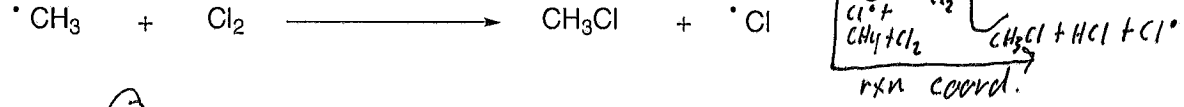
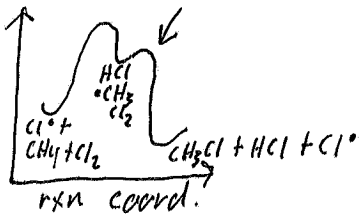
Name: Key

Organic I Lecture
Spring 2010
Quiz #3
(10 points)

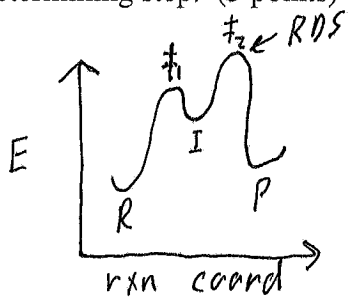
1. Consider the energy diagram for the radical chlorination of methane. The structure of the transition state for the following half reaction would most closely resemble which of the following? (2 points, problem 4-49a)



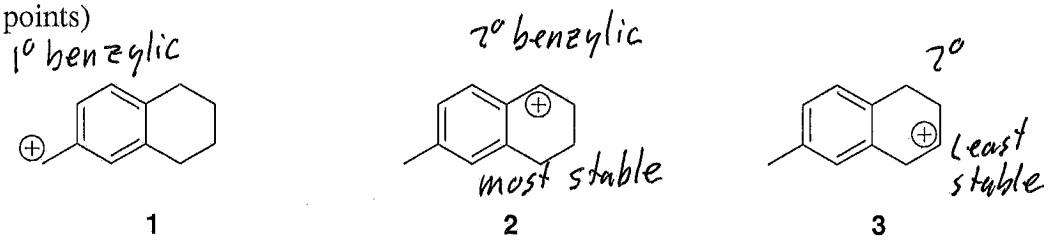


a) reactant (b) intermediate c) product d) insufficient information

2. Provide an energy diagram for an endothermic, two step reactions, where the second step is the rate determining step. (3 points)

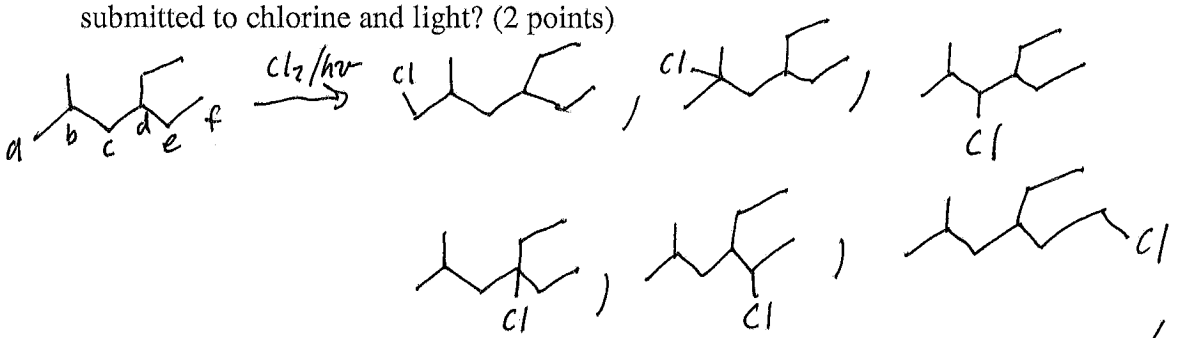


3. Which sequence correctly ranks the following cations in order of increasing stability? (3 points)



a) 1<2<3 b) 2<3<1 (c) 3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2

4. How many monochlorination products are formed when 4-ethyl-2-methylhexane is submitted to chlorine and light? (2 points)

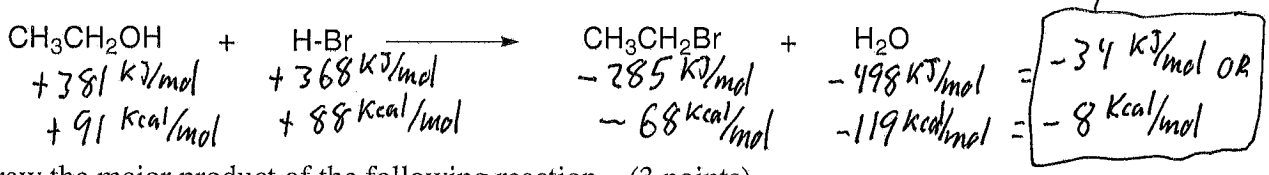


6 monochlor. products (Not Required to draw them.)

