CHEMISTRY 3311, Fall 2004
Professor Walba
Third Hour Exam, November 18

scores:

1) 20

2) 20

3) 20

4) 20

5) 20

_____
100

CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

Name (printed): Key

Signature: _____

Recitation TA Name: _____

Recitation day and time: _____

This is a closed-book exam. The use of notes, models, calculators, scratch paper, or any other paraphernalia will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

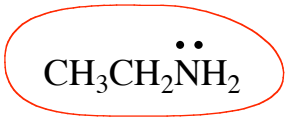
*PLEASE read the questions carefully!*

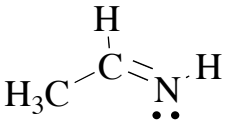
# Partial Periodic Table

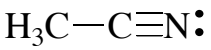
| 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A |
|---|---|---|---|---|---|---|---|
| 1 H | | | | | | | 2 He |
| 3 Li | 4 Be | 5 B | 6 C | 7 N | 8 O | 9 F | 10 Ne |
| 11 Na | 12 Mg | 13 Al | 14 Si | 15 P | 16 S | 17 Cl | 18 Ar |
| | | | | | | 35 Br | |
| | | | | | | 53 I | |

Name:_____

1) (20 pts) a) Circle the strongest Brønsted base in the following list.



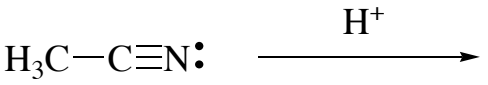


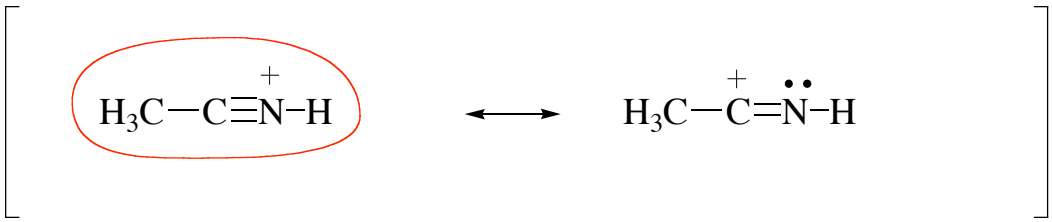


b) Give the reason for your answer to part 1a in one word (or phrase) from the following: Octets, electronegativity, or Coulomb's Law

Electronegativity

c) Give the two most important resonance contributors to the structure of protonated acetonitrile – the conjugate acid of acetonitrile acting as a Brønsted base. Circle the major contributor.

