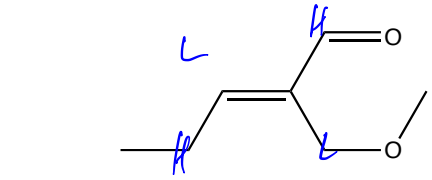
Name _____ Test 3 (12/4)

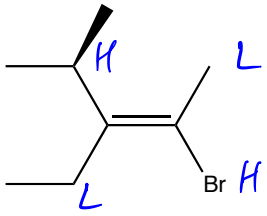
CHEM 0201 (Organic) Fall 2015

not on fall 2018

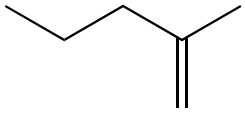
1. (18 pts.) Where appropriate, label the following alkenes as *Z* or *E*. If the molecule can only exist as one stereoisomer write "only one".

a. 


E

b. 


E

c. 

only 1

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

2 A reaction coordinate diagram is drawn on the right.

a. (2 pts) Label the reactants and products.

b. (2 pts.) Put a star next to the transition state(s).

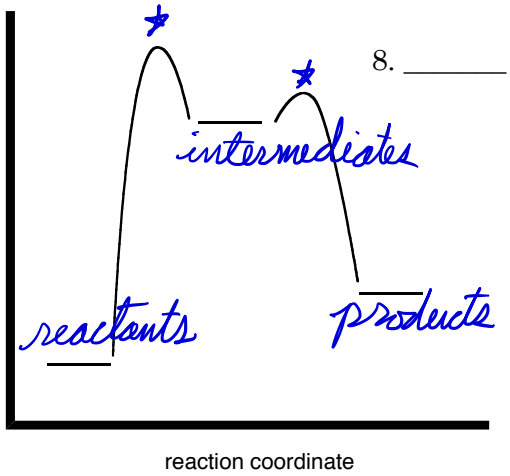
c. (2 pts.) Which is the faster step in this reaction, the first or second step?

second

d. (2 pts.) Which are higher in energy, the reactants or the products?

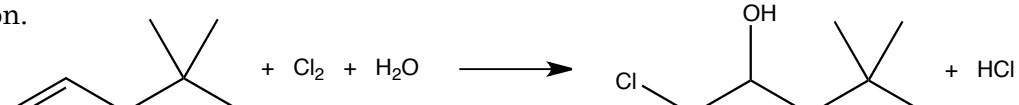
products

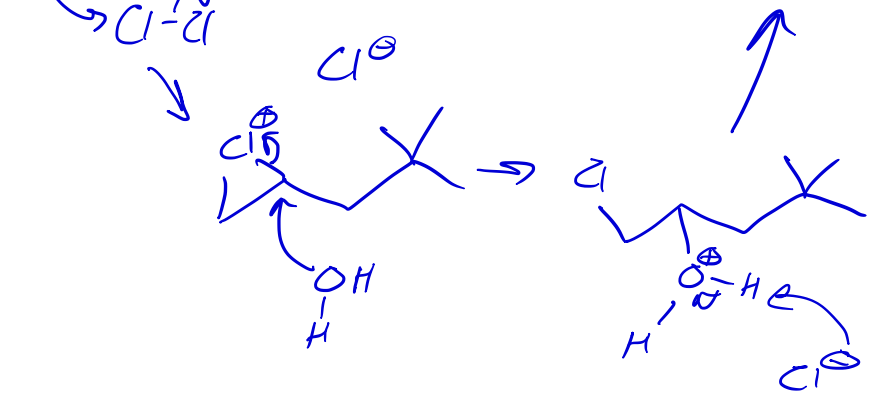
e. (2 pts.) This reaction would have a large or a small K?




small K. Reaction favors reactants

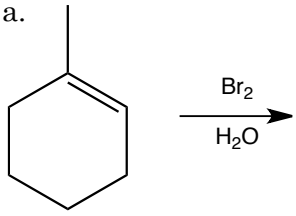
3. (10 pts) Draw a mechanism that accounts for the formation for the product in the following reaction.