Name: Key

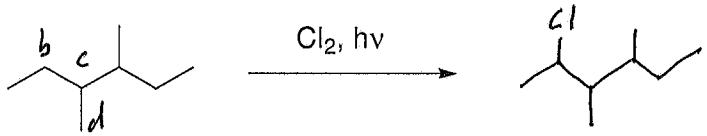
Organic I Lecture
Spring 2011
Quiz #3
(10 points)

1. Use the provided table of bond dissociation enthalpies to calculate the overall enthalpy of the following reaction. (2 points, problem 4-40e)



2. Draw the major product of the following reaction. (3 points)

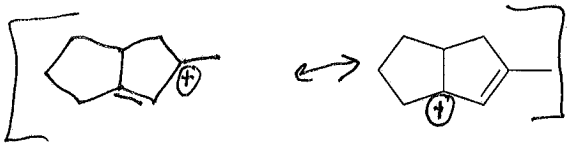
a 6×1=6
b 4×4.5=18
c 2×5.5=11
d 6×1=6



3. How many monochlorination products are possible from the reaction in problem #2? (1 point)

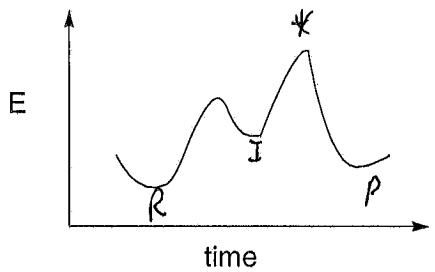
4 monochlor. products

4. Add a (+) to the structure below to generate the most stable carbocation possible. (2 points)



Tertiary allyl

5. Do the following for the energy profile diagram below. (3 points)



a) Place a star above the transition state of the rate determining step. (1 point)

b) What does the structure of the transition state of the rate determining step most closely resemble? (1 point)

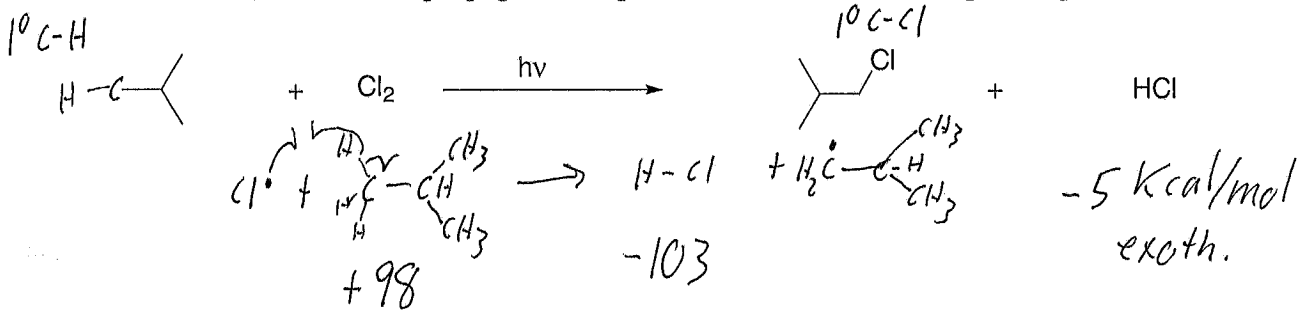
Intermediate (I)

c) (Circle one) Overall this reaction is (endogonic / exogonic) . (1 point)

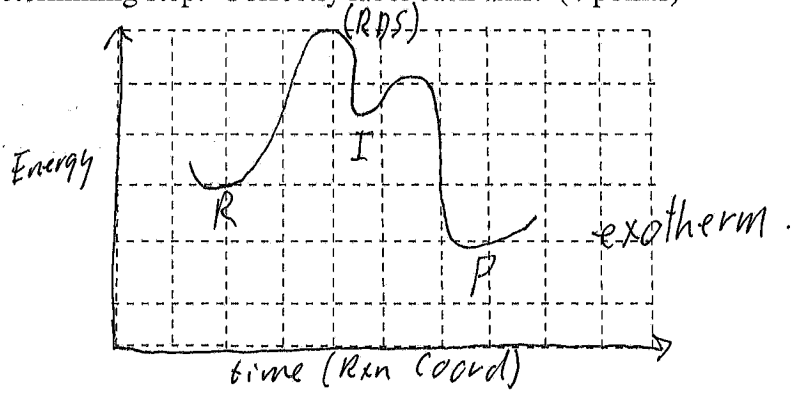
Name: Key

Organic I Lecture
Fall 2011
Quiz #3
(10 points)

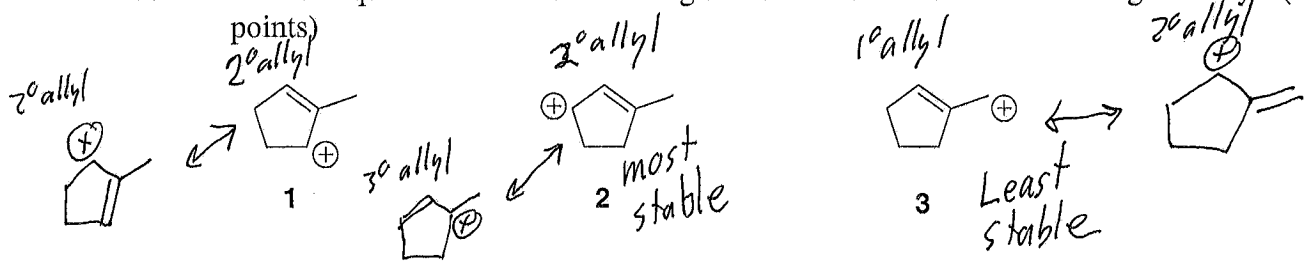
1. Using the provided table of bond-dissociation enthalpies, calculate the heat of reaction (in Kcals/mol) for the first propagation step in the reaction below. (3 points, problem 4-20)



