CHEM 3311-100
Exam 2, October 22
Fall 2009

By printing my name below, I pledge that
"On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance on this work."

Name Answer Key

Please Circle Your Recitation TA's Name: Jacquie Richardson

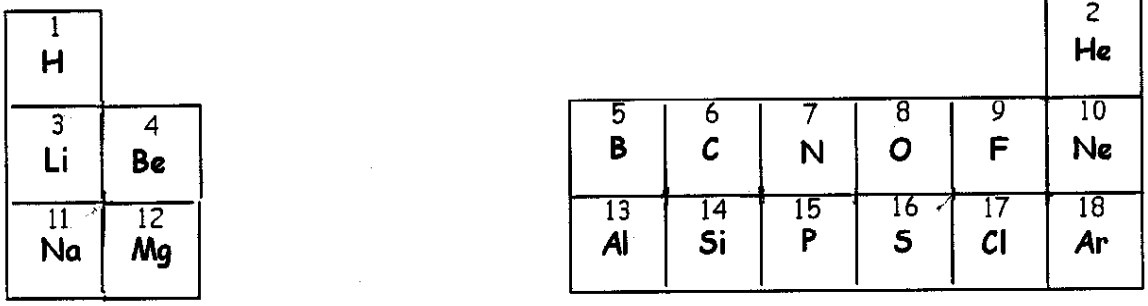
Noel Thomsen

Recitation Day & Time _____ (example, Monday, 8 AM)

Grading Information

Page #	Points Possible	Your Score
2 (Question 1)	15	__
3 (Question 2)	16	__
4 (Question 3)	18	__
5 (Question 3)	15	__
6 (Question 4)	15	__
7 (Question 5)	21	

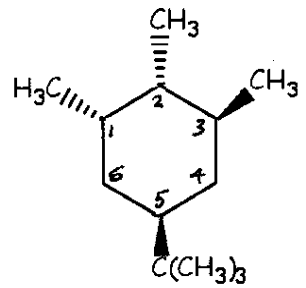
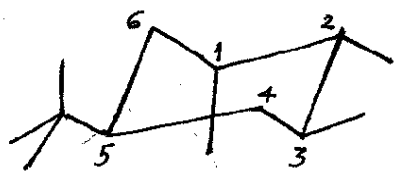
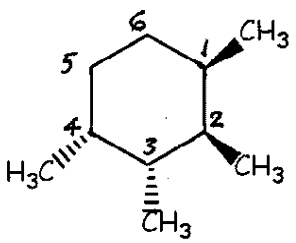
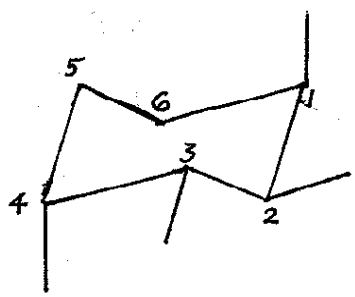
_____ **TOTAL (out of 100)**



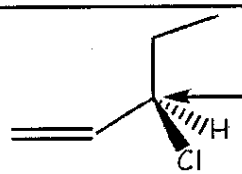
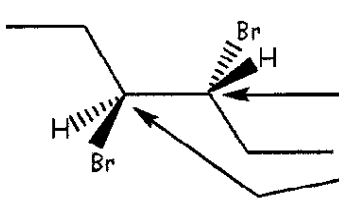
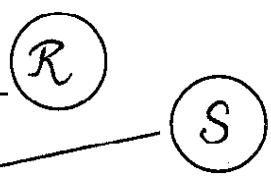
General Instructions
(1) This is a CLOSED BOOK exam! No notes and molecular models are allowed.
(2) Please WRITE LEGIBLY & CLEARLY; minimize erasing and draw a line through information that should not be graded. Untidy work will NOT BE GRADED.
(3) Please follow instructions provided in each question. The grading rubric is based on the information requested in the question.
(4) You have 2 hours to complete the exam.
(5) Write your **name at the top of each page**, starting with page 2 and **sign the Honor Code pledge** on the cover page.
(6) Use the back of exam pages as scratch paper, if necessary.
(7) If caught cheating, you will receive at best an F for this exam. The instructor reserves the right to proceed further in compliance with university policies.
(8) If you complete the exam early, please leave the room quietly after handing in your exam!

Name Answer Key

1A. (8 points) Draw the structure for each compound in its more stable chair conformation.

