

CHEM 3311-100

Exam 3, Fall 2011

Time: 2 Hours

By printing my name below, I pledge that

“On my honor, as a University of Colorado-Boulder student, I have neither given nor received unauthorized assistance on this work.”

Your Name (PRINTED IN CAPITAL LETTERS)

Last Name (-1 if not printed in capital letters) **First Name** **Middle Initial**

Your CU Student ID # (NOT Your Social Security Number) [-1 if missing or incorrect]

Your Recitation TA's Name [-1 if missing or incorrect]

Last Name

Circle Your Recitation Day & Time [-1 if missing or incorrect]

Mon 8 AM (Clancey)	Mon 2 PM (Zhu)	Mon 5 PM (Barbour)	Tues 8 AM (Chaffey)
Tues 5 PM (Barbour)	Wed 8 AM (130) Mai	Wed 8AM (131) Clancey	
Wed 11 AM (Alawneh)	Wed 12 PM (Chaffey)	Wed 5 PM (Alawneh)	Thurs 8 AM (Clancey)

Grading Details

Page # (Question #s)	Points Possible	Points Earned
3 (Q 1)	20	_____
4 (Q 1)	20	_____
5 (Q 2)	20	_____
6 (Q 3)	20	_____
7 (Q 4)	20	_____

TOTAL SCORE (out of 100) _____

General Instructions

- (1) This is a CLOSED BOOK exam; nothing is allowed except a few pencils or pens, eraser, and student ID. Clear Ziploc bag with molecular models is allowed!
- (2) Please WRITE LEGIBLY & CLEARLY; minimize erasing! Untidy/illegible work will NOT be graded.
- (3) Print your name after acknowledging the student honor code. Write your name on each exam page in the space provided.
- (4) **Scantron Sheet** MUST include your (i) name and (ii) student ID # **written** and **bubbled** in!!!!
- (5) Scratch paper is provided.
- (6) If suspected of/caught cheating, you will receive at best an F for the exam. The instructor reserves the right to proceed further in compliance with university policies on academic violations.
- (7) You may NOT leave the room after the exam has started (contact a proctor for extenuating circumstances). Please leave quietly after you submit your exam to the TA or instructor.

Periodic Table

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Ha	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

CHEM 3311 Table of Acidities

Acid pK_a Value

HI -10.1

HCl -3.9

H₃O⁺ -1.7CH₃COOH 4.7NH₄⁺ 9.3

Phenol 10

H₂O 15.7

Alcohols 16-18

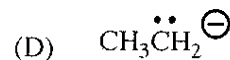
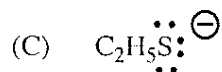
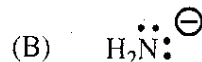
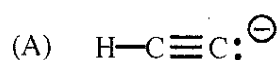
HC≡CH 26

NH₃ 36H₂C=CH₂ 45CH₄ 60

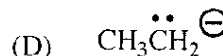
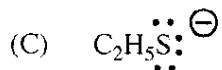
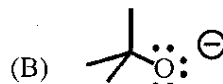
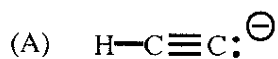
1) Multiple Choice Questions (4 points each)

Scantron Sheet MUST include your (i) name and (ii) student ID # written and bubbled in!!!!

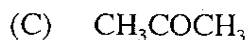
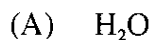
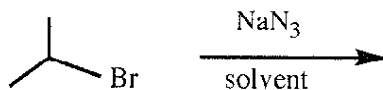
(i) Select the strongest base among the nucleophiles listed.



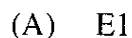
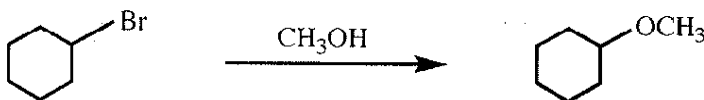
(ii) Select the weakest nucleophile.



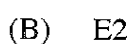
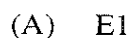
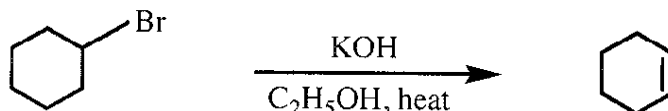
(iii) In which solvent will this reaction proceed at the fastest rate?



(iv) Select the major mechanistic pathway for the reaction shown.

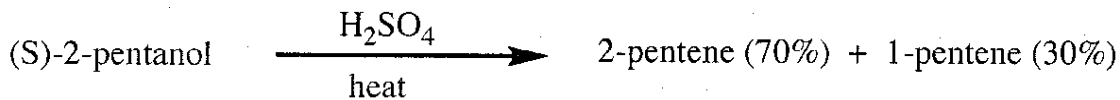


(v) Select the major mechanistic pathway for the reaction shown.



