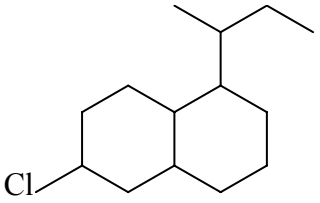
Chemistry 231- Organic I

Exam 1- Dr. Gallo (Brown & Foote)
September 29, 2004

Name:_____

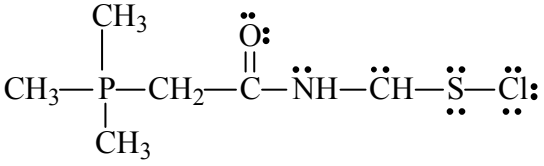
I(24). Circle the letter of the correct answer for each of the following multiple choice questions.

1.) What classification of carbon is <u>not</u> represented in the following structure?



A) 1° B) 2° C) 3° D) 4° E) All types of C are represented.

2.) Which element in the following structure has a formal charge of −1 ?



A) C C) N E) O

B) P D) S F) Cl

3.) Which statement is TRUE?

A) All cyclic compounds are not flat and contain both axial and equatorial bonds.

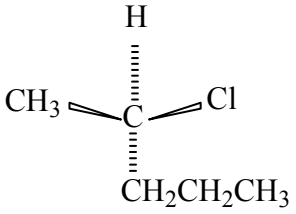
B) Each carbon of cyclohexane has 1 axial H up and 1 axial H down.

C) When a group is in the axial position, it encounters more nonbonded interaction strain than when it is in the equatorial position.

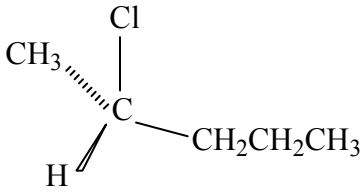
D) Cyclohexane is more stable with an axial methyl group than with an equatorial methyl group.

E) Cyclohexane only exists in the chair conformation.

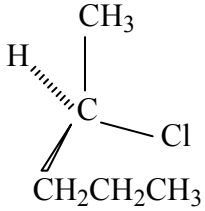
4.) Which of the following represent R-2-chloropentane



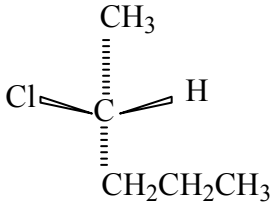
I



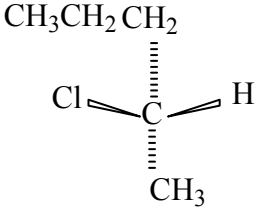
II



III



IV



V

A) I and III

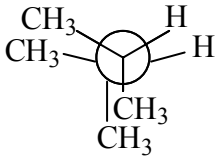
B) I, III and IV

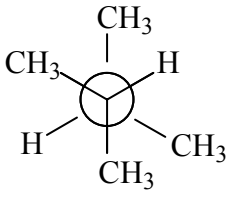
C) I, III, IV, and V

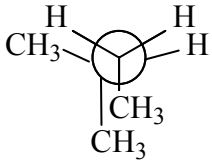
D) I, II, and III

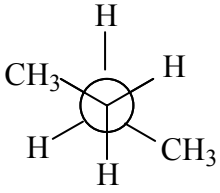
E) I, II, III, and V

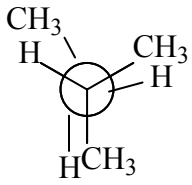
5.) What is the least stable conformation of 2,3-dimethyl-butane when viewing down the C_2-C_3 bond.

A) 

B) 

C) 

D) 

E) 

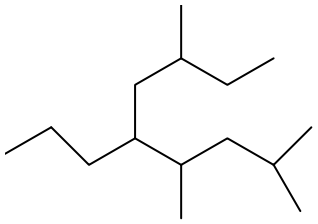
6.) Which of the following statements is <u>not</u> true.

A) Chiral molecules do not possess a plane of symmetry.
B) Stereoisomers differ in their 3-D arrangement in space.
C) Enantiomers have identical boiling and melting points.
D) Enantiomers have opposite configurations.
E) Stereoisomers that have super imposable mirror images are enantiomers.

II(26). Complete each question as indicated.

1.) Draw cis 1-methyl-3-[1,2-dimethylpropyl] cyclopentane.

2.) Provide the IUPAC name for the following:

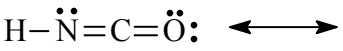


3.) Draw the Lewis structure showing all atom connections, and lone pair valence electrons for $C_2H_6N_2O$. The connectivity is indicated.

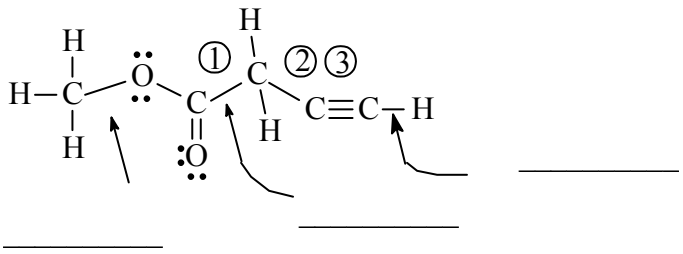
O

C N C N

4.) Draw a major resonance structure for the Lewis structure below and show all formal charges.



5.) a) Tell what orbitals are used to form each of the bonds indicated with arrows.



b.) From the numbered bonds, which is the strongest.

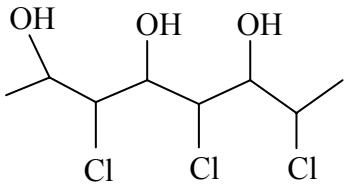
III(27). Complete each question as indicated.

1.) Consider the compound, 2-methylheptane. View down the C_3–C_4 bond axis and draw the Newman projection for the most stable, least stable and gauche conformations.

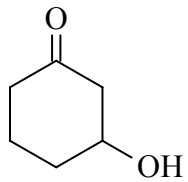
_____	_____	_____
Most Stable	Least Stable	Gauche

2.) Circle all stereocenters in the examples below:

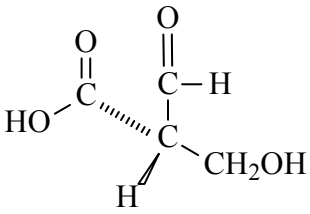
a)



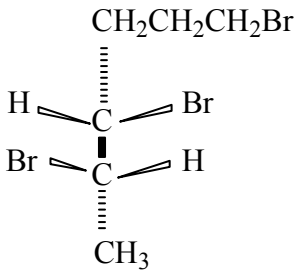
b)



3.) a) Provide the R/S configuration for the following.



b) Give the complete IUPAC name with configuration.



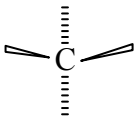
4.) Write the balanced equation for the complete combustion of cyclopentane in air (oxygen).

IV(23). Complete all questions in this section.

1.) Draw cis 1-ethyl-4-methylcyclohexane in two chair conformations. Underline the most stable form or state they are equal in energy.

2.) Draw trans 1-ethyl-4-methyl cyclohexane in two chair conformations and underline the more stable form. State if they are equal in energy.

3.) How many stereoisomers are possible for 2-chloro-3-methylpentane? _____

Draw all stereoisomers in  format for 2-chloro-3-methylpentane.

Label each stereocenter R or S, label pairs of enantiomers and label diastereomers.