2. Provide an energy diagram for an exothermic two-step reaction, where the first step is the rate determining step. Correctly label each axis. (4 points)



3. Which sequence ranks the following carbocations in order of increasing stability? (3 points)

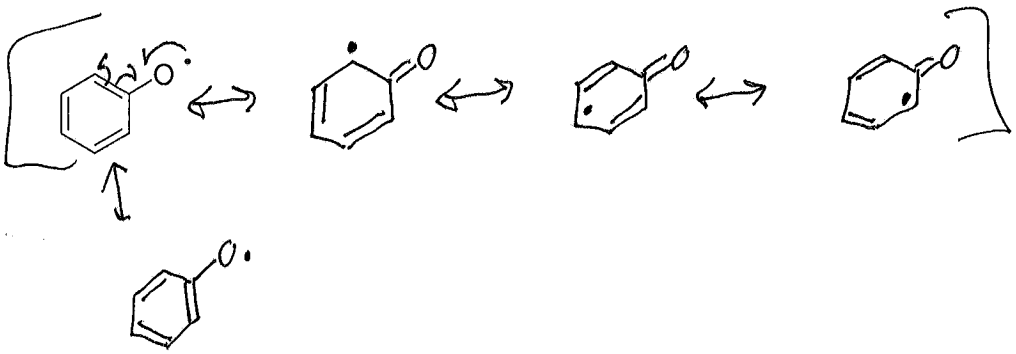


a) 1<2<3 b) 2<3<1 c) 3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2

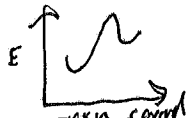
Name: Key

Organic I Lecture
Spring 2012
Quiz #3
(10 points)

1. Draw all important resonance structures for the following radical species. (3 points, problem 4-44)



2. If a one step reaction has a late transition state is it endothermic or exothermic? (1 points)



~~exothermic~~ endothermic

3. Based on the following theoretical reaction, provide a rate equation for a reaction that is second order and bimolecular. (2 points)

A + B ⟶ C + D

$Rate = k_R[A][B]$

4. Provide two possible termination steps resulting from treatment of methane with chlorine and light. (4 points)

$CH_4 + Cl_2 \xrightarrow{h\nu} CH_3Cl + H\text{-}Cl$

Init.: $Cl\text{-}Cl \longrightarrow 2\,Cl^{\bullet}$

Prop I: $Cl^{\bullet} + H\text{-}CH_3 \longrightarrow H\text{-}Cl + {}^{\bullet}CH_3$

Prop II: ${}^{\bullet}CH_3 + Cl\text{-}Cl \longrightarrow CH_3Cl + {}^{\bullet}Cl$

Termination:

$Cl^{\bullet} + {}^{\bullet}Cl \longrightarrow Cl_2$

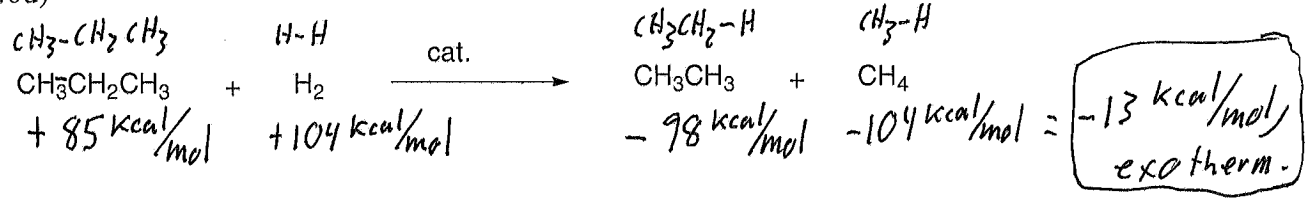
${}^{\bullet}CH_3 + {}^{\bullet}Cl \longrightarrow CH_3Cl$

${}^{\bullet}CH_3 + {}^{\bullet}CH_3 \longrightarrow CH_3\text{-}CH_3$

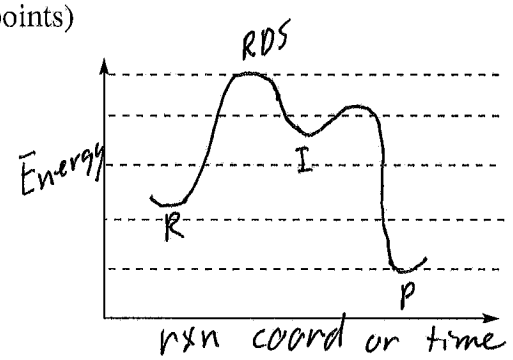
Name: Key

Organic I Lecture
Fall 2012
Quiz #3
(10 points)

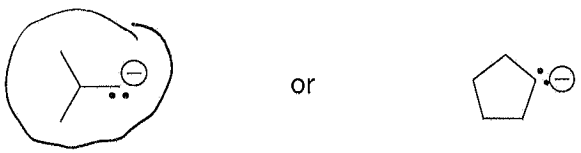
1. Use the table of bond dissociation enthalpies on the back of this page, to calculate the values of ΔH° in Kcal/mol for the following reaction. State whether the reaction is endothermic or exothermic. Show all of your work for full credit. (3 points, problem 4-40d)



2. Provide an energy diagram for a two step exogonic reaction where the first step is rate determining and was found to have a late transition state. Correctly label each axis. (4 points)

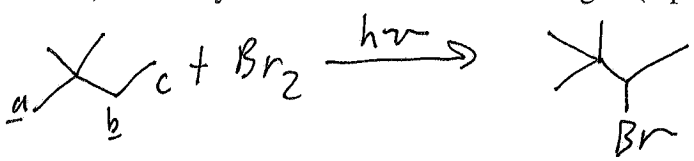


3. Circle the more stable carbanion. (1 points)



Less subst.

