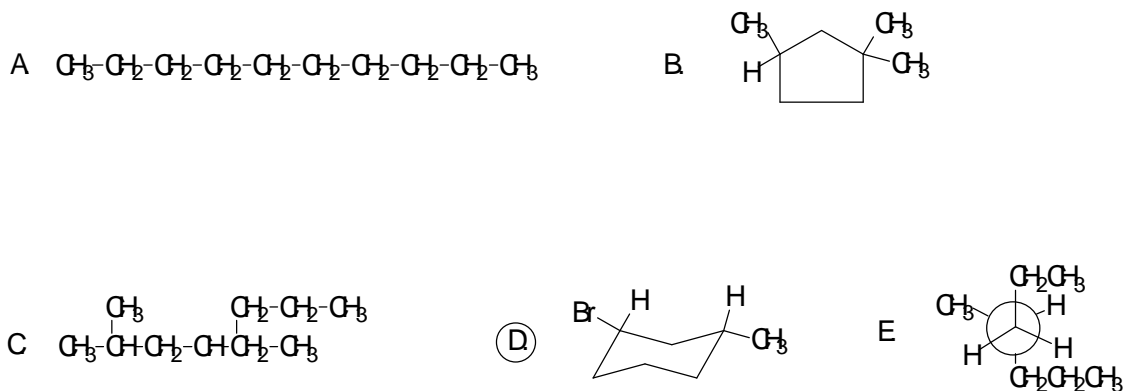


Exam # 1
 Chemistry 2401
 October 3, 2002

(20) I. Name each of the following compounds. Include stereochemical designations for those whose letter is circled.

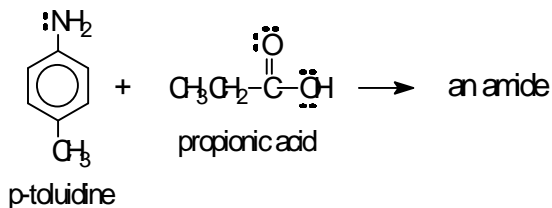


(20) II. Draw structural formulas for each of the following. There may be more than one right answer. In that case, you should draw only one of them.

A. isopentyl bromide

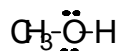
B. an ester with a molecular formula of $\text{C}_6\text{H}_{12}\text{O}_2$.

C. The amide made from p-toluidine and propionic acid.



D. The conjugate acid of methanol.
 Methanol is.

E. Two resonance structures for the
 conjugate base of propionic acid.
 (see C above)



???



???

(16) II. Draw structural formulas.....(continued)

F. An alcohol ($C_5H_{12}O$) in which the OH group is bonded to a tertiary carbon atom.

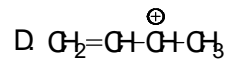
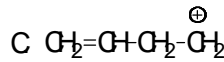
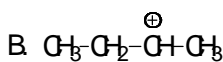
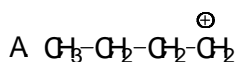
G. An ether that is an isomer of the alcohol in part F.

H. A hydrocarbon with a molecular formula of C_6H_{10} that contains at least one carbon of each hybrid type (sp^3 , sp^2 , and sp)

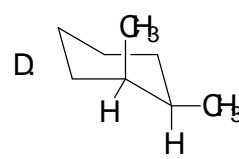
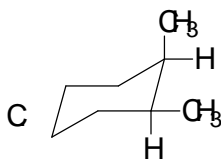
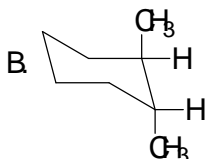
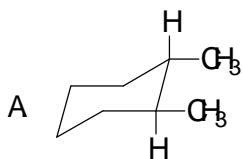
I. The lowest energy chair conformation of cis-1-bromo-4-tert-butylcyclohexane.

(44) III. Multiple choice: Circle the letter corresponding to the correct response.

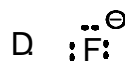
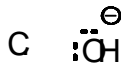
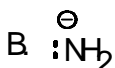
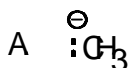
1. Which of the following Lewis structures shown below provides the poorest description of the carbocation it is meant to represent.