Compound	More Stable Chair Conformation
	
	

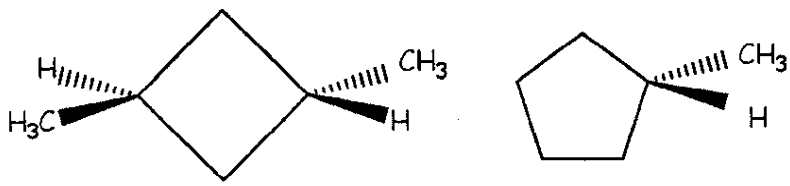
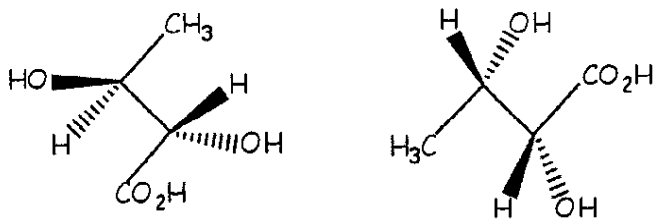
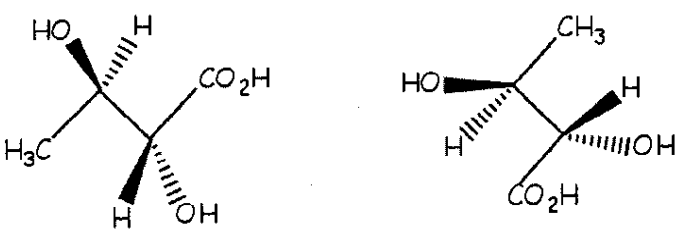
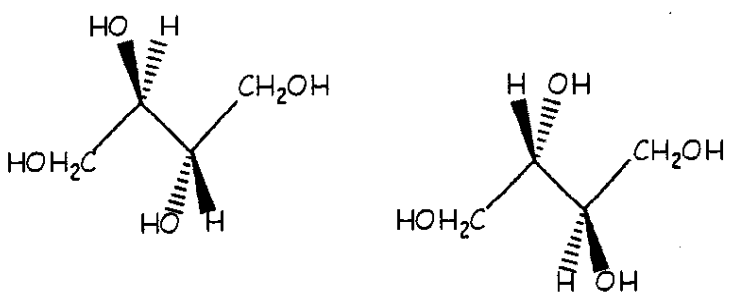
1B. (7 points) Determine the **absolute (R, S) configuration(s)** for each compound and write a correct IUPAC name. Please write "R" or "S" in the appropriate circle.

Compound	Absolute (R,S) Configuration(s)	IUPAC Name
		(R)-3-chloro-1-pentene or (R)-3-chloropent-1-ene
		(3S,4R)-3,4-dibromohexane or (3R,4S)-3,4-dibromohexane

Points on this page ____

Name Answer Key

2. (16 points) What is the relationship between each pair of structures? Circle the relevant answer from the choices listed.

	(Constitutional Isomers) Enantiomers Diastereomers Meso Compound Unrelated
	Constitutional Isomers Enantiomers (Diastereomers) Meso Compound Unrelated
	Constitutional Isomers (Enantiomers) Diastereomers Meso Compound Unrelated
	Constitutional Isomers Enantiomers Diastereomers (Meso Compound) Unrelated

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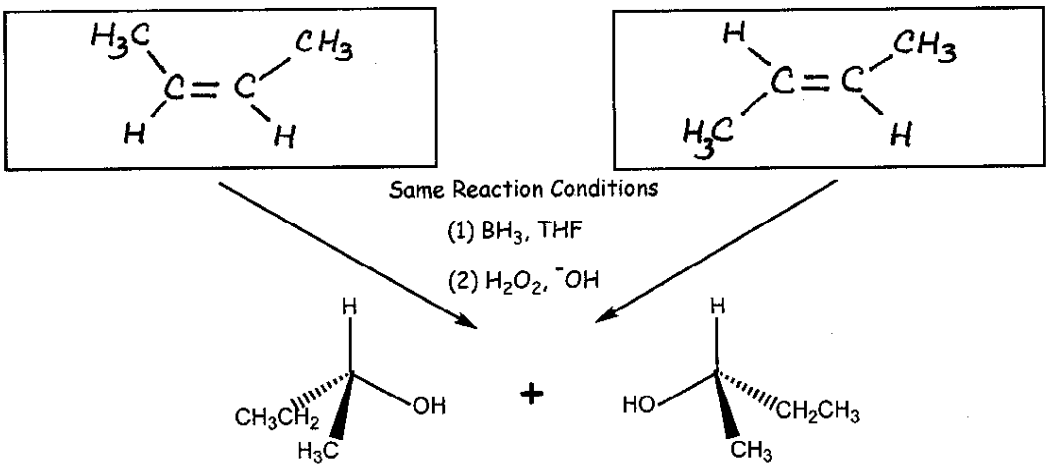
NAME Answer Key

3A. (18 points) Fill in the boxes with the structures of the appropriate reactant(s) or product(s). To receive FULL CREDIT, please **SHOW STEREOCHEMISTRY ONLY AT STEREOGENIC CENTERS** using line-and-wedge structures. **Circle the relationship between products** in reactions B & C using the terms constitutional isomers, diastereomers, enantiomers, identical or meso.