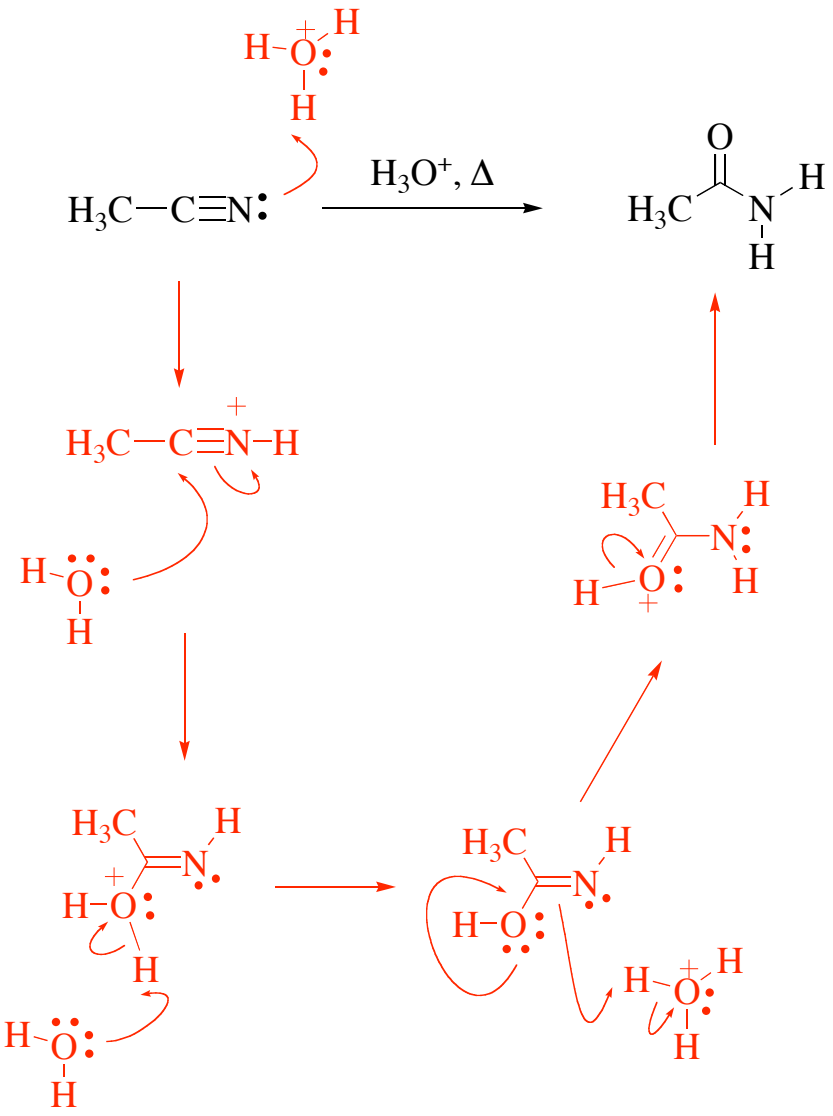




Name:_____

1) – continued –

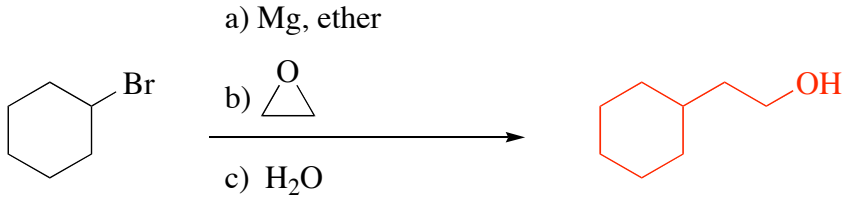
d) Propose an arrow-pushing mechanism for the hydrolysis of acetonitrile to acetoamide.

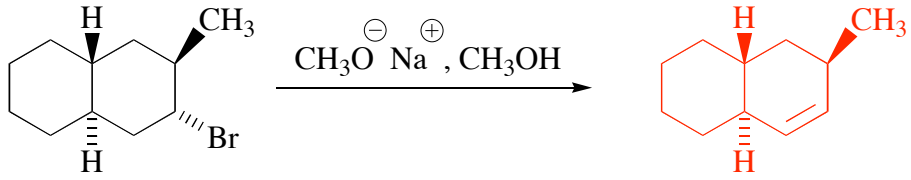


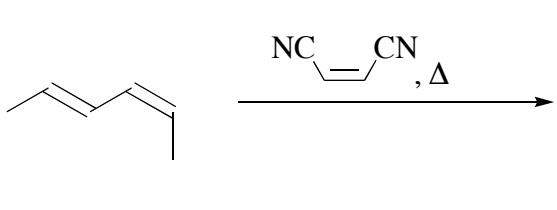
Name:_____

2) (20 pts) Give the single major product of each of the following reactions. If a racemate is formed, show only one enantiomer, and label it "rac."

a) 

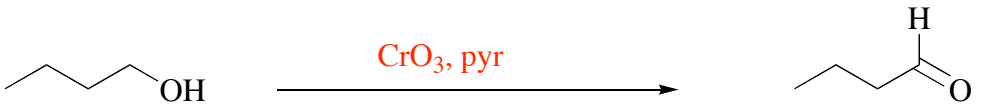

b) 

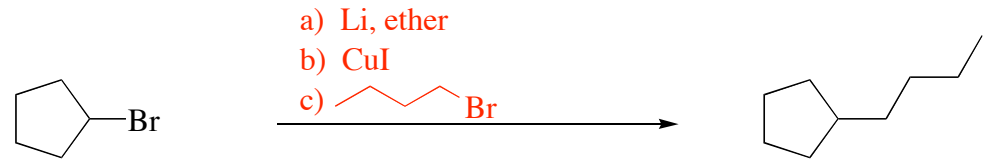

c) 

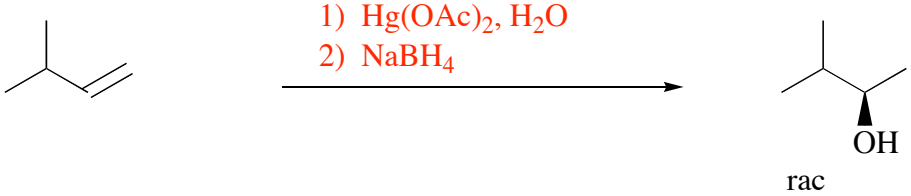

d) 

Name:_____

3) (20 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step may be required! Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). You must use the starting material given; you may use any other reagents you need.

a) 


b) 


c) 

