

283G
 Midterm
 Instructor: Dr. Brian Pagenkopf
 Saturday, March 15, 2008
 2:00 pm – 5:00

Name

First Letter of Last Name

Key

Work alone. Do not share answers or information. **No notes, books, calculators, cell phones, iPods, computers or electronics of any sort allowed. Please turn off your phone now.**

You have 3 hours to complete the exam.

Pay attention to how many points each question is worth, and manage your time accordingly. Be sure you have all of the exam pages.

Please do not write your name on subsequent pages, but you may write your ID number.

If needed, any blank scratch paper must be provided by the proctor.

PERIODIC TABLE OF THE ELEMENTS

Atomic masses are based on ¹²C. Atomic masses in parentheses are for the most stable isotope.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------------------|--|-----------------------------|--|-----------------------------|--|-----------------------------|--|----------------------------|--|----------------------------|--|------------------------------|--|------------------------------|--|--------------------------------|--|-----------------------------|--|---------------------------|--|---------------------------|--|-------------------------------|--|-----------------------------|--|----------------------------|--|----------------------------|--|-----------------------------|--|---------------------------|--|
| 6 — Atomic number C — Symbol 12.011 — Atomic mass | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Groups 1A H 1.00079 | | | | | | | | | | | | | | | | | | VIII A He 4.00260 | | | | | | | | | | | | | | | | | | | |
| Periods 3 Li 6.941 | | IIA Be 9.01218 | | | | | | | | | | | | | | | | | | 5 B 10.81 | | 6 C 12.011 | | 7 N 14.0067 | | 8 O 15.9994 | | 9 F 18.998403 | | 10 Ne 20.179 | | | | | | | |
| 11 Na 22.98977 | | 12 Mg 24.305 | | IIB Ca 40.08 | | IIB Sc 44.9559 | | IVB Ti 47.90 | | VB V 50.9415 | | VIB Cr 51.996 | | VIIB Mn 54.9380 | | VIIIB Fe 55.847 | | VIIIB Co 58.9332 | | VIIIB Ni 58.70 | | IB Cu 63.546 | | IIB Zn 65.38 | | IIIA Al 26.98154 | | IVA Si 28.0855 | | VA P 30.97376 | | VIA S 32.06 | | VIIA Cl 35.453 | | 18 Ar 39.948 | |
| 19 K 39.0963 | | 20 Ca 40.08 | | 21 Sc 44.9559 | | 22 Ti 47.90 | | 23 V 50.9415 | | 24 Cr 51.996 | | 25 Mn 54.9380 | | 26 Fe 55.847 | | 27 Co 58.9332 | | 28 Ni 58.70 | | 29 Cu 63.546 | | 30 Zn 65.38 | | 31 Ga 69.72 | | 32 Ge 72.59 | | 33 As 74.9216 | | 34 Se 78.96 | | 35 Br 79.904 | | 36 Kr 83.80 | | | |
| 37 Rb 85.4678 | | 38 Sr 87.62 | | 39 Y 88.9059 | | 40 Zr 91.22 | | 41 Nb 92.9064 | | 42 Mo 95.94 | | 43 Tc (98) | | 44 Ru 101.07 | | 45 Rh 102.9055 | | 46 Pd 106.4 | | 47 Ag 107.868 | | 48 Cd 112.41 | | 49 In 114.82 | | 50 Sn 118.69 | | 51 Sb 121.75 | | 52 Te 127.60 | | 53 I 126.9045 | | 54 Xe 131.30 | | | |
| 55 Cs 132.9054 | | 56 Ba 137.33 | | 57 La 138.9055 | | 72 Hf 178.49 | | 73 Ta 180.9479 | | 74 W 183.85 | | 75 Re 186.207 | | 76 Os 190.2 | | 77 Ir 192.22 | | 78 Pt 195.09 | | 79 Au 196.9665 | | 80 Hg 200.59 | | 81 Tl 204.37 | | 82 Pb 207.2 | | 83 Bi 208.9804 | | 84 Po (209) | | 85 At (210) | | 86 Rn (222) | | | |
| 87 Fr (223) | | 88 Ra 226.0254 | | 89 Ac 227.0278 | | 104 Unq (261) | | 105 Unp (262) | | 106 Unh (263) | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*Lanthanide series

| | | | | | | | | | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 |
| Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |
| 140.12 | 140.9077 | 144.24 | (145) | 150.4 | 151.96 | 157.25 | 158.9254 | 162.50 | 164.9304 | 167.26 | 168.9342 | 173.04 | 174.967 |

