# CHEMISTRY 2311-EXAMINATION III
## NOVEMBER 18, 1998
### DR. MARK A. FORMAN

**NAME:_______________________________**

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**TOTAL _______**
1. Assign an (R) or (S) configuration to the indicated stereocenters in the following molecules (6 points).
   a.)
   ![Image 1]
   b.)
   ![Image 2]

2. Draw a Fischer projection for (2R, 3S)-dibromobutane (4 points).

3. a.) Place an asterisk at all stereocenters in adenosylmethionine (3 points).
   ![Image 3]

   b.) How many stereoisomers are possible for adenosylmethionine? Show how you arrived at this conclusion (2 points).

4. a.) Place an asterisk at the stereocenter in carvone (2 points).
   ![Image 4]

   b.) Determine whether the stereocenter in carvone has the R or S configuration. (3 points).

5. Identify the relationship between the following pairs of molecules by describing them as enantiomers, diastereomers, constitutional isomers, or two molecules of the same compound. (15 points)
   a.)
   ![Image 5]
   b.)
   ![Image 6]
   c.)
   ![Image 7]
   d.)
   ![Image 8]
   e.)
   ![Image 9]

6. In one sentence, describe resolution (3 points).
7. Are each of the following statements true or false (10 points)?

T    F    A molecule that contains a plane of symmetry is optically inactive.
T    F    Protic solvents speed up the rate of $S_n2$ reactions by solvating the nucleophile.
T    F    If a molecule has more than one stereocenter, it may or may not be chiral.
T    F    The reactivity order of alkanes toward halogenation is $3^\circ>2^\circ>1^\circ$.
T    F    All compounds that rotate plane polarized light in the dextrorotatory direction have the $S$ configuration at their stereocenter(s).
T    F    $S_n1$ reactions always proceed with complete inversion of configuration.

8. Provide reagents which will carry-out the following transformations (9 points).

a.)

b.)

9. Predict the product(s) of each of the following reactions (9 points).

a.)

b.)

10. Using 2-bromopropane as the only source of carbon, show how you could accomplish the following synthetic transformation. You will need several steps (6 points).

11. Draw all resonance structures for each of the following (6 points).

a.)

b.)
12. Which product (or products) would you expect to obtain from each of the following reactions? In each case, give the mechanism (Sₐ¹, Sₐ², E₁, E₂) by which each product is formed and predict the relative amount of each (i.e. the only product, the major product, a minor product etc.)? (16 points)

a.)

\[
\text{CH}_3\text{CH}_2\text{CHCH}_3\text{Br} \xrightarrow{\text{EtONa, EtOH}} \]

b.)

13. Consider the following reaction.

\[
\text{CH}_3\text{CH}_2\text{CHCH}_3\text{I} \xrightarrow{\text{CH}_3\text{OH, 25 °C}} \text{CH}_3\text{CH}_2\text{CHCH}_3\text{OEt}
\]

a.) What affect would you expect on the rate of the reaction if the concentration of ethanol is tripled? Explain (3 points).

b.) What affect would you expect on the rate of the reaction if the solvent was changed from ethanol to water? Explain (3 points).