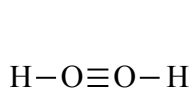
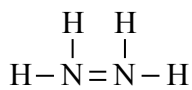


Section 1: Multiple
Section 1: Multiple choices [1x15 = 15]

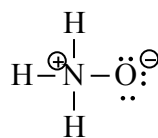
1. Which Lewis structures are correct?



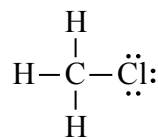
I



II



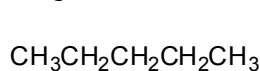
III



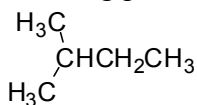
IV

- a) I, II
- b) II, IV
- c) III, IV
- d) I, III

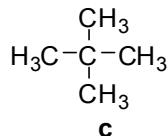
2. Which compound has the lowest boiling point?



a



b

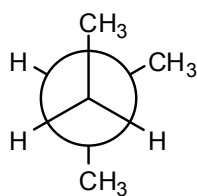


c

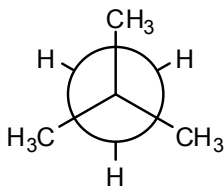


d

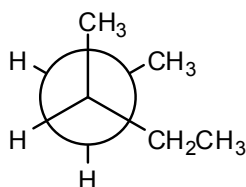
3. Which is a conformer of pentane?



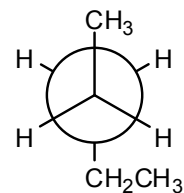
a)



b)

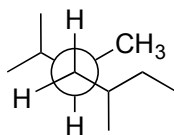


c)



d)

4. What is the IUPAC name of the compound shown below?



- a) 2-ethyl-4,4-dimethylhexane
- b) 5-ethyl-2,3,-dimethylhexane
- c) 3,5,6-trimethylheptane
- d) 2,3,5-trimethylheptane

5. Which of the following properties are not identical for constitutional isomers?

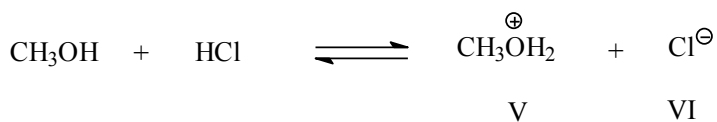
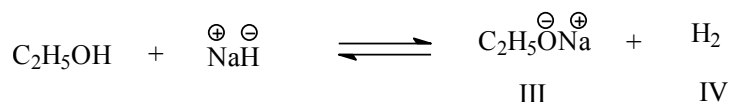
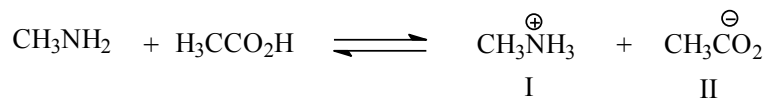
- I. molecular formula
- II. molecular weight
- III. order of attachment of atoms
- IV. physical properties

- a) I, IV
- b) II, III
- c) I, II
- d) III, IV

6. The most stable conformation of *cis*-1-isopropyl-4-methylcyclohexane is:

- a) a chair with the isopropyl equatorial and the methyl axial
- b) a chair with the isopropyl axial and the methyl equatorial
- c) a boat with both the isopropyl and methyl substituents equatorial
- d) a chair with both the isopropyl and methyl substituents equatorial

7. Identify the conjugate bases in the following reactions.

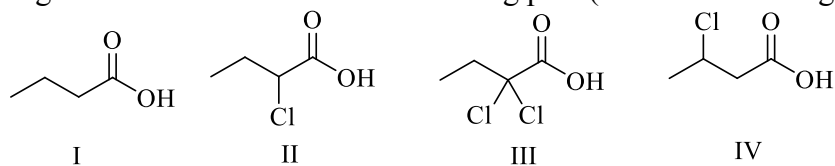


- a) II, III, VI
- b) I, IV, V
- c) I, III, V
- d) II, IV, VI

8. How many 1-3-diaxial interactions are present in 1-methylcyclohexane?

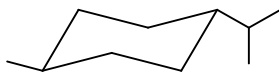
- a) 0
- b) 1
- c) 3
- d) 2

9. Put the following molecules in the order of increasing pKa (from lowest to highest):



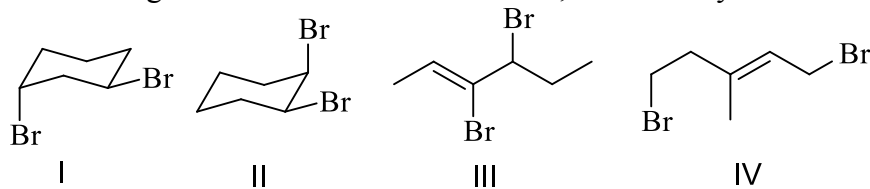
- a) I<IV<II<III
- b) II<IV<III<I
- c) III<II<IV<I
- d) IV<II<III<I

