Chemistry 334

Final Examination

May 18, 1998 Professor Charonnat

Name: _____

Be certain that your examination has eleven (11) pages including this one.

Put your name on **each** page of this examination booklet.

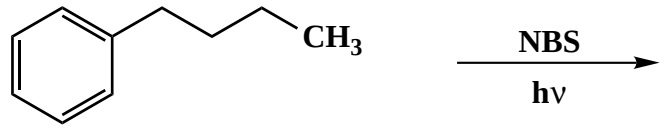
By putting your name on this examination booklet you agree to abide by
California State University, Northridge policies of academic honesty and integrity.

Name:_____

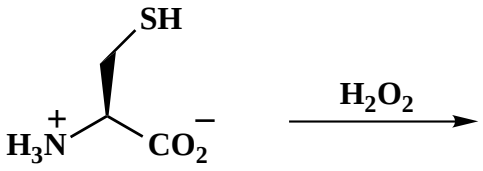
1. (50 points)

For each of the following ten (10) questions draw the structure of the expected major organic product. If relevant, explicitly specify absolute and/or relative stereochemistry.

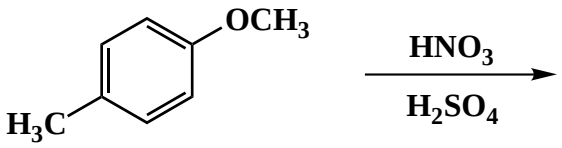
A.



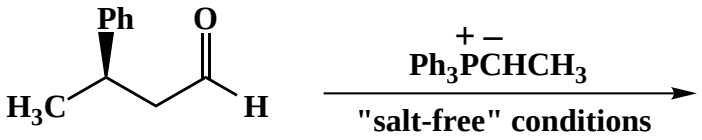
B.



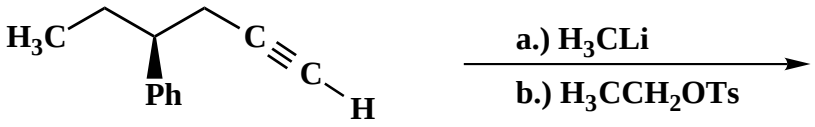
C.



D.



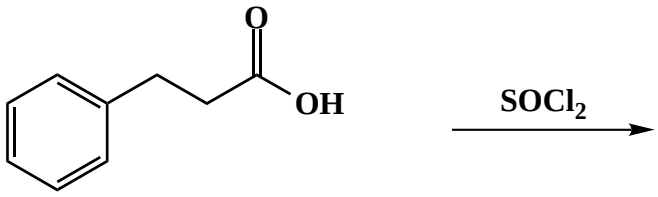
E.



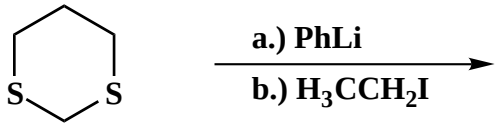
Name:_____

1. (cont.)

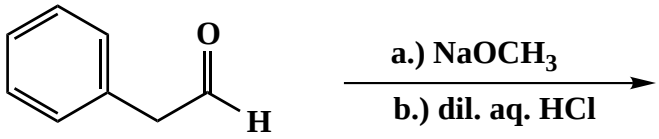
F.



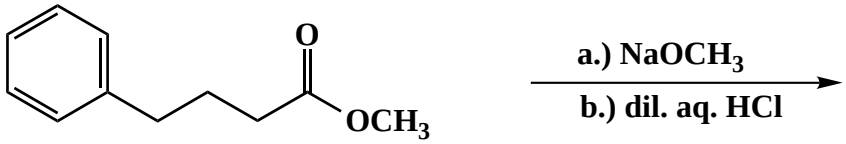
G.



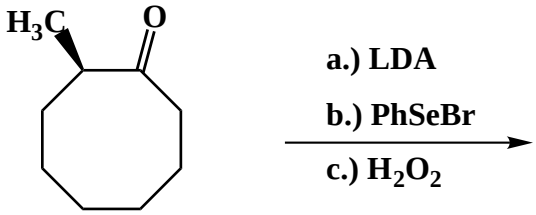
H.



I.



J.