(A)

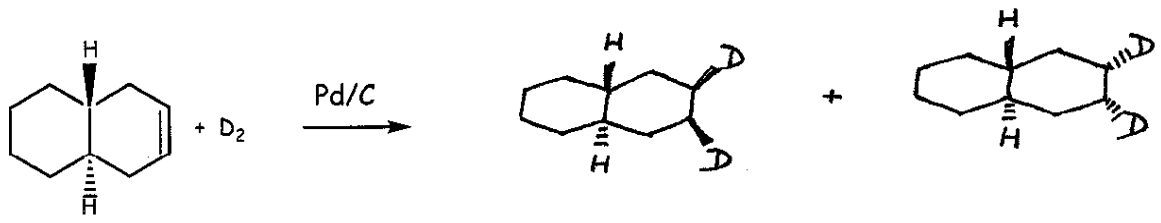


(B)

Constitutional Isomers — Diastereomers

(Enantiomers) — Identical

(C)



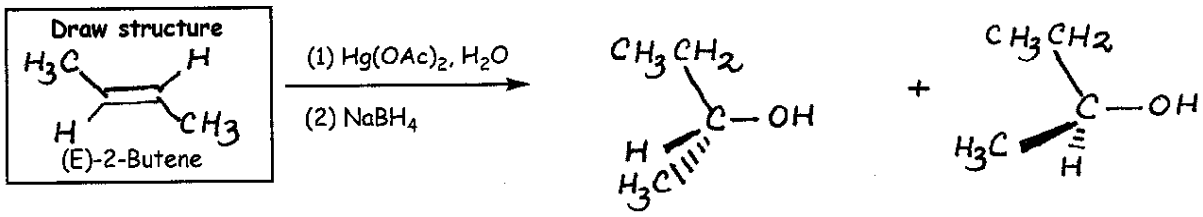
Constitutional Isomers — Diastereomers

Enantiomers — (Identical)

Points on this page ___

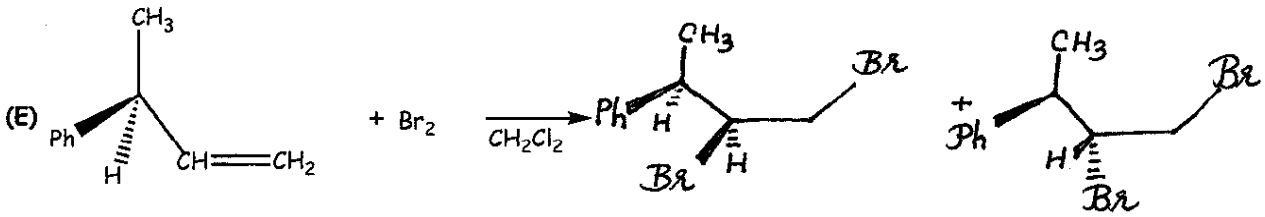
NAME Answer Key

3B. (15 points) Fill in the boxes with the structures of the appropriate reactant(s) or product(s). To receive FULL CREDIT, please **SHOW STEREOCHEMISTRY ONLY AT STEREOGENIC CENTERS** using line-and-wedge structures. **Circle the relationship between products** in reactions **D** & **E** using the terms constitutional isomers, diastereomers, enantiomers, identical or meso.

(D) 

Constitutional Isomers Diastereomers

(Enantiomers) Identical

(E) 

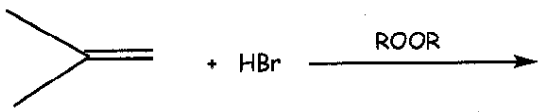
Constitutional Isomers (Diastereomers)