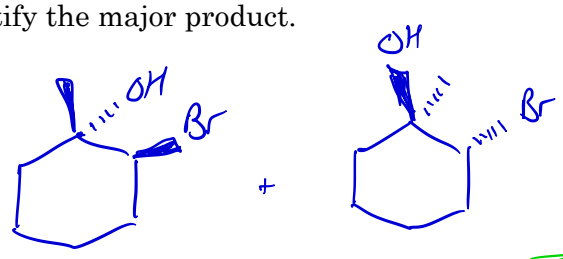


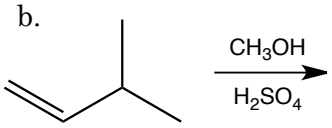
3. (18 pts.) Predict the organic products for the following reactions. If a mixture of major and minor products are expected, identify the major product.

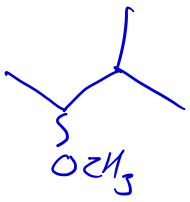
a.




b.

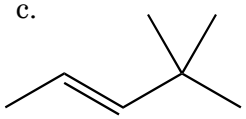


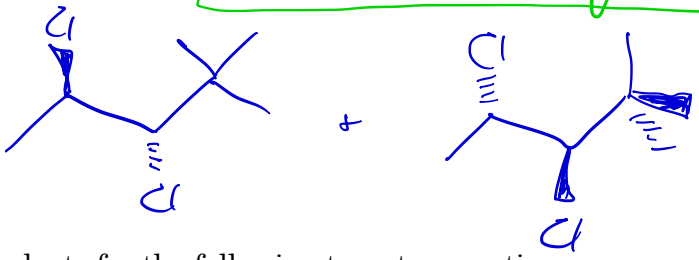




major product due


to $C^+$ rearrangement

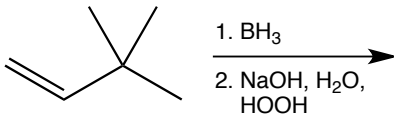
c.



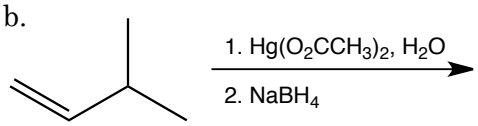

4. (12 pts.) Predict the major organic products for the following two step reactions.

a.





b.





not on fall 2018 test

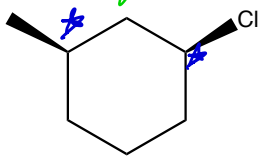
5. (10 pts.) When $Cl_2$, $Br_2$, and $Hg^{2+}$ are used as electrophiles, carbocation rearrangements do not occur. Explain how these electrophiles prevent carbocation rearrangements.

Instead of only pulling e⁻'s out of the C to C π bond, the Cl, Br, and $Hg^{2+}$ donate lone pair e⁻'s back to the C atom, thus, forming a 3-membered ring and preventing $C^+$ formation; e.g.,

6. (i. 8 pts.) Place a star next to the chiral carbons and (ii. 8 pts.) determine which of the following molecules are chiral or achiral.

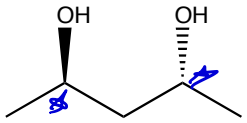
not on fall 2018 test 3 not on fall 2018 test 3

a.



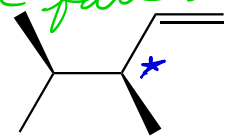

chiral

b.