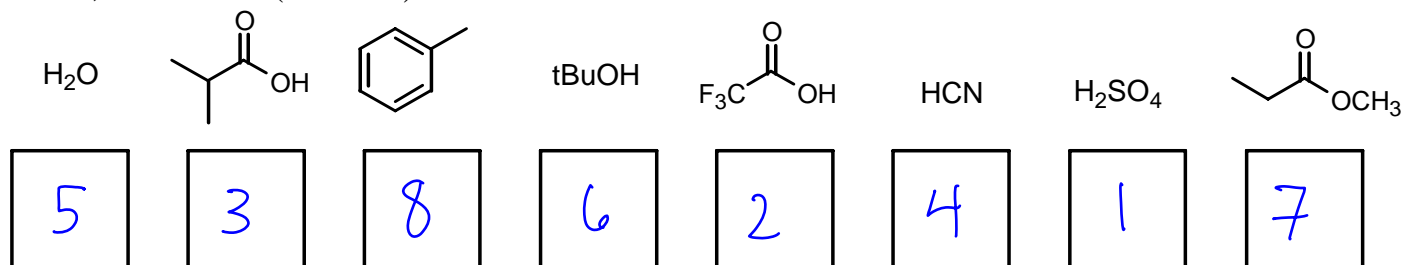
† Actinide series

| | | | | | | | | | | | | | |
|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 |
| Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |
| 232.0381 | 231.0359 | 238.029 | 237.0482 | (244) | (243) | (247) | (247) | (251) | (252) | (257) | (258) | (259) | (260) |

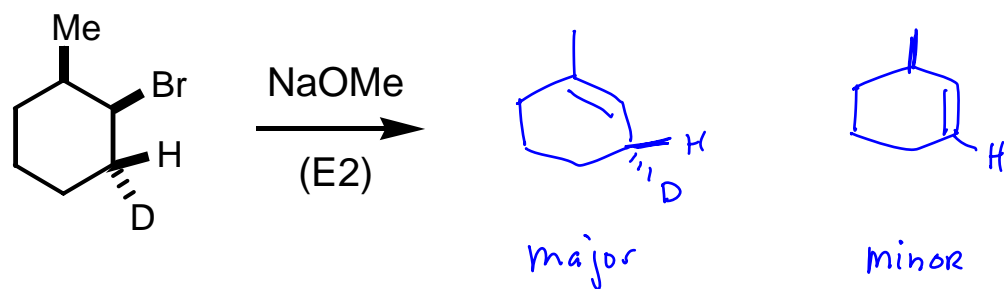
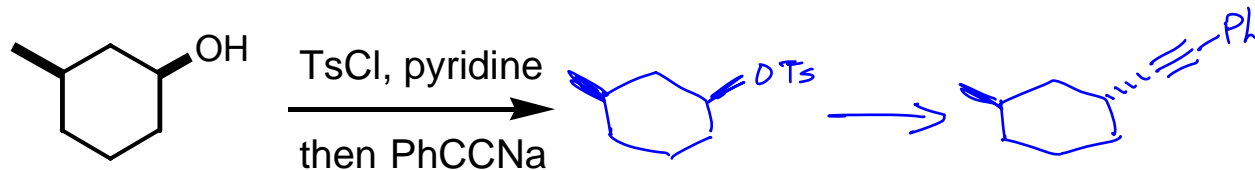
| page | points | |
|------|--------|--|
| 3 | 13 | |
| 4 | 12 | |
| 5 | 12 | |
| 6 | 12 | |
| 7 | 12 | |
| 8 | 12 | |
| 9 | 12 | |
| 10 | 15 | |
| | | |
| | 100 | |
| | | |
| | | |

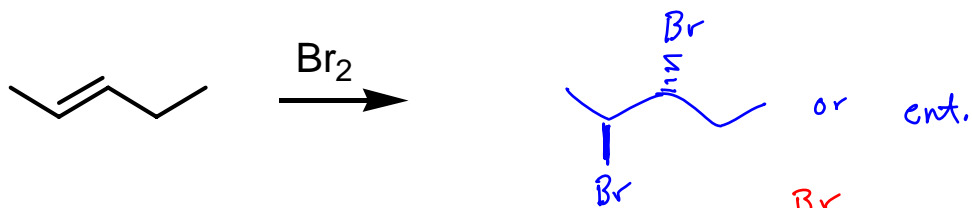
Total

Rank the following molecules in order of increasing acidity (which is the same as decreasing pKa). Write an 8 in the box for the least acidic, a 1 in the box under the most acidic, and so on. (5 marks)