4. Draw a structure for the major monobromination product that would result from treating 2,2-dimethylbutane with bromine and light. (2 points)

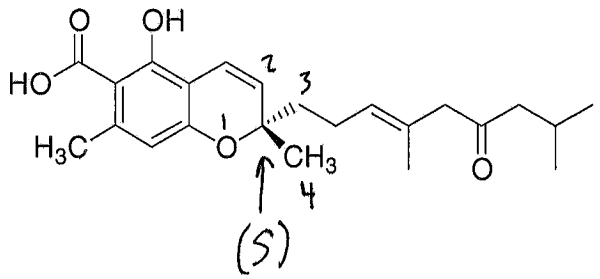


a 9x1 = 9
b 2x97=194
c 3x1 = 3

Name: Key

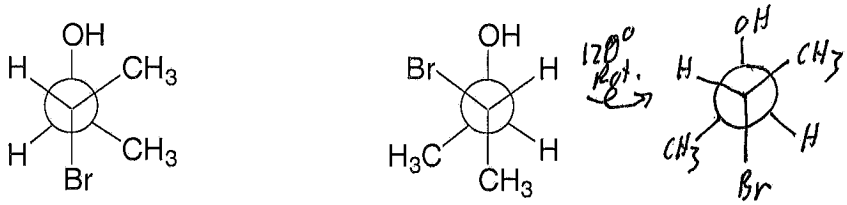
Organic I Lecture
Fall 2010
Quiz #4
(10 points)

1. Anthopogochromene A is isolated from Rhododendron anthopogonoides and is used as an expectorant and in treating chronic bronchitis (*J. Nat. Prod.*, **2010**, 1203). State the configuration of each chiral center in the following structure. (2 points)



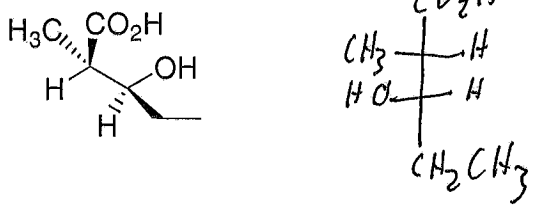
(S)

2. State the relationship between the two structures below as being the same structure, enantiotopic, diastereotopic or constitutional isomers. (2 points, problem 5-30e)



Diaster.
(1 center the same + 1 center different)

3. Translate the following perspective structure to a Fischer projection. (3 points)



4. Compound **A** has a specific rotation of -45°. If 2.0 g of compound **A** is dissolved in 15 mL of acetone and placed in a 10 cm long polarimetry tube, calculate the observed rotation of this solution. Show all of your work for full credit. (3 points)

$[\alpha]_D = -45^\circ$

$c = 2.0\,g/15\,mL$

$\ell = 1\,dm\ (10\,cm)$

$\alpha = ??$

$[\alpha]_D = \frac{\alpha}{c \times \ell}$

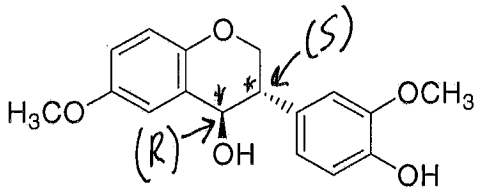
$-45 = \frac{\alpha}{(0.13\,g/mL)(1\,dm)}$

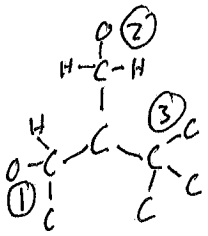
$\alpha = -6^\circ$

Name: Key

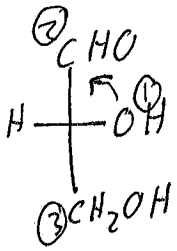
Organic I Lecture
Spring 2011
Quiz #4
(10 points)

1. The compound shown below is a cytochrome P50 inhibitory natural product (*J. Med. Chem.* **2011**, 102). Label each chiral center as having *R* or *S* configuration. (4 points)

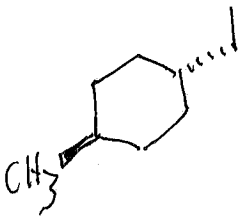


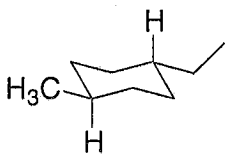


2. Draw (R)-glyceraldehyde, $HOCH_2CH(OH)CHO$, in a Fischer projection. (3 points, problem 5-17e)

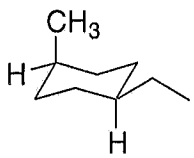


3. State the relationship between compound **A** and compound **B** as being the same compound, enantiomers, diastereomers, or not stereoisomers. (2 points)

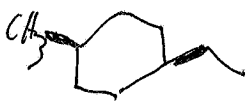




A



B



Diaster.

