

Answer Key

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. **Molecular models in a transparent/clear Ziploc bag 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

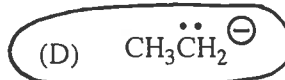
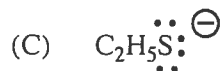
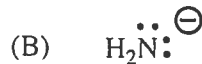
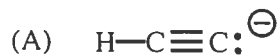
Acid pK_a Value

HI	-10.1
HCl	-3.9
H ₃ O ⁺	-1.7
CH ₃ COOH	4.7
NH ₄ ⁺	9.3
Phenol	10
H ₂ O	15.7
Alcohols	16-18
HC≡CH	26
NH ₃	36
H ₂ C=CH ₂	45
CH ₄	60

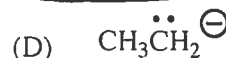
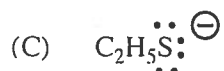
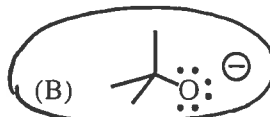
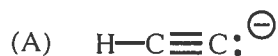
1) Multiple Choice Questions (4 points each)

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

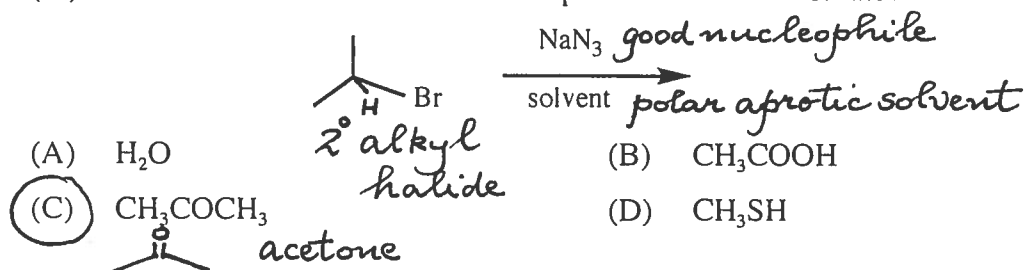
(i) Select the strongest base among the nucleophiles listed.



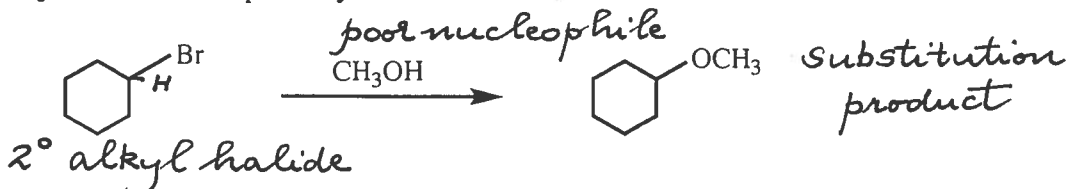
(ii) Select the weakest nucleophile.