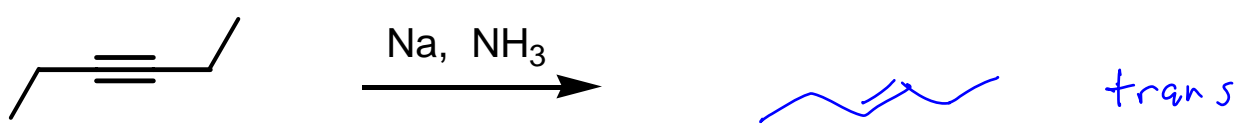
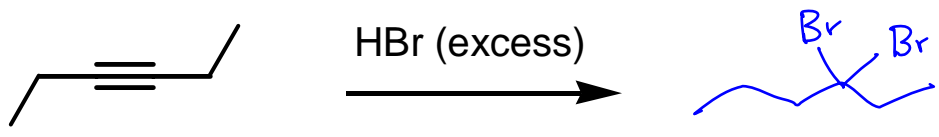


Show products for the following reactions. For some questions stereochemistry is a critical part of the answer for full marks. Be on the alert for carbocation rearrangements.

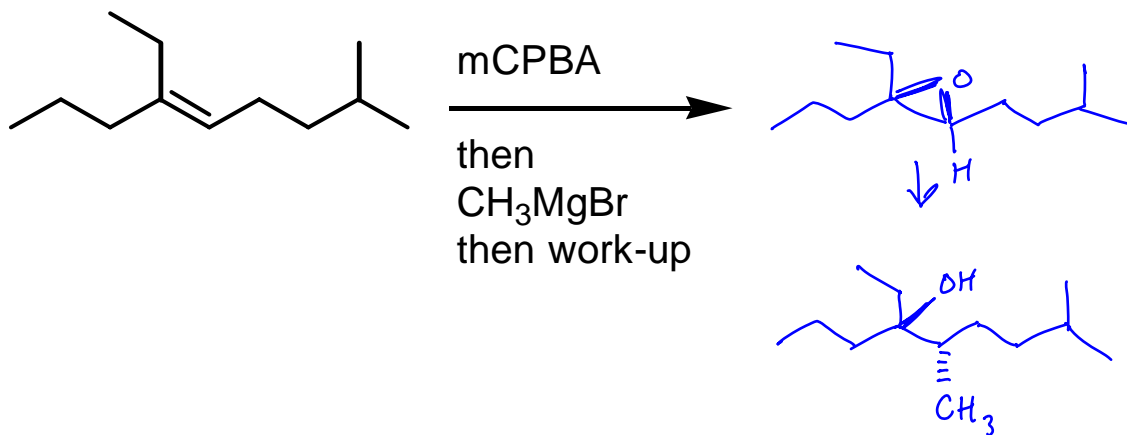
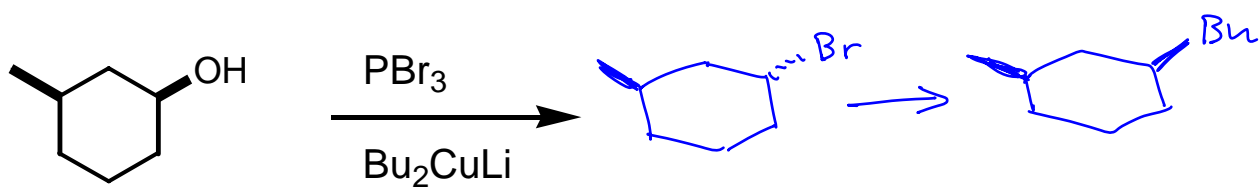