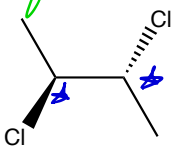

chiral

c. not on fall 2018 test 3



chiral

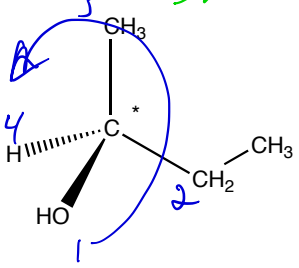
d. not on fall 2018 test 3




achiral

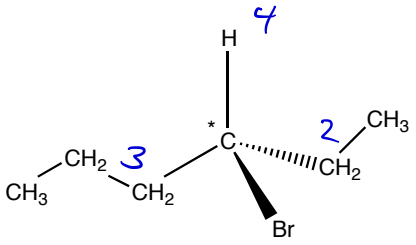
7. (12 pts.) Determine the configuration (*R* or *S*) for the starred chiral carbon atoms.

a. not on fall 2018 test 3




S

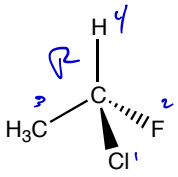
b.

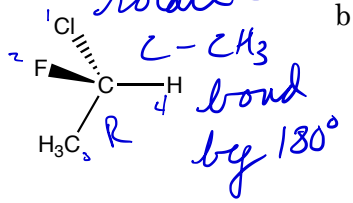



1 R

8. (12 pts.) Determine whether the pairs of molecules below are enantiomers, diastereomers, or the same molecule.

a.

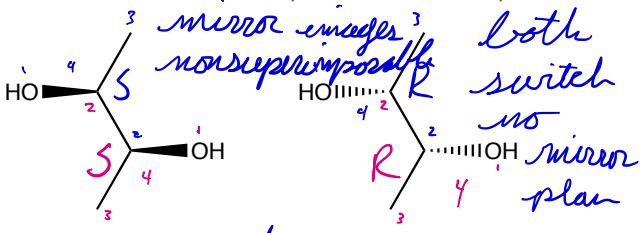



rotate on C–CH3 bond by 180°

same

b.

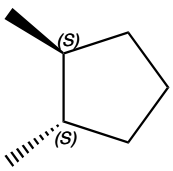


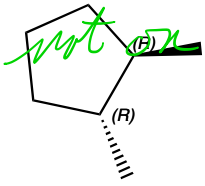

mirror images nonsuperimposable

both switch no mirror plan

enantiomers

c.