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



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

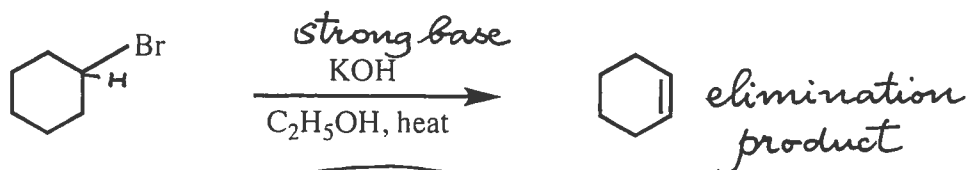


(A) E1

(B) E2

(C) $\text{S}_{\text{N}}1$ (D) $\text{S}_{\text{N}}2$

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



(A) E1

(B) E2

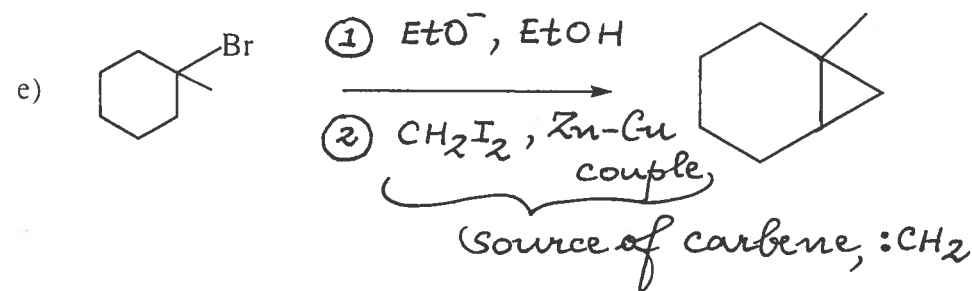
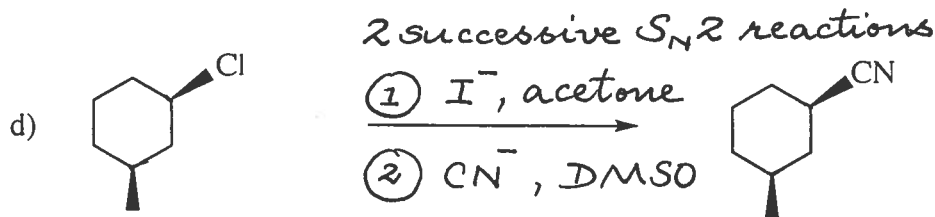
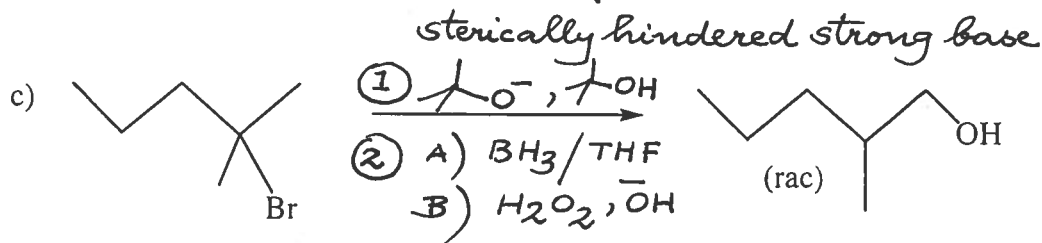
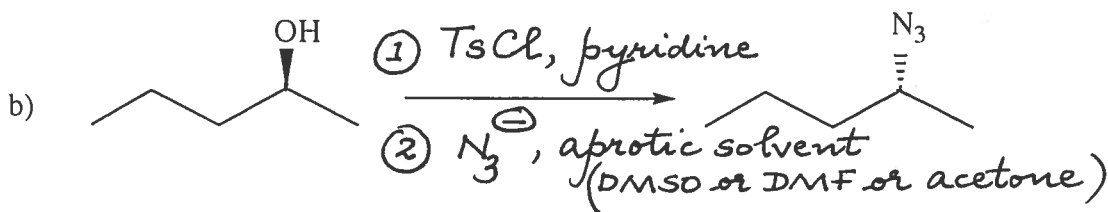
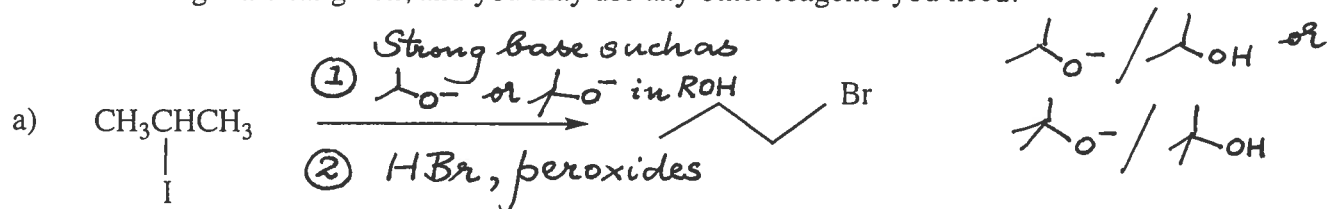
(C) $\text{S}_{\text{N}}1$ (D) $\text{S}_{\text{N}}2$

