Multiple Choice

1. Lipitor is a member of the drug class known as statins that have been used for lowering blood cholesterol. Choose the functional group not present in Lipitor. (textbook 2.45)

![Lipitor molecule](image)

A. alcohol  
B. amide  
C. ketone  
D. aromatic  
E. amine  
F. carboxylic acid  

2. Choose the best description of the indicated bond in laevomandelonitrile. (lecture quiz)

![Laevomandelonitrile molecule](image)

A. C<sub>sp3</sub>-C<sub>sp3</sub>  
B. C<sub>sp3</sub>-C<sub>sp2</sub>  
C. C<sub>sp2</sub>-C<sub>sp2</sub>  
D. C<sub>sp2</sub>-C<sub>sp</sub>  
E. C<sub>sp3</sub>-C<sub>sp</sub>  
F. C<sub>sp</sub>-C<sub>sp</sub>  

3. Choose the shape of the indicated atoms 1 and 2 in lactic acid. (lecture quiz)

![Lactic acid molecule](image)

A. 1 = tetrahedral, 2 = bent  
B. 1 = trigonal pyramidal, 2 = bent  
C. 1 = trigonal planar, 2 = bent  
D. 1 = tetrahedral, 2 = linear  
E. 1 = trigonal pyramidal, 2 = linear  
F. 1 = trigonal planar, 2 = linear
4. Choose the order that has the following bases correctly arranged with respect to *increasing* basicity. (textbook 3.18)

![Bases Diagram]

5. Choose the order that has the following contributing structures correctly arranged with respect to *increasing* importance (stability). (WS2 online quiz; q7)

![Contributing Structures Diagram]

6. Choose the resonance structures of imidic acid. (lecture quiz)

![Imidic Acid Diagram]

A i  B ii  C iii  D ii and iii  E i and ii  F i and iii
7. Select the major product of the following reaction. (WS3 pt2; q6)

\[
\text{H}_3\text{C} \text{CH}_3 \quad \xrightarrow{\text{NaOD (cat.)}} \quad \text{D}_2\text{O} \quad ?
\]

A. \(\text{H}_3\text{C} \text{CH}_3 \quad \text{O} \quad \text{O} \quad \text{CD}_3 \quad \text{CH}_3\)
B. \(\text{H}_3\text{C} \text{CD}_3 \quad \text{O} \quad \text{O} \quad \text{CD}_3 \quad \text{CH}_3\)
C. \(\text{H}_3\text{C} \text{CD}_3 \quad \text{O} \quad \text{O} \quad \text{CH}_3 \quad \text{CD}_3\)
D. \(\text{D}_3\text{C} \text{CD}_3 \quad \text{O} \quad \text{O} \quad \text{CD}_3 \quad \text{CH}_3\)
E. \(\text{D}_3\text{C} \text{CD}_3 \quad \text{O} \quad \text{O} \quad \text{CH}_3 \quad \text{CD}_3\)
F. \(\text{D}_3\text{C} \text{CD}_3 \quad \text{O} \quad \text{O} \quad \text{CD}_3 \quad \text{CH}_3\)

8. The reaction shown below gives two isomeric products. One is shown. Choose the structure of the other product. (lecture Quiz)

\[
\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{Cl} \quad \xrightarrow{\text{H}_3\text{C} \text{CH}_3} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + ?
\]

A. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{O} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H}\)
B. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H}\)
C. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H}\)
D. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H}\)
E. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H}\)
F. \(\text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H} \quad \text{H}^+ \text{C} - \text{C}^- \text{H} + \text{H}^+ \text{C} - \text{C}^- \text{H}\)
9. Choose the energy difference that can be used to calculate the equilibrium constant of the following reaction (lecture quiz)

\[ \text{HO}^- + \text{CH}_3\text{-Cl} \rightarrow \text{Cl}^- + \text{CH}_3\text{-OH} \]

10. Choose the correct reactants that would give the following alcohol. (lecture quiz)

\[ ? \xrightarrow{?} \text{H}_2\text{O} \]

\( ^\text{(organo} \quad \text{lithium)} \quad \text{(C=O} \quad \text{group)} \)

\[ \text{A} \quad \text{and} \quad \text{B} \quad \text{and} \quad \text{C} \quad \text{and} \quad \text{D} \]

11. Predict the major products of the following reaction. 5 pts (textbook 3.25)

\[ \text{H}_3\text{C} - \text{CH-Li} + \text{H-O-CH}_3 \rightarrow \text{H}_3\text{C} - \text{CH}_2 \quad \text{and} \quad \text{Li} \text{-O-CH}_3 \]

12. Predict the major product of the following reaction. 5 pts (workshop 3, part 1)

\[ \text{H}_3\text{C} - \text{NH} + \text{H}^+ \rightarrow \text{N} - \text{H}^- \quad \text{and} \quad \text{N} - \text{H} \]
13. Give the product(s) resulting from the following curved arrows. 5 pts (textbook 3.24)

14. Predict the major product of the following reaction. 5 pts (lecture quiz)

15. The following ketones are constitutional isomers.
   (a) Draw the next best resonance structure for each of the isomers (1) and (2).
   (b) Choose the ketone, (1) or (2), that is more stabilized by electron delocalization. 10 pts (lecture quiz)

16. A compound B has the formula C₃H₆O with the following infrared spectrum.
    Give the structure of compound B. (textbook 2.51, 2.55)
17. Using the library of synthetic reactions on the cover page, propose a synthesis of the following compound from compounds containing four carbon atoms or less. (Class Quiz) 10 pts