10.7, which of the following statements is TRUE ?

__ A. In order for both both compounds to dissolve in the water layer the pH of the water layer has to be between 4.8 and 10.7

__ B. In order for both both compounds to dissolve in the ether layer the pH of the water layer has to be below 4.8

__ C. In order for both both compounds to dissolve in the ether layer the pH of the water layer has to be between 4.8 and 10.7

__ D. In order for the carboxylic acid to dissolve in the ether layer and the amine to dissolve in the water layer the pH of the water layer has to be above 10.7

__ E. In order for both both compounds to dissolve in the ether layer the pH of the water layer has to be above 10.7

Rationale:
Chapter 1 Problem 103

10. Draw the most stable conformer of each of the disubstituted cyclohexanes named in the multiple choices and find the substance in which one of the substituents is in the AXIAL position in the MOST STABLE conformer.

__ A. trans-1-ethyl-3-methylcyclohexane

__ B. trans-1-ethyl-2-methylcyclohexane

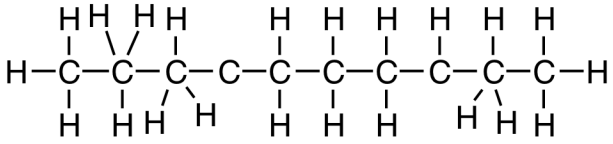
__ C. trans-1-ethyl-2-isopropylcyclohexane

__ D. cis-1-ethyl-3-isopropylcyclohexane

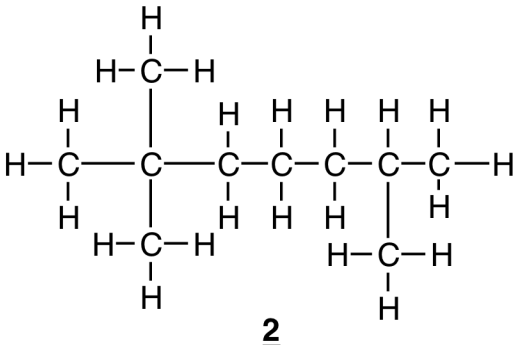
__ E. cis-1-ethyl-3-methylcyclohexane

Rationale:
Chapter 2 Problem 67

11. Expand the condensed structure of the compound with the molecular formula $(CH_3)_3C(CH_2)_3CH(CH_3)_2$ and figure out which of the numbered structures below corresponds to your expanded structure.



1



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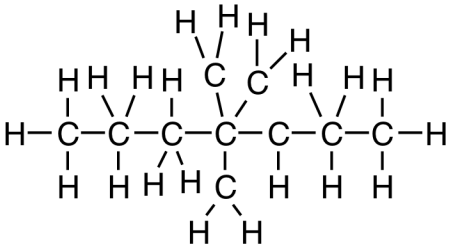

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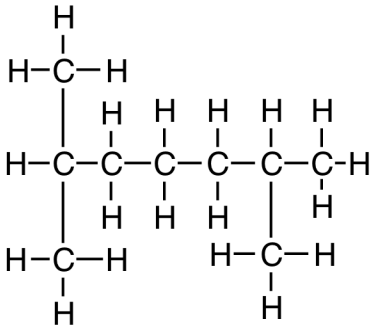

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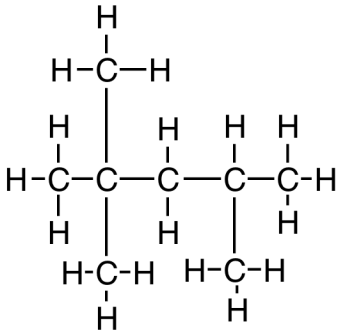


5

__ A. Structure 1 is the correct expanded structure for this compound.

__ B. Structure 4 is the correct expanded structure for this compound.

__ C. Structure 2 is the correct expanded structure for this compound.

__ D. Structure 3 is the correct expanded structure for this compound.

__ E. Structure 5 is the correct expanded structure for this compound.

Rationale:
Chapter 1 Problem 19d

12. Pick the choice which gives two CORRECT names for the compound whose structural formula is $CH_3CH_2CH(CH_3)NHCH_2CH_3$.

__ A. 2-butylethylamine and N- sec-butylethanamine

__ B. ethylisobutylamine and N-ethyl-1-methylpropanamine

__ C. 2-butylethanamine and 3-methyl-3-pentylamine

__ D. sec-butylethylamine and N-ethyl-2-butanamine

__ E. butylethylamine and 3-heptanamine

Rationale:
similar to Chapter 2 Problem 55c

13. Squalene, a hydrocarbon with molecular formula $C_{30}H_{50}$, is obtained from shark liver (Squalus is Latin for "shark.") If squalene is an acyclic compound, how many π bonds does it have?

__ A. 4

__ B. 5

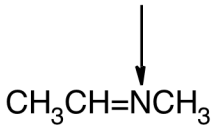
__ C. 12

__ D. 6

__ E. 10

Rationale:
Chapter 3 Problem 45

14. What is the hybridization of the indicated atom in the molecule whose structure is shown below?



__ A. sp^3d

__ B. sp

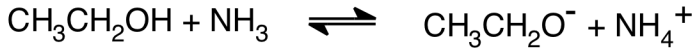
__ C. sp^3d^2

__ D. sp^3

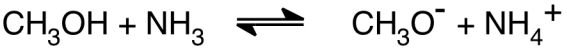
__ E. sp^2

Rationale:
Chapter 1 Problem 82e

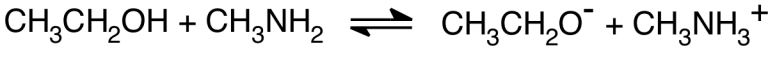
15. Look at the three reactions shown below and then look at the pKa table shown below these reactions. By using the information in the pKa table determine which of the three reactions has the highest equilibrium constant.



Reaction **1**



Reaction **2**



Reaction **3**

acid	pKa	X	acid	pKa
CH_3CH_2OH	15.9	X	CH_3OH	15.5
$CH_3NH_3^+$	10.7	X	NH_4^+	9.4

__ A. Since we have to compare "apples" and "oranges" here there is no correct answer to this problem.

__ B. Reaction 2 has the highest equilibrium constant.

__ C. Reaction 1 has the highest equilibrium constant.

__ D. Reaction 3 has the highest equilibrium constant.

__ E. All three reactions have an identical equilibrium constant.

Rationale:
Chapter 1 Problem 98b

Answer Key

"Grade or Education" = 1

CHEM 2261/01
Summer 08
Exam 1
Chapters 1-3

1. C
2. C
3. A
4. E
5. D
6. C
7. D
8. B
9. A
10. A
11. C
12. D
13. D
14. E
15. D