1. Which of the following is an enantiomer of structure 1.

![Structure 1]

A. B. C. D. E.

2. The following is the conformational energy profile for the rotation about the indicated bond in 1,1-dichloropropane. (WS 5)

![Energy Profile]

Choose the position on this profile that corresponds to structure 1.

3. Choose the order that has the following compounds correctly arranged according to increasing stability. (WS 5)

![Compounds](i, ii, iii)

A. B. C. D. E.

4. Choose the structure that has the name (R,Z)-2-bromo-4-methyl-2-phenylhex-4-ene.

![Structures](A, B, C, D, E)
5. Choose the order that has the following leaving groups correctly arranged with respect to increasing leaving group ability in $S_N1$ and $S_N2$ reactions.

6. Choose those reactions that will give 2-methylbutane. (clicker quiz)

7. Identify which of the following compounds is (are) NOT meso structures.

A. 2  
B. 2 and 4.  
C. 1 and 3  
D. 3, 4 and 5  
E. 2 and 5
8. Choose the number of stereocenters in the following molecular fragment of oxytocin (a mammalian hormone that acts as a neurotransmitter in the brain).

A. 6  
B. 7  
C. 8  
D. 9  
E. 10

9. Choose the major product of the following reaction.

\[ \text{BrCH}_2\text{CH}_3 + \text{Et}_2\text{O} \rightarrow \text{major product} \]

(\text{Et} = \text{-CH}_2\text{CH}_3)

A  
B  
C  
D  
E

10. Predict the major products of the following two reactions. (6.46)

\[ \text{Cl}_2 \text{CH}_2\text{Cl} + \text{I}^- \rightarrow 1 \text{ or } 2 \]

\[ \text{Cl}_2 \text{CH}_2\text{Cl} + \text{H}_2\text{O/acetone solvolysis} \rightarrow 3 \text{ or } 4 \]

A. 1 and 3  
B. 1 and 4  
C. 2 and 3  
D. 2 and 4
11. Draw the major product with correct stereochemistry for the following reaction. 5 pts

\[
\text{Br} \quad \overset{\text{KCN}}{\text{DMF}} \quad \text{product}
\]

12. Draw the most stable conformation of the following compound. 5 pts (WS 5)

\[
\text{CH}_3 \quad \text{H}_3\text{C} \quad \text{CH}_3
\]

13. Treatment of 3-bromo-4,4-methyl-1-cyclohexene with NaOH can lead to two products (X) and (Y). Draw structures for compounds X and Y. 10 pts

\[
\text{Br} \quad \overset{\text{NaOH}}{\text{H}_2\text{O}} \quad \text{X} \quad \text{Y}
\]

\[
\text{C}_8\text{H}_{14}\text{O} \quad \text{C}_8\text{H}_{12}
\]

14. Two compounds, A and B, have the following properties:

(a) They both have the formula \(\text{C}_7\text{H}_{13}\text{Br}\) and both are chiral.
(b) Compound A is a diastereomer of compound B.
(c) Treatment of A with base (\(^{6}\text{OEt}\)), gave alkene C and treatment of B gave alkene D).
(d) Alkene C is chiral but alkene D is achiral.
(e) Catalytic hydrogenation of both alkenes C and D gave methylcyclohexane.

Give the Structures of compounds A and B. 10 pts (7.36, WS7)

15. Propose a synthesis of the following compound from reactants containing four carbon atoms or less. 10 pts (WS 8)

\[
\text{reactants with four carbons or less}
\]

16. Using the curved arrow formalism show the bond making and bond breaking that occurs in the following transformation. A good answer will require additional intermediate structures with appropriate curved arrows. 10 pts (class quiz)

\[
\text{H} \quad \overset{\text{H}^\circ}{\text{O}} : \quad : \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}}
\]

\[
\text{H}_3\text{C} \quad \text{CH}_3 \quad \text{CH}_3 \quad \text{OH} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}} \quad \overset{\text{H}^\circ}{\text{O}}
\]

\[
\text{H}_3\text{C} \quad \text{CH}_3 \quad \text{CH}_3
\]