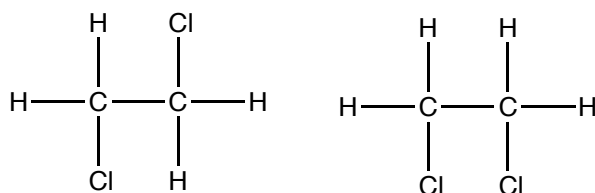


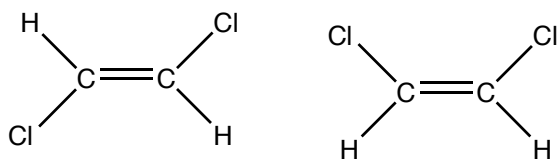
**Part A: Isomers of Organic Compounds**

**Definitions**

1. Nonsuperimposable mirror images are called \_\_\_\_\_.  
A) structural isomers    B) achiral    C) geometric    D) enantiomers
2. Molecules with the same formula but the bonding in the structures is different are called \_\_\_\_\_.  
A) structural isomers    B) achiral    C) geometric    D) enantiomers
3. Molecules with the same formula, the bonding is the same, but the spatial arrangement of atoms is different are called \_\_\_\_\_.  
A) structural isomers    B) achiral    C) geometric    D) enantiomers
4. Below are structures for 1,2-dichloroethane. Are these cis-trans isomers?

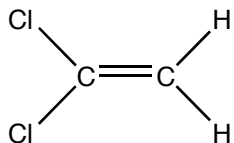


5. Below are structures for 1,2-dichloroethene. Are these cis-trans isomers?



Why is your answer different in 4. vs. problem 5?

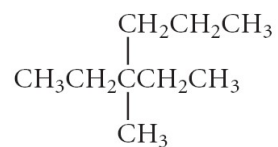
6. Below is another structure that has the same chemical formula as the 1,2-dichloroethene. It is called 1,1-dichloroethene. Is this another geometric (cis-trans isomer)?



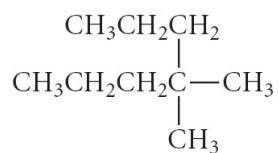
7. Which of the following compounds exhibit geometric isomerism (cis-trans isomerism)?  
A)  $\text{CH}_2=\text{CH}-\text{CH}_3$   
B)  $\text{CCl}_2=\text{CBr}_2$   
C)  $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$   
D)  $\text{CCl}_2=\text{CHBr}$   
E) All of the above exhibit geometric isomerism.

**Part B: Naming Hydrocarbons**

8. Name the following compound.

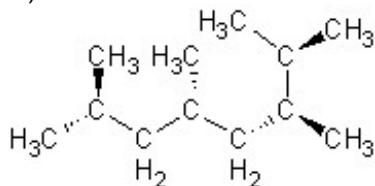


9. Name the following compound.

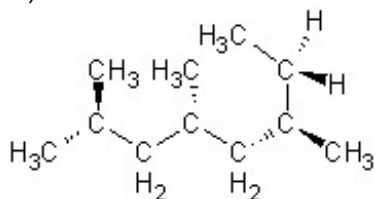


10. Find the structure for 2,3,5,7-tetramethyloctane

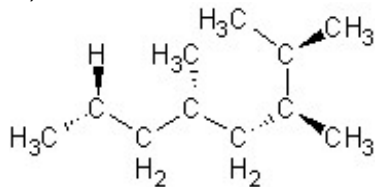
A)



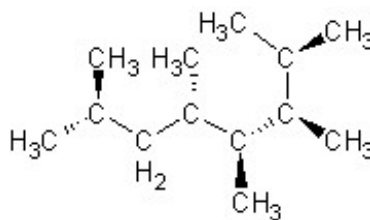
B)



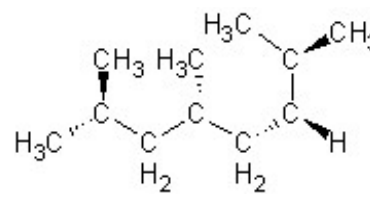
C)



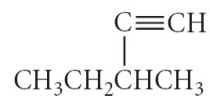
D)



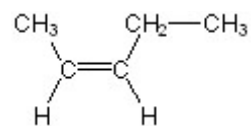
E)



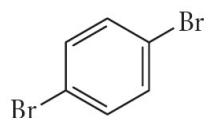
11. Name the following compound.