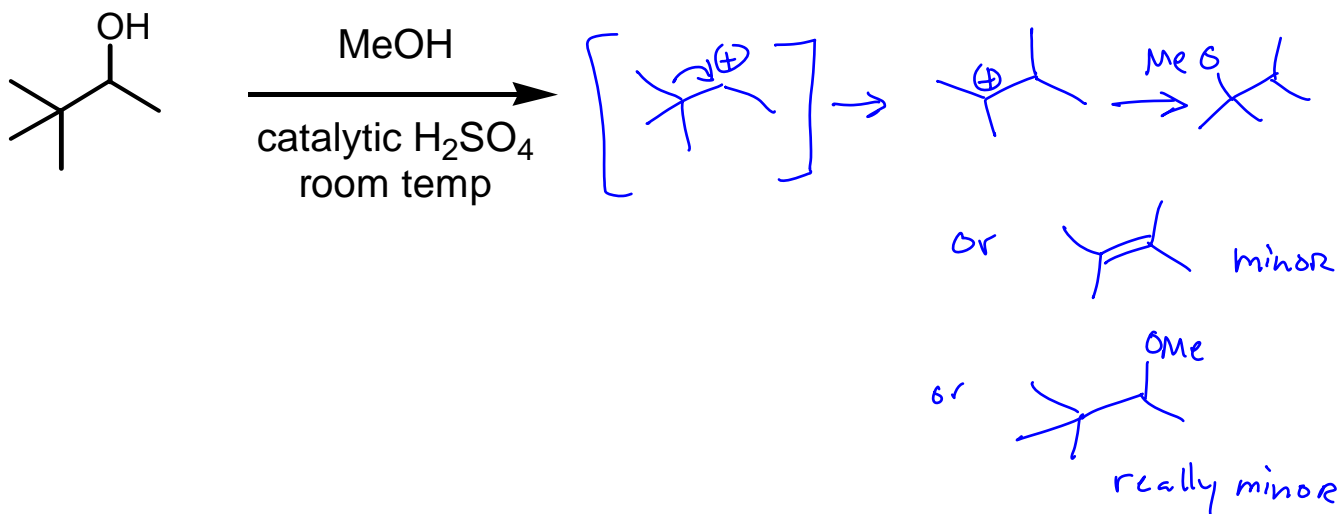
CCC(Br)C(Br)CC is not acceptable.
Br There is no stereochem. info here.

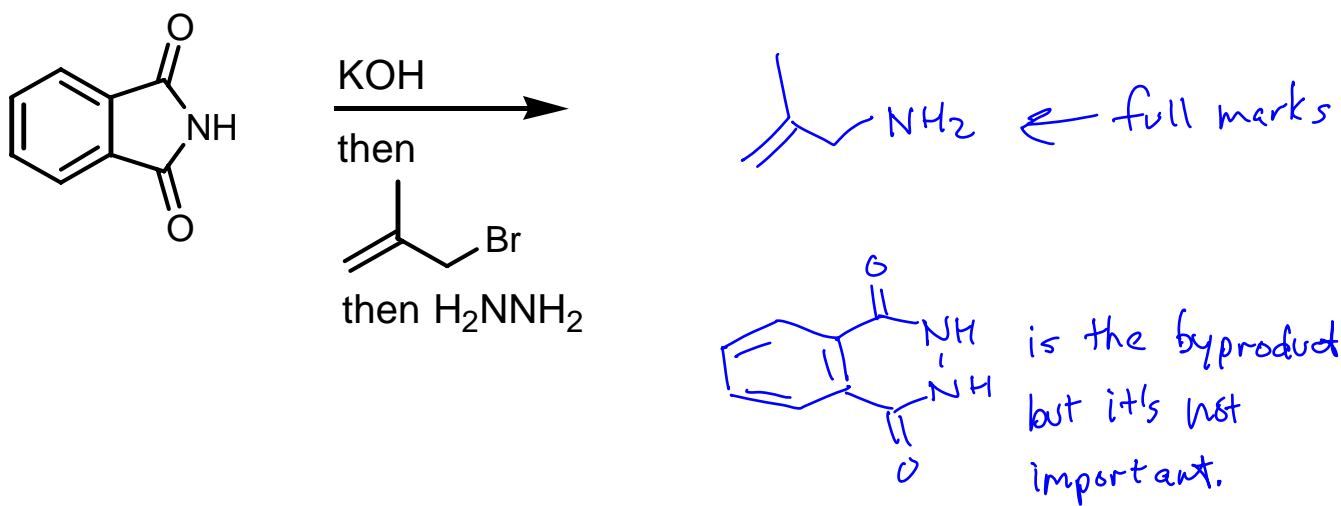
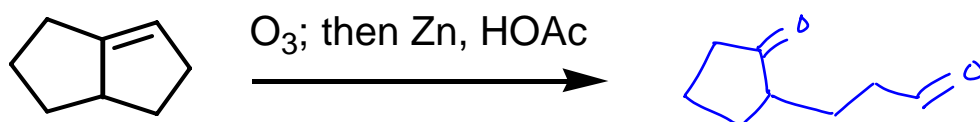
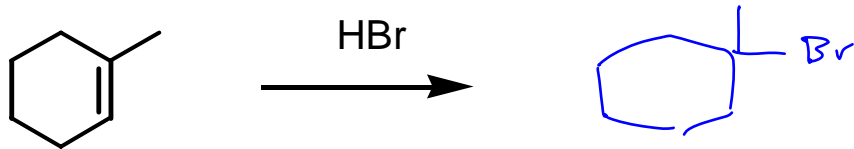