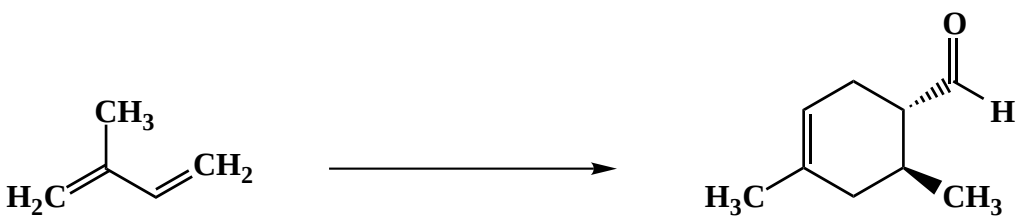
Name:_____

2. (50 points)

For each of the following ten (10) questions draw the specific reagent(s) necessary to effect the transformation shown. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly.

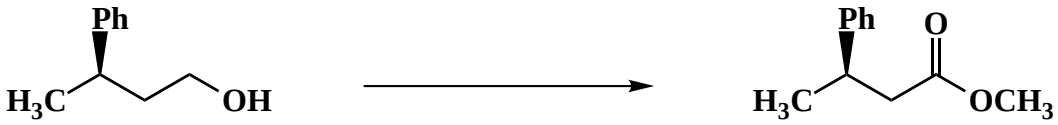
A.

B.

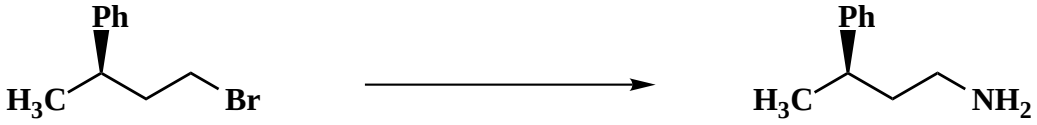


(racemic)

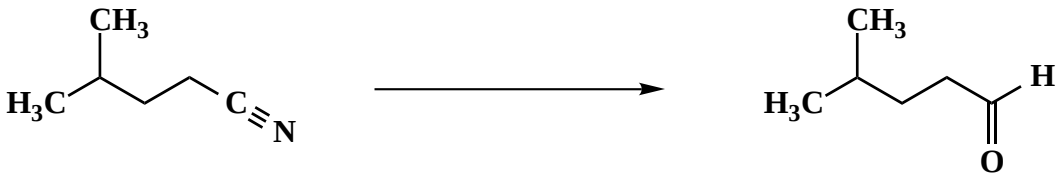
C.



D.



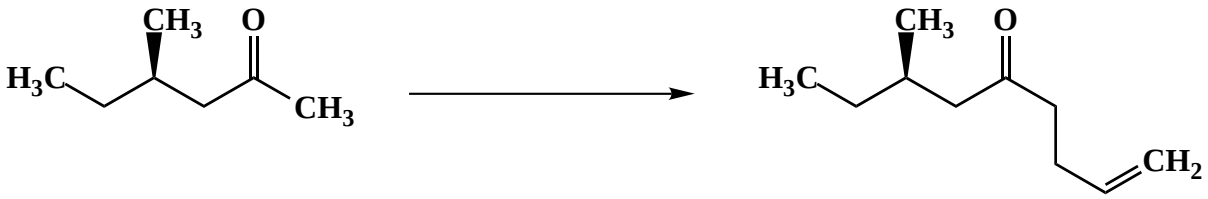
E.



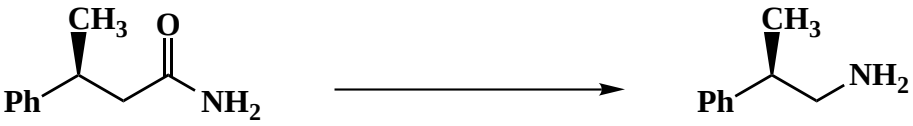
Name:_____

2. (cont.)

F.

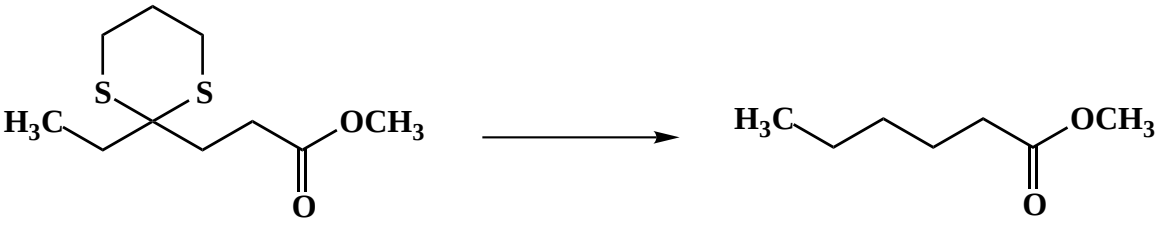


G.