{ Not superimp.
Not mirror images.

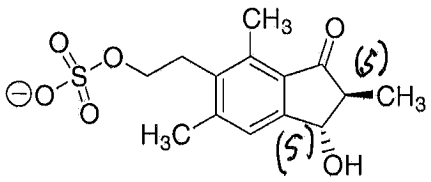
4. State whether compound **A** is chiral or achiral. (1 points)

Both are achiral having planes of symmetry.

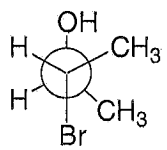
Name: Key

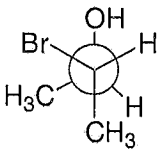
Organic I Lecture
Fall 2011
Quiz #4
(10 points)

1. The following compound was isolated from the aerial parts of Acrostichum aureum, and has been found to be effective against certain cancer cell lines (*J. Nat. Prod.* **2011**, 2010). Label each chiral center as having *R* or *S* configuration. (4 points)

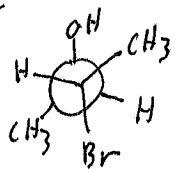


2. State the stereochemical relationship between the two structures below as being enantiomers, diastereomers, same compound or constitutional isomers. (2 points, probelm 5-30e)



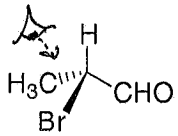


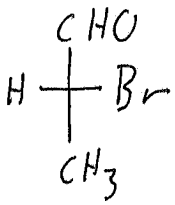
120° Rot



Diaster.

3. Convert the following perspective structure to a Fischer projection. (3 points)





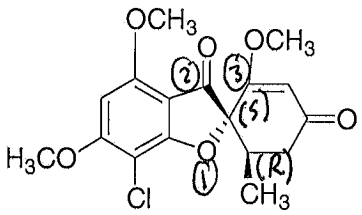
4. An instrument used to measure the rotation of plane polarized light is called a(n)

polarimeter . (1 point)

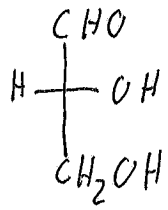
Name: Key

Organic I Lecture
Spring 2012
Quiz #4
(10 points)

1. Griseofulvin is a strong antifungal agent tested effective against pathogenic dermatophytes (*J. Med. Chem.*, **2012**, 652). Label each chiral center as having *R* or *S* configuration. (4 points)



2. Correctly draw (R) glyceraldehyde, $CH_2(OH)CH(OH)CHO$, in a Fischer projection. (3 points, problem 5-17e)



3. If dissolving 5 grams of glucose in 10 mL of water produced a solution having an observed rotation of +26.4° when placed in a 10 cm long polarimetry tube, what is the specific rotation of glucose? Show all of your work for full credit. (3 points)

$c = 5\,g/10\,mL$

$\alpha = +26.4^\circ$

$l = 1\,dm$

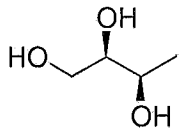
$10\,cm = 1\,dm$

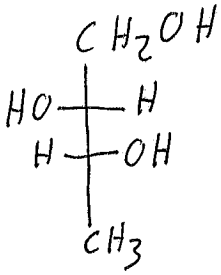
$$[\alpha]_D = \frac{\alpha}{c \times l} = \frac{+26.4^\circ}{(0.5\,g/mL)(1\,dm)} = \boxed{+52.8^\circ}$$

Name: Key

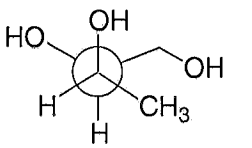
Organic I Lecture
Fall 2012
Quiz #4
(10 points)

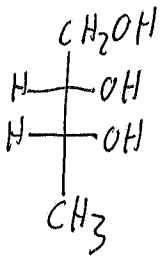
1. Translate the following perspective structure to a Fischer projection. (3 points, problem 5-28d)





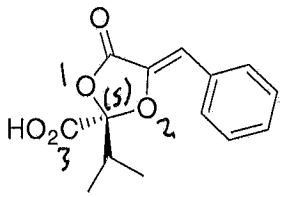
2. State the stereochemical relationship between the structure in problem 1 and the structure below as being same structure, enantiomer, diastereomer, or constitutional isomers. (2 points)





Diastereomers

3. Guignardic acid, shown below, has been found to be phytotoxic (*J. Nat. Prod.* **2012**, 1265). Assign all chiral centers as having *R* or *S* configuration. (2 points)



4. Given that sucrose has a specific rotation of +66.5°, what is the observed rotation of solution made from 1.5 g sucrose dissolved in 10 mL water and placed in a 10 cm long sample cell. Show all of your work for full credit. (3 points)

$[\alpha]_D = +66.5^\circ$

$\alpha = ??$

$c = 1.5\,g/10\,mL$

$l = 1\,dm$

$10\,cm = 1\,dm$

$[\alpha]_D = \frac{\alpha}{c \times l}$

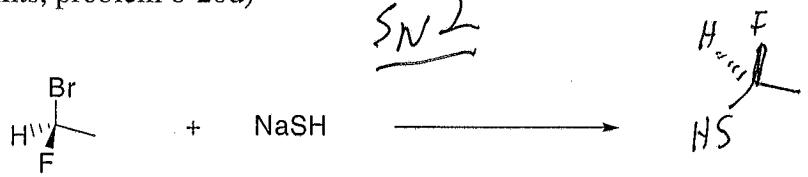
$+66.5^\circ = \frac{\alpha}{(.15\,g/mL)(1\,dm)}$