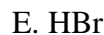
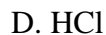
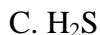
2. Which of the conformations of 1,2-dimethylcyclohexane is lowest in energy?



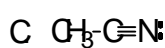
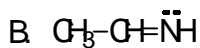
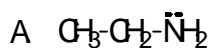
3. Which of the following is the strongest base?



4. Which of the following is the strongest acid?

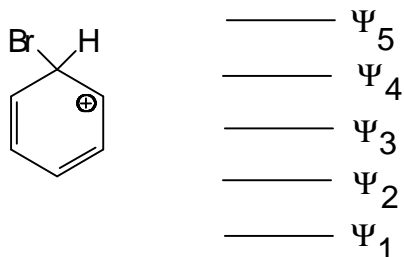


5. Recall that hybrid orbitals that possess more "s" character are shorter and therefore electrons in those orbitals are closer to the nucleus of that atom. Given that, which of the following would be the weakest Lewis base (poorest electron pair donor)?

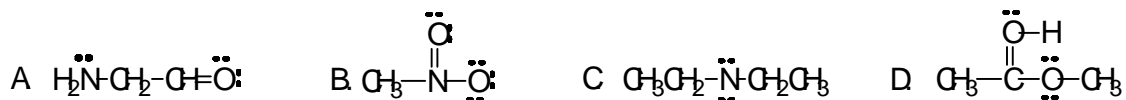


D none of these are Lewis bases.

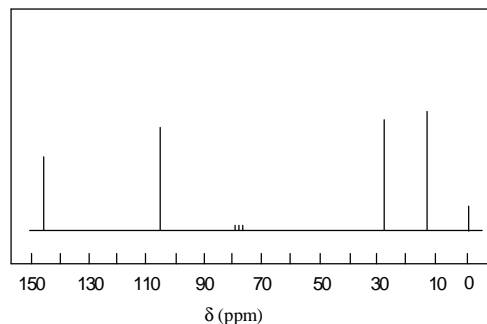
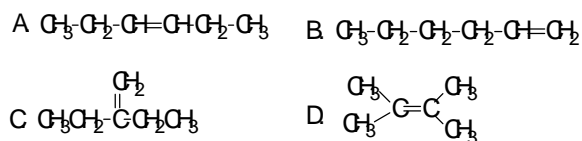
6. If the carbocation shown below has the molecular orbital diagram indicated, then which of the following statements is true. By the way, the cation is not paramagnetic.



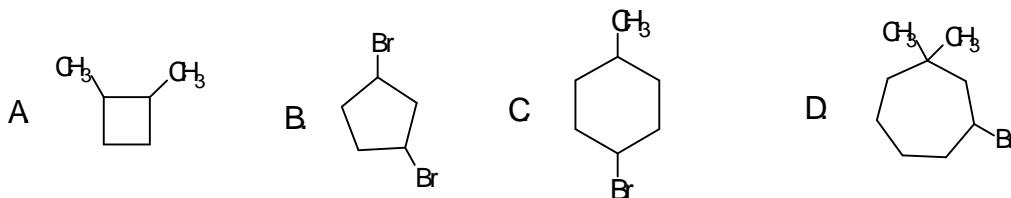
- A. The LUMO is Ψ_3 and the HOMO is Ψ_2 . B. The LUMO is Ψ_2 and the HOMO is Ψ_3 .
 C. The LUMO is Ψ_4 and the HOMO is Ψ_2 . B. The LUMO is Ψ_2 and the HOMO is Ψ_1 .
7. Which of the following does not contain an atom with a formal charge?



8. Which of the compounds below would produce the ^{13}C NMR spectrum shown?



9. Which of the following cycloalkanes does not exist in stereoisomeric forms?



10. Cyclopropane rings are relatively high in energy because they have

- A. angle strain B. torsional strain C. steric strain
 D. both angle and torsional strain E. both angle and steric strain

11. Different resonance structures of a compound cannot be isolated from each other because they

- A. interconvert too rapidly. C. are too strongly attracted to one another.
 B. are subject to the Heisenberg uncertainty principle. D. don't actually exist.