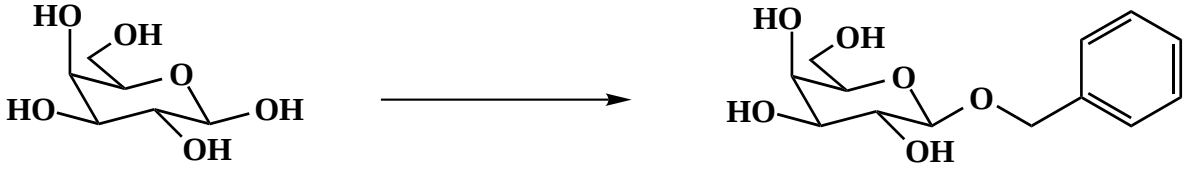


H.

I.



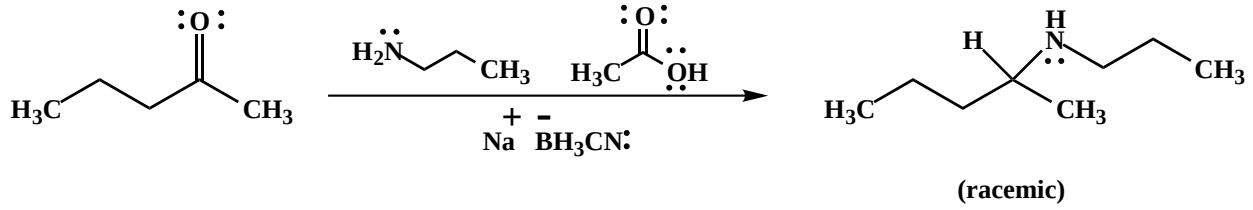
J.



Name:_____

3. (25 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. Clearly denote reversibility or irreversibility for each primary mechanistic step. Describe in one sentence why a racemic mixture is obtained.

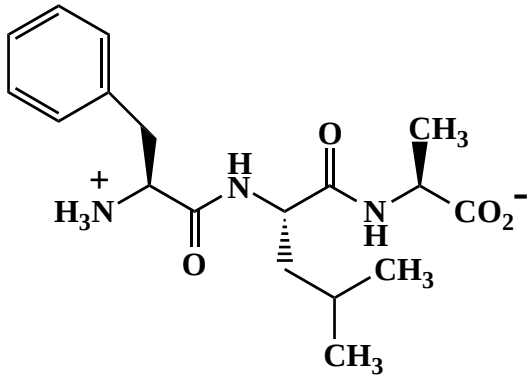


(racemic)

Name:_____

4. (25 points)

Design a synthesis of the following tripeptide from the corresponding BOC-protected α-amino acids. Use any inorganic and organic reagents that are necessary. Show all reagents and stable synthetic intermediate compounds. (**N.B.** Do not draw mechanisms for each synthetic transformation!)



Name:_____

5. (25 points)

Give a specific example of each of the following.

A. any terpene:

B. any reducing carbohydrate:

C. any nonreducing carbohydrate:

D. any naturally-occurring wax:

E. any prostaglandin:

F. any naturally-occurring phospholipid:

G. any naturally-occurring neutral α-amino acid (zwitterionic form):

H. any naturally-occurring saturated triacylglycerol:

I. any enzyme:

J. any two compounds that are anomers of each other:

K. any steroid:

L. any fibrous protein:

M. any globular protein:

Name:_____

6. (25 points)

The infrared, ^{1}H NMR and ^{13}C NMR (broadband ^{1}H decoupled) spectra of compound A ($C_8H_8O_2$) are shown below. Clearly assign all the resonances that you can identify with certainty and draw the structure of compound A. (Correlation tables are included separately.)

The infrared spectrum is unavailable due to copyright considerations.

Name:_____

6. (continued)

The ^{1}H NMR and ^{13}C NMR spectra are unavailable due to copyright considerations.

Name:_____

6. (continued)

Infrared absorption assignments:

wave number (cm^{-1})	**functional group**	**type of vibration (stretch or bend)**

^{1}H NMR assignments:

chemical shift (ppm)	**assignment**	**explanation of multiplicity**

^{13}C NMR assignments:

chemical shift (ppm)	**assignment**	**explanation of multiplicity**

structure of compound A:

Congratulations!

1	/50
2	/50
3	/25
4	/25
5	/25
6	/25
Total:	/200