$\alpha = +10^\circ$

Name: Key

Organic I Lecture
Spring 2010
Quiz #5
(10 points)

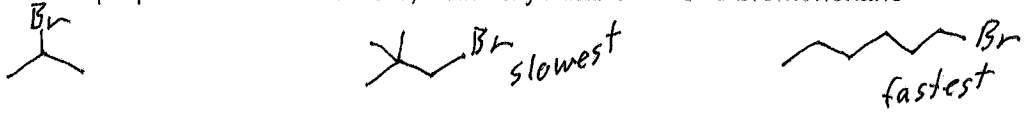
1. Complete the following reaction by filling in the structure of the expected product. (3 points, problem 6-20d)



2. Provide an energy diagram of a typical S_N1 reaction. (2 points)

3. Which sequence ranks the following electrophiles in order of increasing reactivity in an S_N2 reaction? (3 points)

1 2-bromopropane **2** 1-bromo-2,2-dimethylbutane **3** 1-bromohexane



a) 1<2<3 b) 2<3<1 c) 3<1<2 d) 3<2<1 (e) 2<1<3 f) 1<3<2

4. Circle the stronger nucleophile out of the following pair of structures. (2 points)

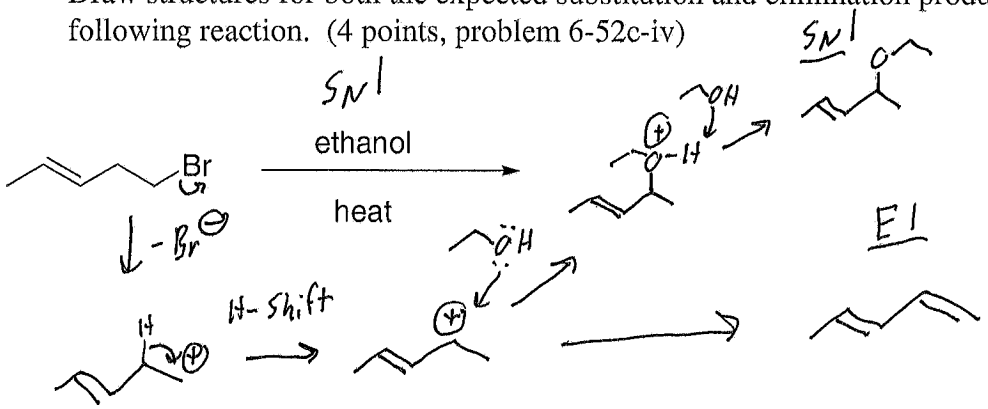
$NaPH_2$ or NaOH

N O
P S

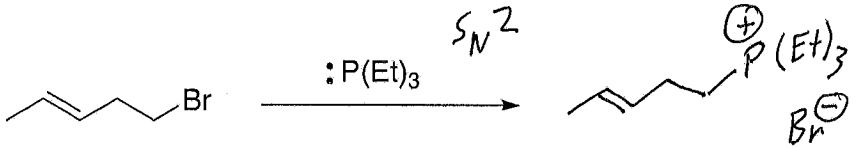
Name: Key

Organic I Lecture
Spring 2011
Quiz #5
(10 points)

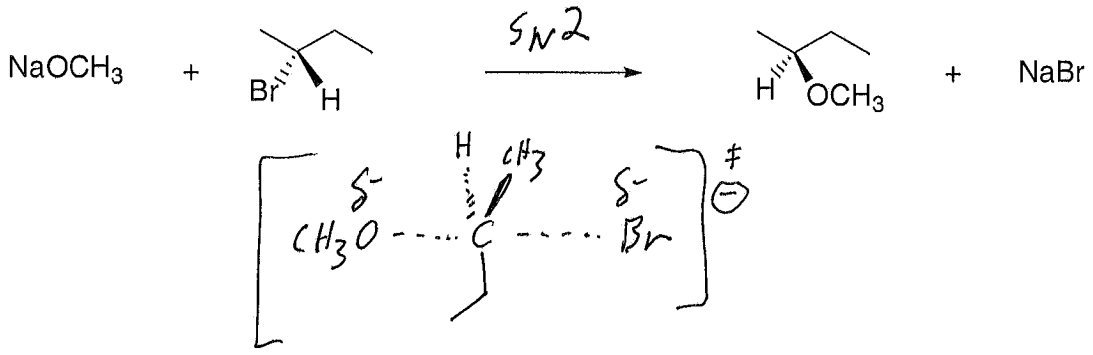
1. Draw structures for both the expected substitution and elimination products of the following reaction. (4 points, problem 6-52c-iv)



2. Predict the major product of the following reaction. (3 points)



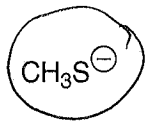
3. Draw the transition state for the following reaction. (3 points)



Name: Key

Organic I Lecture
Fall 2011
Quiz #5
(10 points)

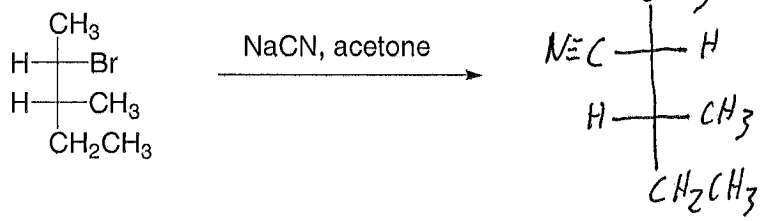
1. Circle the species below that would be the strongest nucleophile in a S_N2 reaction. (2 points, problem 6-16f)



or CH_3OH

O
P ↓

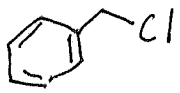
2. Complete the reaction below by drawing a structure for the expected product in a Fischer projection. (2 points)



Inversion of config.