Enantiomers Identical

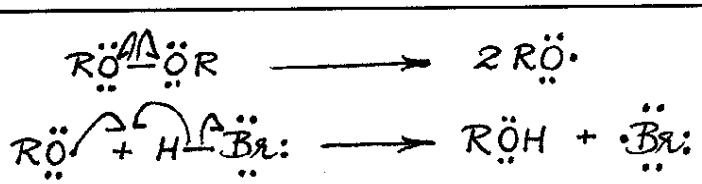
Points on this page ___

NAME Answer Key

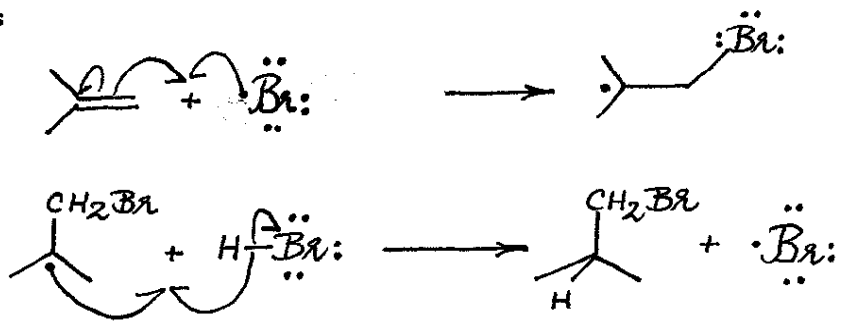
4. (15 points) Write a CLEARLY LEGIBLE stepwise mechanism for the reaction shown below. Write the initiation, propagation, and termination steps in the appropriate boxes provided to receive FULL CREDIT. **You MUST SHOW all relevant arrows, and lone pairs or unpaired electrons.**



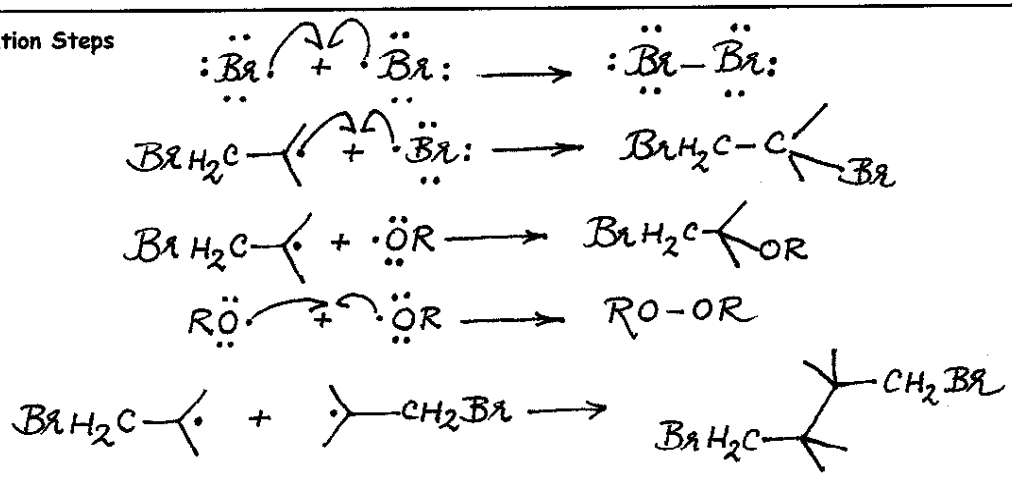
Initiation Steps



Propagation Steps



Termination Steps



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NAME Answer Key

5. (21 points) Multiple Choice: **Please circle the correct answer** (A, B, C, or D).

(I) Which compound can exist as a meso form?
(A) 1,2-dibromobutane
(B) 1,3-dibromobutane
(C) 1,4-dibromobutane
(D) 2,3-dibromobutane

(II) Circle the **incorrect** statement.
(A) The peroxy linkage in peroxides is a weak bond.
(B) Free radicals have unpaired electrons.
(C) Propagation steps may be endothermic or exothermic.
(D) Termination steps in free radical reactions are always endothermic.

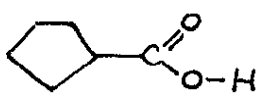
(III) Which alkene will have the highest heat of combustion?
(A) 1-Butene
(B) 2-Butene
(C) 2-Methyl-2-butene
(D) 1-Pentene

(IV) Which cycloalkane will have the lowest heat of combustion?
(A) Cyclopentane
(B) *cis*-1,2-Dimethylcyclopropane
(C) *trans*-1,2-Dimethylcyclopropane
(D) Methylcyclobutane

(V) Circle the **incorrect** statement.
(A) Achiral molecles are optically active.
(B) Enantiomers rotate plane-polarized light through the same angle in opposite directions.
(C) Meso compounds contain asymmetric carbon atoms.
(D) Racemic mixtures are optically inactive.

(VI) What happens when (**S**)-4-methyl-hex-1-ene reacts with HBr?
(A) A pair of diastereomeric products in uequal amounts is formed.
(B) A single enantiomer of a chiral product is formed.
(C) A pair ofenantiomeric products in equal amounts is formed.
(D) A meso compound is formed.

(VII) What is the unsaturation number in cyclopentane carboxylic acid?
(A) 1
(B) 2
(C) 3
(D) 4



1 ring & 1 double bond

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