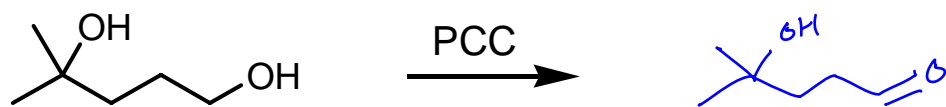
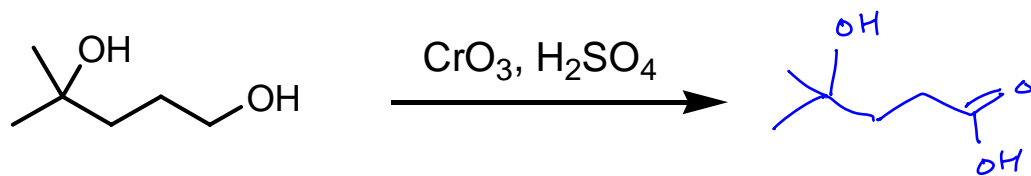
CCC=CC(N)C and related things are totally wrong



full marks required correct
 stereochemistry

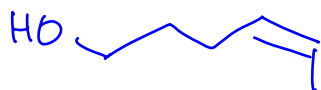
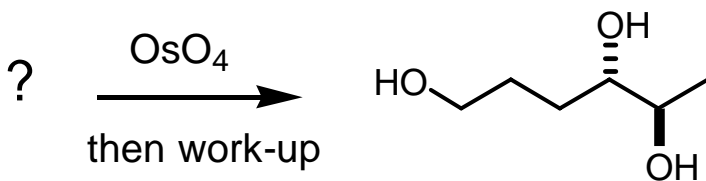
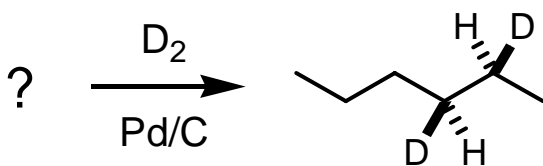
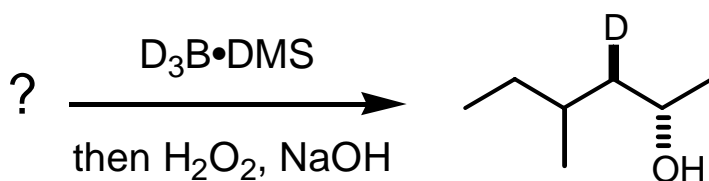




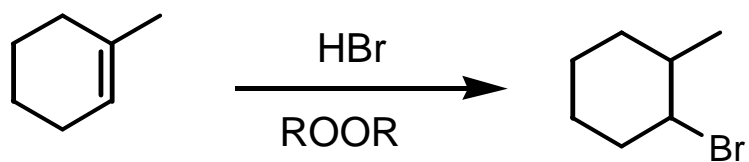
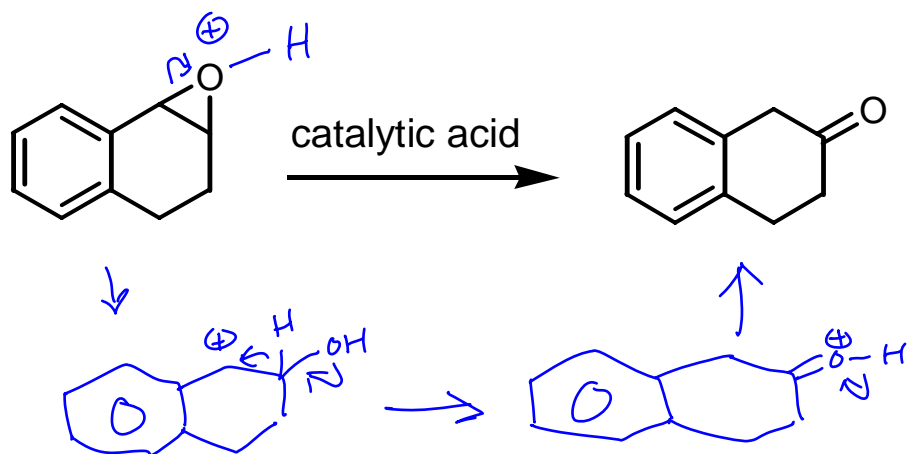