Total Points Possible: 20

Your Score _____

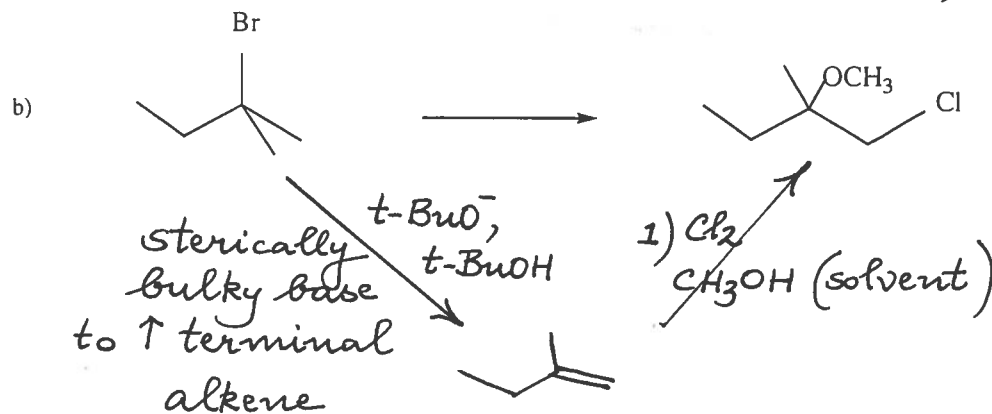
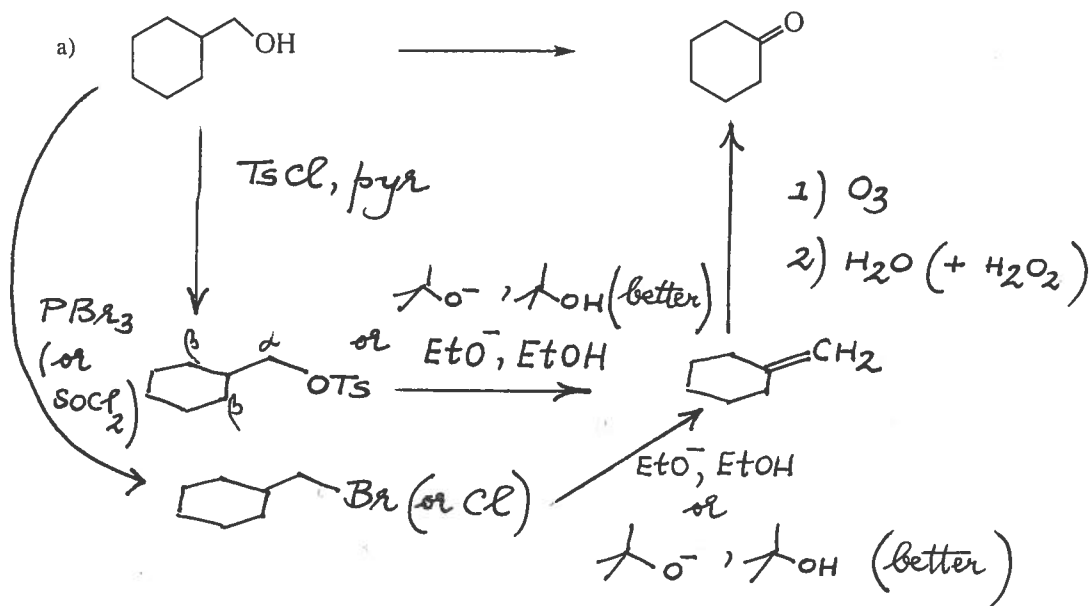
2) 20 points

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. If the compound is meso, draw ONLY ONE structure and label it "meso". 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.