10. What is the correct IUPAC name for the following compound?



- a) cis-1-isopropyl-4-methylcyclohexane
- b) trans-1-isopropyl-4-methylcyclohexane
- c) trans-1-methyl-4-isopropylcyclohexane
- d) cis-1-methyl-4-isopropylcyclohexane

11. Which of the following are constitutional isomers of 1,3-dibromocyclohexane?

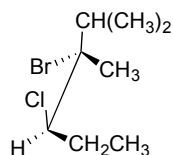


- a) I, II, III, IV
- b) II, III, IV
- c) I, II
- d) III, IV

12. Molecule **A** is the enantiomer of molecule **B**. Molecule **B** is a stereoisomer of molecule **C** but NOT its mirror image. What is the relationship between **A** and **C**?

- a) Same compound
- b) Enantiomers
- c) Diastereomers
- d) Constitutional isomers

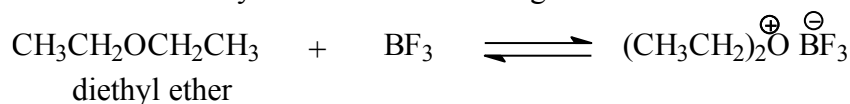
13. Consider the following molecule:



If Br and CH₃ group switch their places, what would the relationship between the new molecule and the one above be?

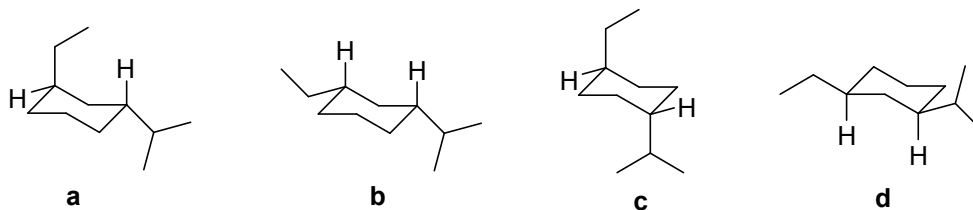
- a) Constitutional isomers
- b) Same compound
- c) Enantiomers
- d) Diastereomers

14. What is the role of diethyl ether in the following reaction?



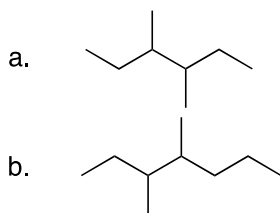
- a) Lewis acid
- b) Lewis base
- c) Brønsted acid
- d) Brønsted base

15. Which is the most stable structure of *trans*-1-ethyl-3-isopropylcyclohexane?



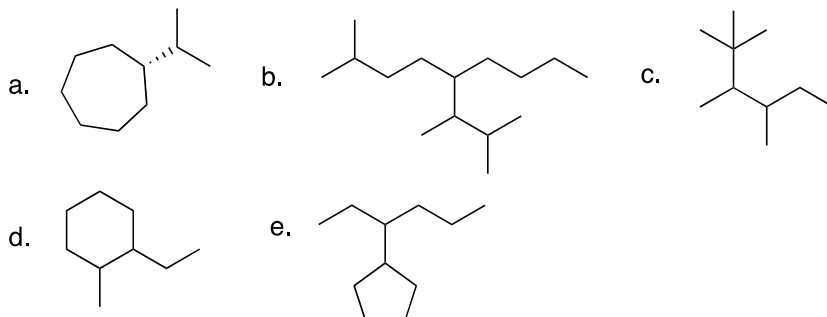
*****End of multiple choice*****

16. Draw all possible stereoisomers for the following compounds using dash and wedge bonds and provide the IUPAC names all the stereoisomers with absolute configurations. [10]

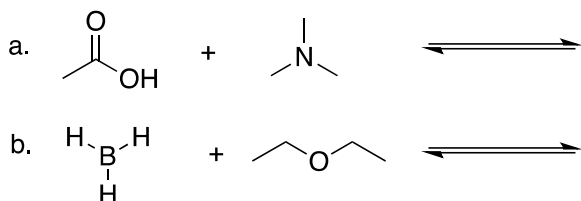


17. Draw the Newman's projection of compound 16a (using the chirality center carbons) in its most stable form. [2]

18. Write an acceptable IUPAC name of the following compounds. [10]



19. Predict the product(s) of following reactions. Use the curved arrows to demonstrate the flow of electrons in the overall transformation. [4]

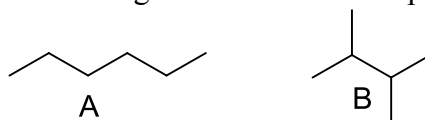


20. Provide a reasonable explanation in your own words (no more than 5-6 sentences) for the following observations [4]:

(a) Trifluoroacetic acid (TFA) is a stronger acid than acetic acid (AA).



(b) The boiling point of compound A is higher than that of compound B.



21. Draw all reasonable resonance contribution structures of the following species, use curved arrows to indicate electron movement. [5]

