

Name _____

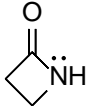
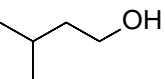
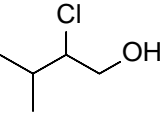
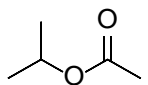
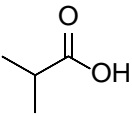
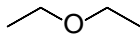
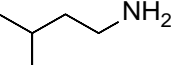
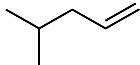
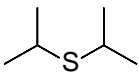
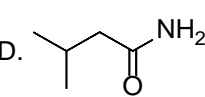
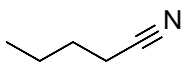
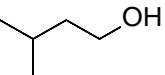
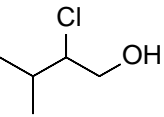
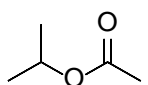
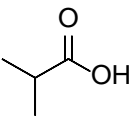
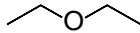
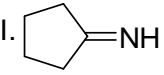
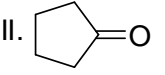
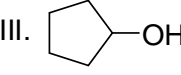
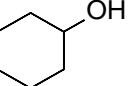
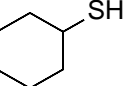
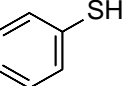
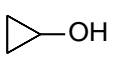
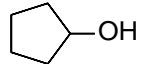
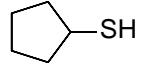
General Instructions: Write your name the space above and on the provided Scan-tron form. ***Do not put your name anywhere else in this exam book.***

Make sure that you read each question carefully and provide **complete** answers.

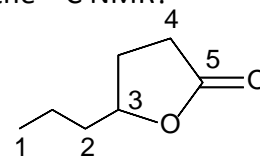
Time Limit = 55 min. Exams must be turned in immediately upon my call of time up.

Grading: Grading will be on the basis of a highest possible score of 100 points.

- I. Multiple Choice - 2 points each, 40 points total
- II. Structures → Names - 4 points each, 12 points total
- III. Names → Structures - 3 points each, 12 points total
- IV. Drawing Isomers - 2 points each, 16 points total
- V. C-13 NMR Problem - 6 points
- VI. Reactions - 4 points each, 16 points total

1. Which of these compounds contains an sp^2 -hybridized carbon atom?
 A. C_2H_6 B. CO_2 C. HCN D. C_2H_4 E. None of these
2. What is the formal charge on nitrogen in the structure at right?
 A. +1 B. -1 C. 0 D. -2 E. +2
- 
3. Which of the following is an ester?
 A.  B.  C.  D.  E. 
4. Which of the choices to #3 is the **strongest** acid?
5. Which of the following is the **strongest** base?
 A.  B.  C.  D.  E. 
6. Which of the choices to #5 is an alkene?
7. Which of the following is the **weakest** acid?
 A.  B.  C.  D.  E. 
8. Which of the choices to #7 is an ether?
9. What is the order of the boiling points of the three compounds shown (from **highest** to **lowest**)?
 I.  II.  III. 
- A. III > I > II B. I > II > III C. II > I > III D. II > III > I E. III > II > I
10. What is the order of acidity of the three compounds shown (from **strongest** to **weakest**)?
 I.  II.  III. 
- A. III > I > II B. I > II > III C. II > I > III D. II > III > I E. III > II > I
11. What is the order of water solubility of the three compounds shown (from **most soluble** to **least soluble**)?
 I.  II.  III. 
- A. III > I > II B. I > II > III C. II > I > III D. II > III > I E. III > II > I
12. How many resonances are theoretically present in the ^{13}C NMR spectrum of decane?
 A. eight B. five C. six D. ten E. twelve

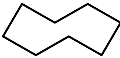
13. For the compound at right, which carbon resonates at the **lowest** frequency in the ^{13}C NMR?
 A. 1 B. 2 C. 3. D. 4. E. 5



14. For the compound at above right, which carbon resonates at the **highest** frequency in the ^{13}C NMR?
 A. 1 B. 2 C. 3. D. 4. E. 5

For questions 15-20 indicate which type(s) of strain is(are) significant in the molecule given. Choose from the choices below.

A. both torsional and steric B. both torsional and angle C. torsional only D. steric only E. angle only

15. Gauche butane
 16. Cyclohexane boat conformation
 17. Cyclopropane
 18. Cyclooctane chair conformation 
 19. Eclipsed ethane
 20. Cyclopentane

II Show the structure of each of the following.

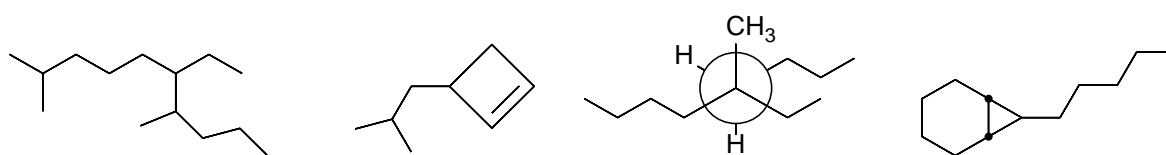
a. octa-1,3-diene

b. 1-cyclopropyl-3,3,-dipropylpentane

c. 3-ethylhexane
 (most stable conformation @C2-C3 bond)

d. *cis*-1-tert-butyl-4-pentylcyclohexane
 (most stable conformation)

III. Name each of the following.

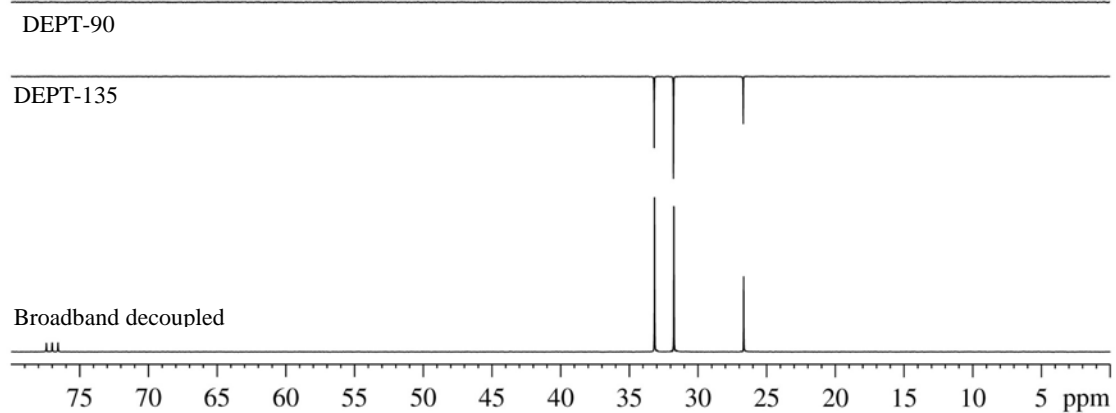


IV. Drawing Isomers.

There are nine constitutional isomers of formula C_4H_6 . Draw and name at least four of them.

Draw the four constitutional isomers of C_3H_9N .

V. A compound with molecular formula $C_5H_{10}Br_2$ displays the following ^{13}C NMR along with the DEPT-90 and DEPT-135 ^{13}C NMR spectra. What is the structure for this compound?



VI. Predict the products of each of the following reactions. If no reaction occurs write N.R. and explain.