12. Name the following compound.



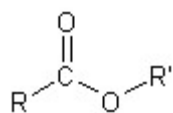
13. Is the structure below ortho-, meta- or para-dibromobenzene?



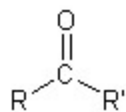
### Part C: Functional Groups in Organic Compounds

14. Which of the following classes of organic compounds and their general structural formulas have been correctly matched?

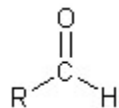
I) ester:



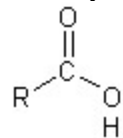
II) Aldehyde:



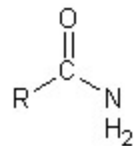
III) Ketone:



IV) Carboxylic acid:

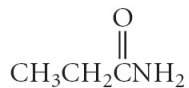


V) Amide:

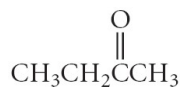


15. Which of the following compounds is an ester?

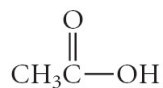
A)



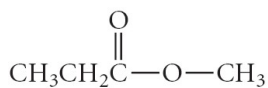
B)



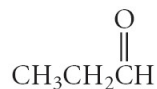
C)



D)



E)



16. Which of the following compounds is an alcohol?

A) C<sub>2</sub>H<sub>6</sub>

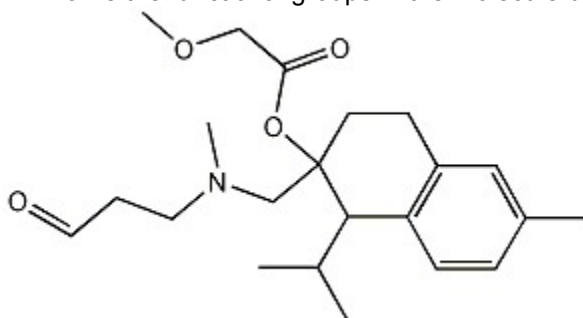
B) C<sub>2</sub>H<sub>5</sub>OH

C) CH<sub>3</sub>CO<sub>2</sub>H

D) CH<sub>3</sub>CO<sub>2</sub>CH<sub>3</sub>

E) CH<sub>3</sub>-O-CH<sub>3</sub>

17. Name the functional groups in the molecule below (notice the skeleton structure is used here):



A) ester, ether, amine, keto

B) carboxyl, ether, amine, keto

C) ester, ether, amine, aldehyde

D) ester, ether, amide, aldehyde

E) ester, carboxyl, amine, keto

**Part D: Review of Lewis Acids and Bases (but now we see them in O-chem!)**

18. Draw the structures of the following (if not given) and label them as Lewis acids or bases

a.  $\text{BF}_3$

b.  $\text{NEt}_3$

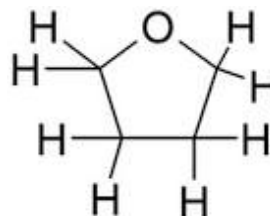
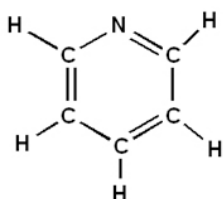
c.  $\text{AlCl}_3$

d.  $\text{PMe}_3$

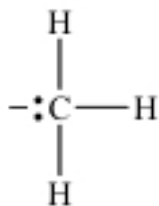
e.  $\text{OEt}_2$

g. pyridine

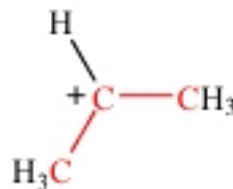
h. tetrahydrofuran (a common solvent in o-chem)



i. The ion below is called a carbanion. In organic chem, it's very reactive.

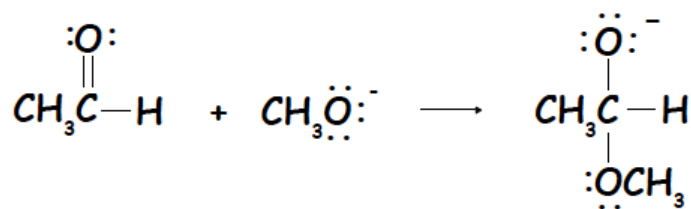


j. The ion below is called a carbocation. In organic chem, it's very reactive.



19. Several reactions are listed below. Identify the Lewis Acid and Lewis Base.

a)



b)