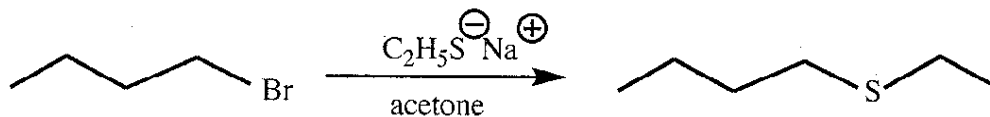
Scantron Sheet MUST include your (i) name and (ii) student ID # **written** and **bubbled** in!!!!

(vi) Select the major mechanistic pathway for the reaction shown.



- (A) E1 (B) E2
(C) S_N1 (D) S_N2

(vii) Select the major mechanistic pathway for the reaction shown.



- (A) E1 (B) E2
(C) S_N1 (D) S_N2

(viii) What gas is released when CH₃MgBr is added to D₂O?

- (A) CH₄ (B) CD₄
(C) CH₃D (D) CHD₃

(ix) Which dimethylcyclohexane exists as a pair of conformational enantiomers?

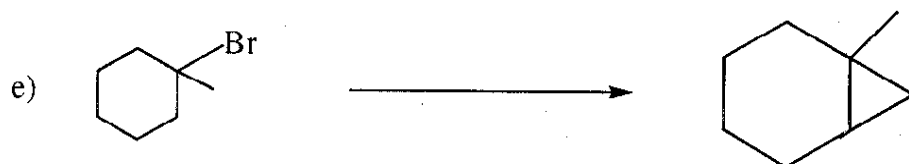
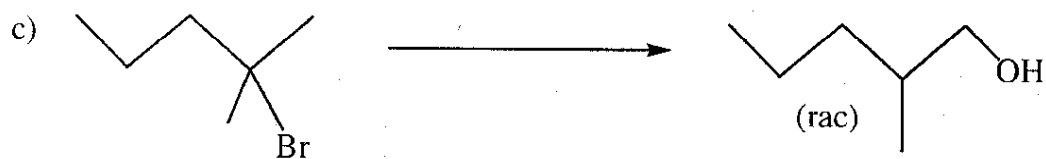
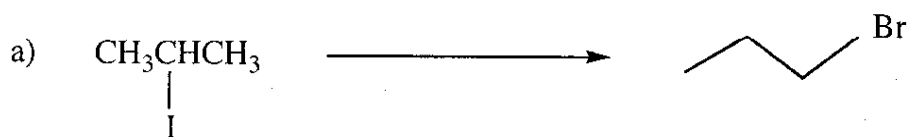
- (A) 1,1-Dimethylcyclohexane (B) *cis*-1,2-Dimethylcyclohexane
(C) *cis*-1,3-Dimethylcyclohexane (D) *trans*-1,4-Dimethylcyclohexane

(x) Which compound has the highest boiling point?

- (A) 1-Butanol (B) 2-Methyl-1-propanol
(C) Diethylether (D) Pentane

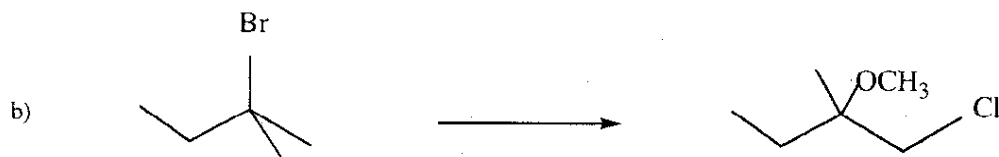
2) 20 points

Propose reagents for accomplishing each transformation using the fewest number of steps. For example, hydroboration/oxidation or oxymercuration/reduction counts as one step. Try to make your synthesis efficient (target molecule should be the major product). You must use the starting material given, and you may use any other reagents you need.



3) 20 points

Propose a synthesis for each target molecule starting with the reactant provided. Try to make your synthesis efficient (target molecule must be the major product and produced in the highest yield possible). More than one step may be necessary; show intermediate steps (including product of each step) and reagents/solvents involved. Do not show intermediates or mechanisms!



4) 20 points total

Provide the products and mechanisms for each reaction. Show intermediates, lone pairs, formal charges, and all the arrows required for each step. If a reaction would produce stereoisomers, draw each isomer and indicate if they will be produced in equal or unequal amounts. You are NOT REQUIRED to write a mechanism for each stereoisomer; just show one mechanism for the reaction and then draw any other stereoisomers that would be produced; state "equal" or "unequal amounts" as appropriate.