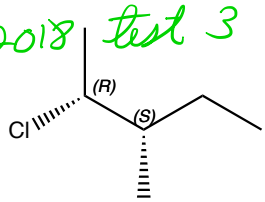


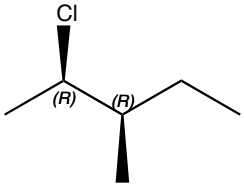




enantiomers

same reasons a b

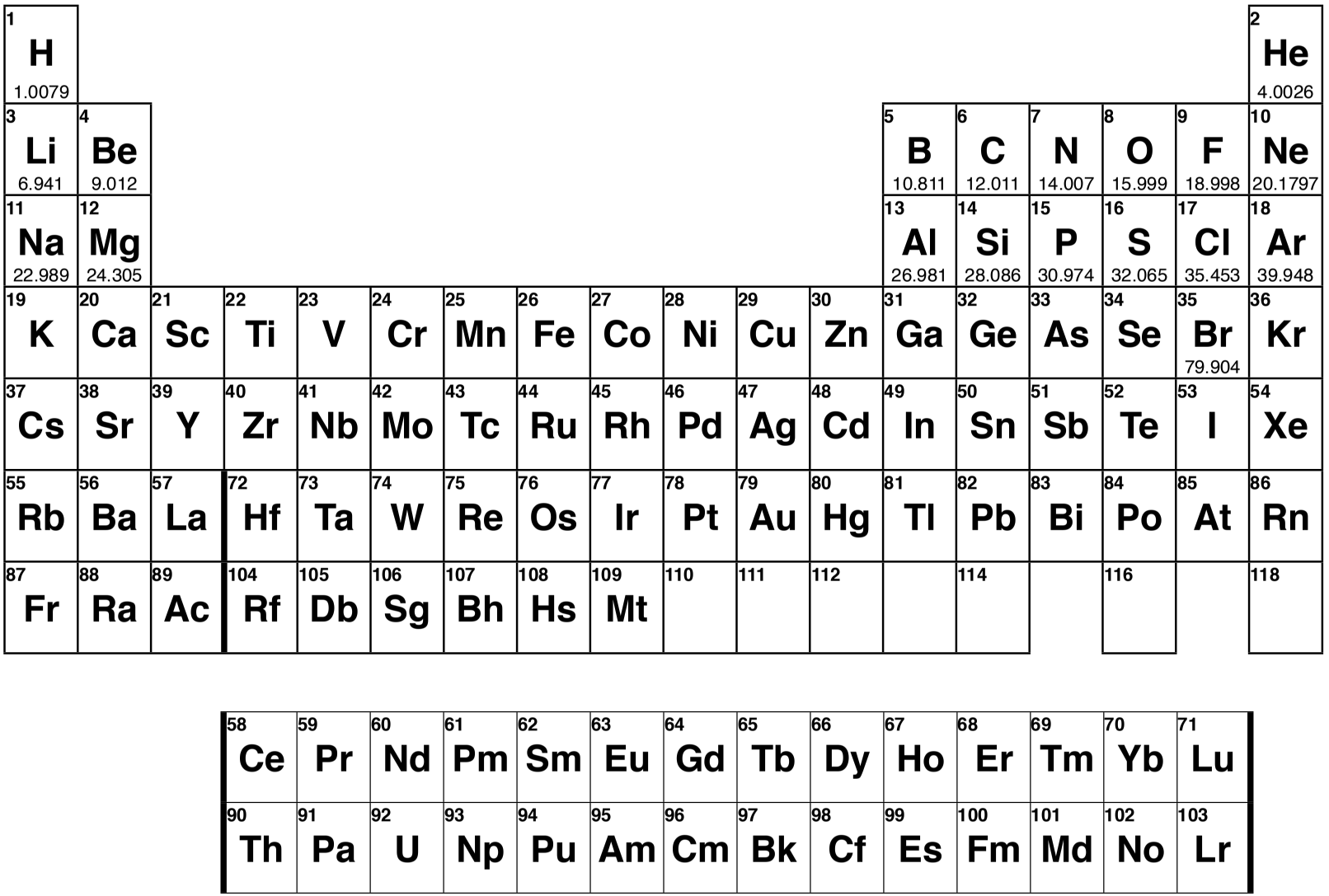
d. not on fall 2018 test 3




diastereomers

at least one chiral center but not all switched


1 H 1.0079
2 He 4.0026
3 Li 6.941
4 Be 9.012
5 B 10.811
6 C 12.011
7 N 14.007
8 O 15.999
9 F 18.998
10 Ne 20.1797
11 Na 22.989
12 Mg 24.305
13 Al 26.981
14 Si 28.086
15 P 30.974
16 S 32.065
17 Cl 35.453
18 Ar 39.948
19 K
20 Ca
21 Sc
22 Ti
23 V
24 Cr
25 Mn
26 Fe
27 Co
28 Ni
29 Cu
30 Zn
31 Ga
32 Ge
33 As
34 Se
35 Br 79.904
36 Kr
37 Cs
38 Sr
39 Y
40 Zr
41 Nb
42 Mo
43 Tc
44 Ru
45 Rh
46 Pd
47 Ag
48 Cd
49 In
50 Sn
51 Sb
52 Te
53 I
54 Xe
55 Rb
56 Ba
57 La
72 Hf
73 Ta
74 W
75 Re
76 Os
77 Ir
78 Pt
79 Au
80 Hg
81 Tl
82 Pb
83 Bi
84 Po
85 At
86 Rn
87 Fr
88 Ra
89 Ac
104 Rf
105 Db
106 Sg
107 Bh
108 Hs
109 Mt
110
111
112
114
116
118
58 Ce
59 Pr
60 Nd
61 Pm
62 Sm
63 Eu
64 Gd
65 Tb
66 Dy
67 Ho
68 Er
69 Tm
70 Yb
71 Lu
90 Th
91 Pa
92 U
93 Np
94 Pu
95 Am
96 Cm
97 Bk
98 Cf
99 Es
100 Fm
101 Md
102 No
103 Lr