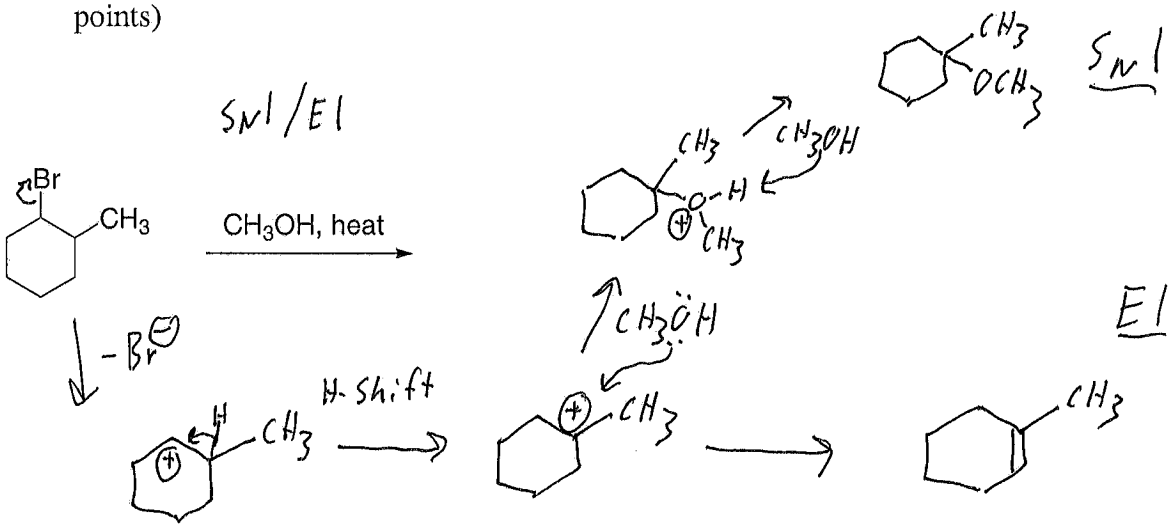
+ NaBr

3. Provide an example of a benzyl chloride compound. (2 points)



Multiple answers accepted

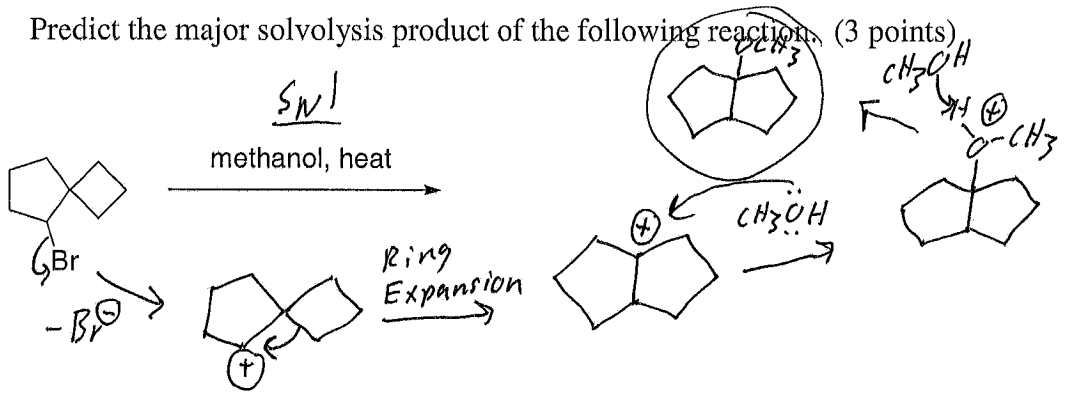
4. Predict the major substitution and elimination products of the following reaction. (4 points)



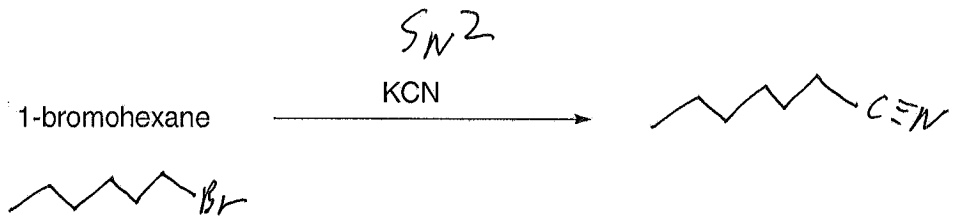
Name: Key

Organic I Lecture
Spring 2012
Quiz #5
(10 points)