Identify the starting material, being careful in regard to cis//trans geometry of the alkene.
 You may need to do some bond rotations. *3 marks each for the*

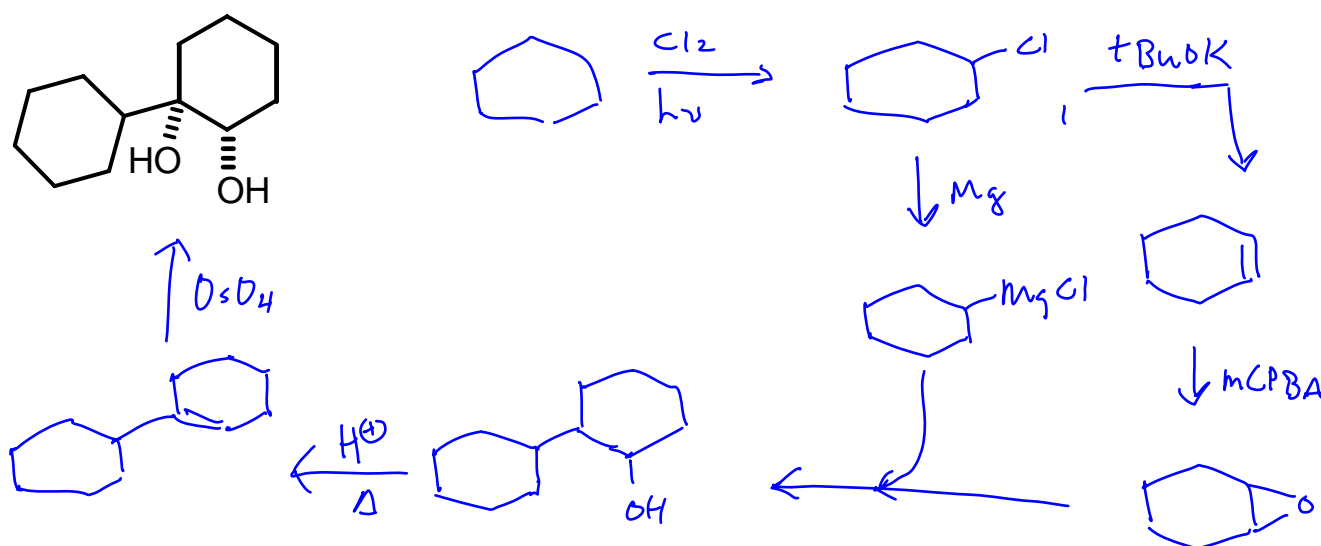
cis/trans part



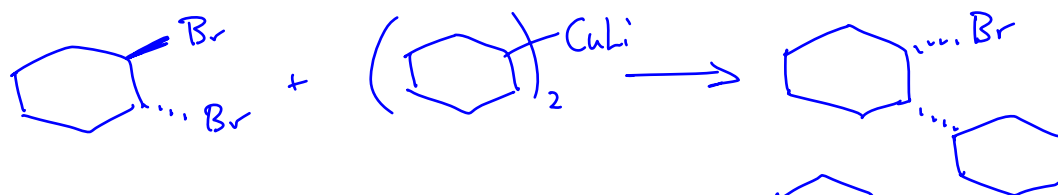
Provide plausible mechanisms for the following transformations (4 + 8 marks).



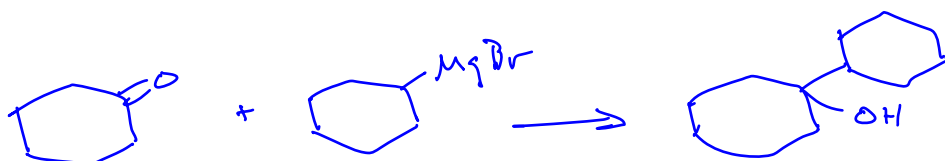
Propose a laboratory synthesis of the following compound using any reagents you want with the restriction that cyclohexane can be your only source of carbon.



also OK were routes involving the following



and



(but this chemistry hasn't been discussed in lecture yet)

Approaches that involved this proposed reaction are flawed on so many levels...