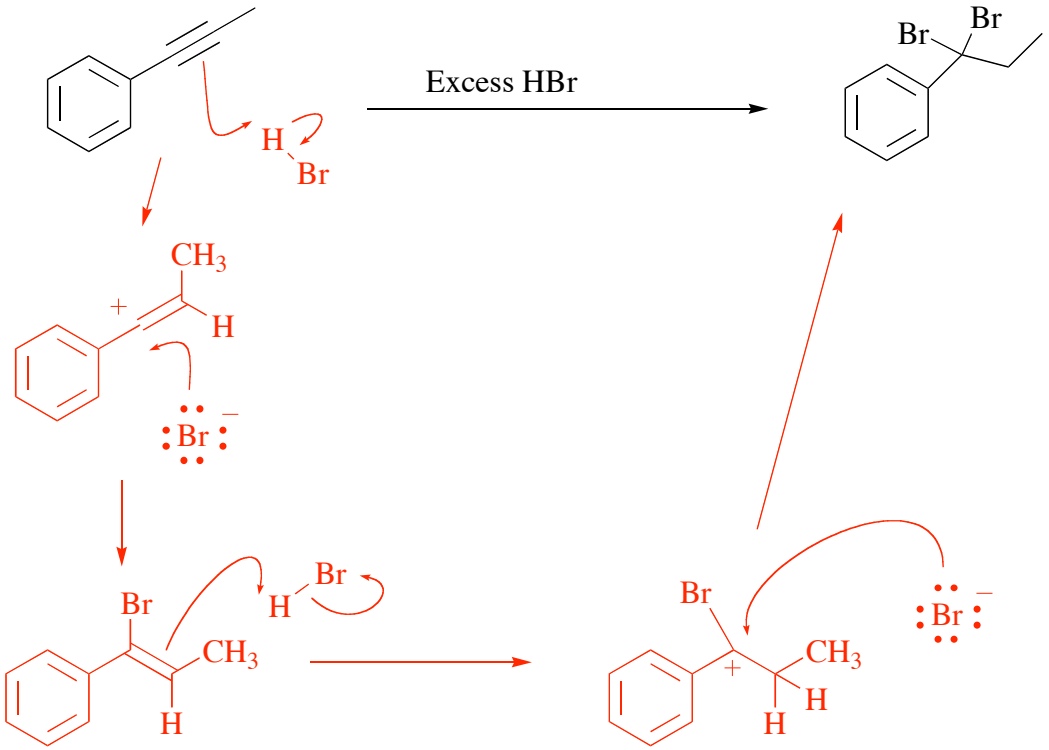
rac

d) 

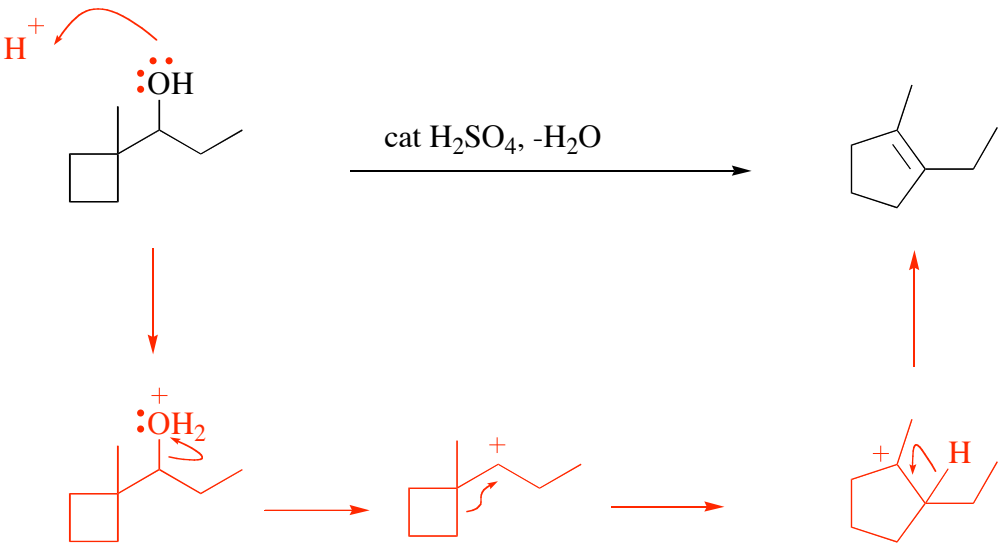
Name:_____

4) (20 pts) Propose an arrow-pushing mechanism for each of the following transformations.

a)



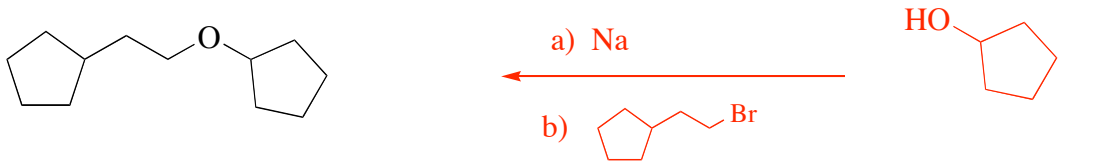

b)

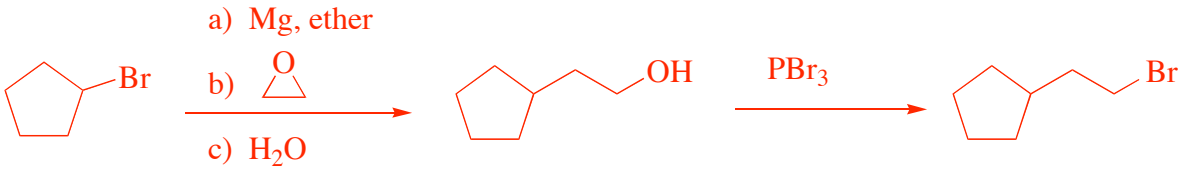


Name:_____

5) (20 pts) ) Propose a synthesis for each of the following targets using any organic starting materials with FIVE carbons or less, and any inorganic reagents you need. Try to make your synthesis efficient (that is, the desired product in each step should be the major product, and shorter syntheses are generally better).

a)



Name:_____

5) – continued –

b)