1. Predict the major solvolysis product of the following reaction. (3 points)



2. Predict the major product of the reaction below. (2 points, problem 6-12b)

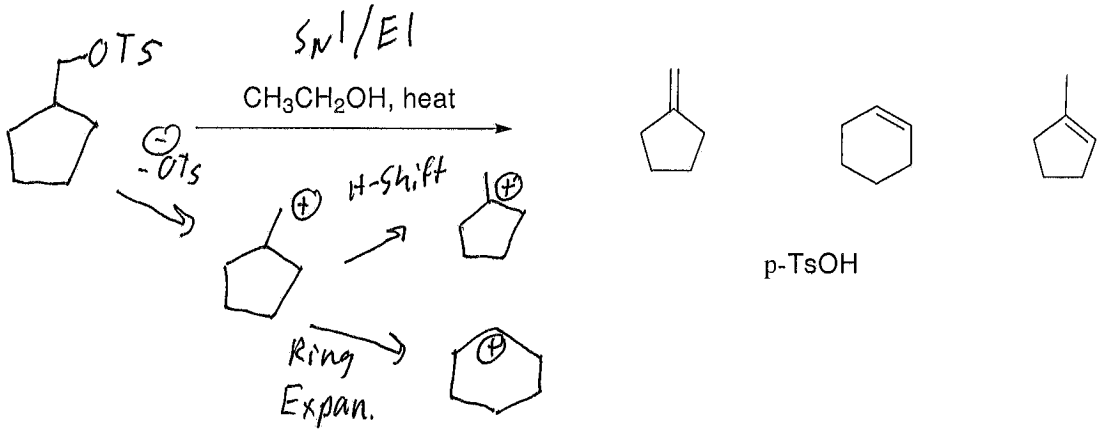


3. Circle the stronger nucleophile in the pair below. (2 points)

C N O F

NaOH or $NaNH_2$

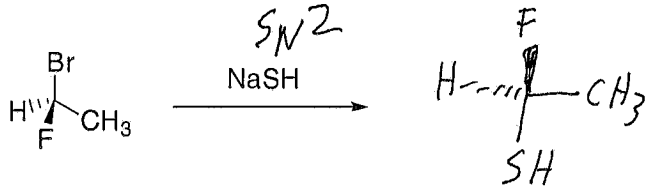
4. Based upon the following E1 products shown below, draw a correct structure for the starting material. (3 points)



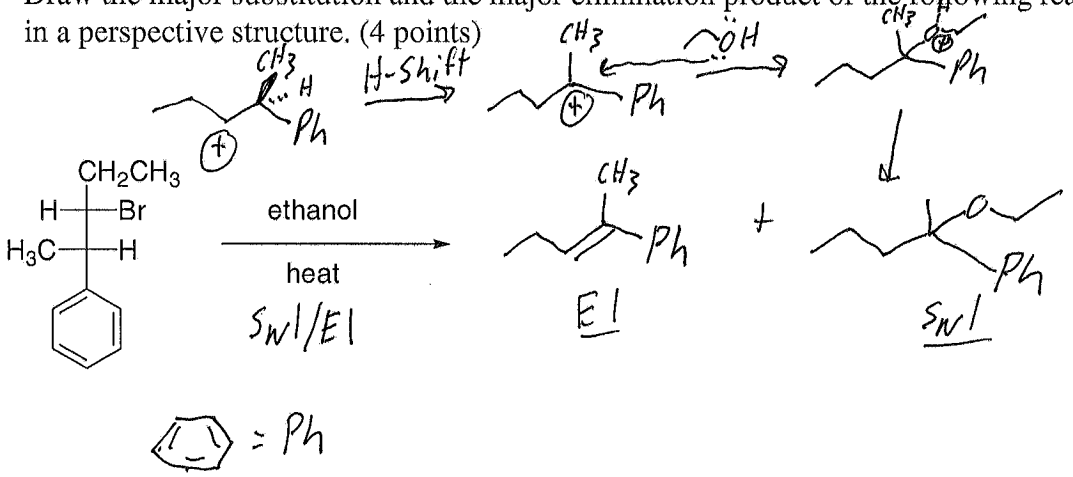
Name: Key

Organic I Lecture
Fall 2012
Quiz #5
(10 points)

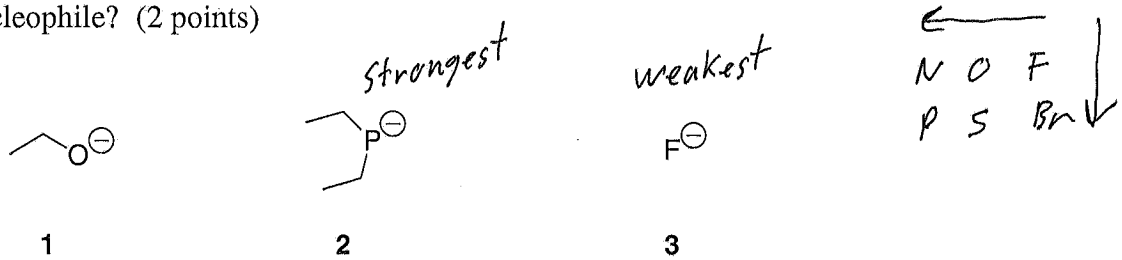
1. Complete the reaction below by drawing a correct structure for the expected product. (3 points, problem 6-20d)



2. Draw the major substitution and the major elimination product of the following reaction in a perspective structure. (4 points)



3. Which sequence ranks the following structures in order of increasing strength as a nucleophile? (2 points)



a) 1<2<3 b) 2<3<1 c) 3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2