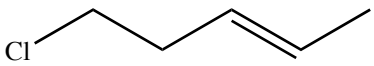
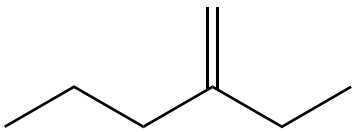
Name _____ Test 3 (11/30)
CHEM 0201 (Organic) Fall 2018

1. a. (6 pts.) Determine the degree of unsaturation for the hydrocarbon with the formula C_5H_6.

b. (8 pts.) When a molecule has a degree of unsaturation of 1, what does that mean?

2. (8 pts. each) Provide IUPAC names for the following alkenes. Use *Z*/*E* nomenclature where appropriate to specify the stereochemistry of the alkene.

a. 

b. 

_____ _____

3. (8 pts.) Using valence bond theory (hybridization) explain why alkenes are nucleophilic.

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

4. (2 pts. ea.) The questions below refer to the reaction coordinate diagram draw to the right.

a. Label the reactants with an "a".

b. Label the products with a "b".

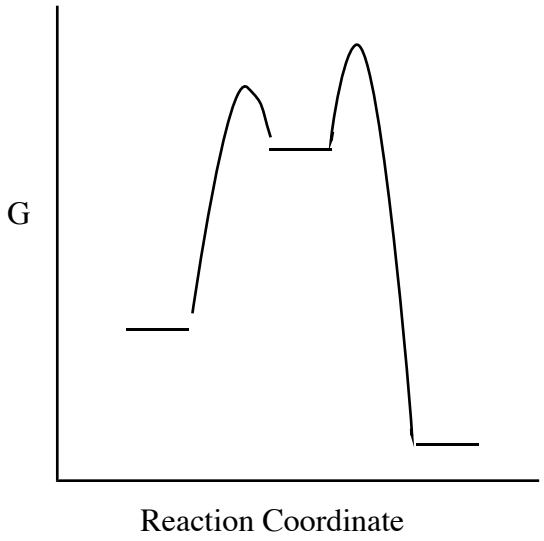
c. Label the intermediates with a "c".

d. Label the transition state(s) with a "d".

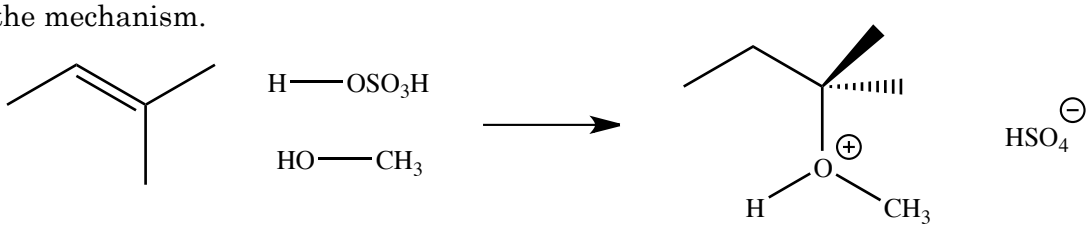
e. Does this reaction absorb or release energy?

f. Would this reaction have a positive or negative ΔG?

g. Does the equilibrium favor the reactants or products.

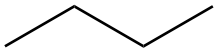
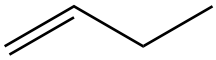
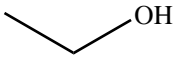


5. (12 pts.) Draw a mechanism for the reaction shown below. Include electron movement arrows with the mechanism.

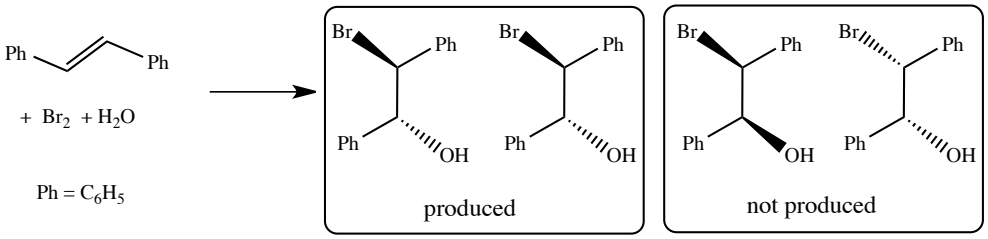


6. a. (8 pts.) Which is more stable, a primary or a tertiary carbocation. b. (12 pts.) Explain why one is more stable than the other.

7. (16 pts.) Determine whether the following are nucleophiles, electrophiles, or neither.

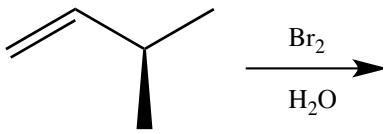
H^+	CH_3OH		
Br^-	H_2SO_4		$CH_3CHCHCH_3$

8. (12 pts.) In lab, you reacted *trans*-stilbene with bromine and water. The product, 1,2-diphenyl-2-bromo-ethanol, exists as four stereoisomers, but you reaction only made two stereoisomers. Draw the intermediate that forms when the Br_2 reacts with the *trans*-stilbene and explain why only two of the four possible stereoisomers are formed.

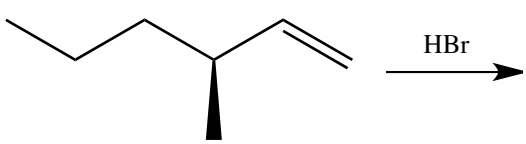


9. (8 pts. ea.) Predict the major organic products for the following reactions. Remember to indicate the stereochemistry of the products using wedge (▬◀), dashed (┈┈), or squiggly (∿∿) bonds where appropriate.

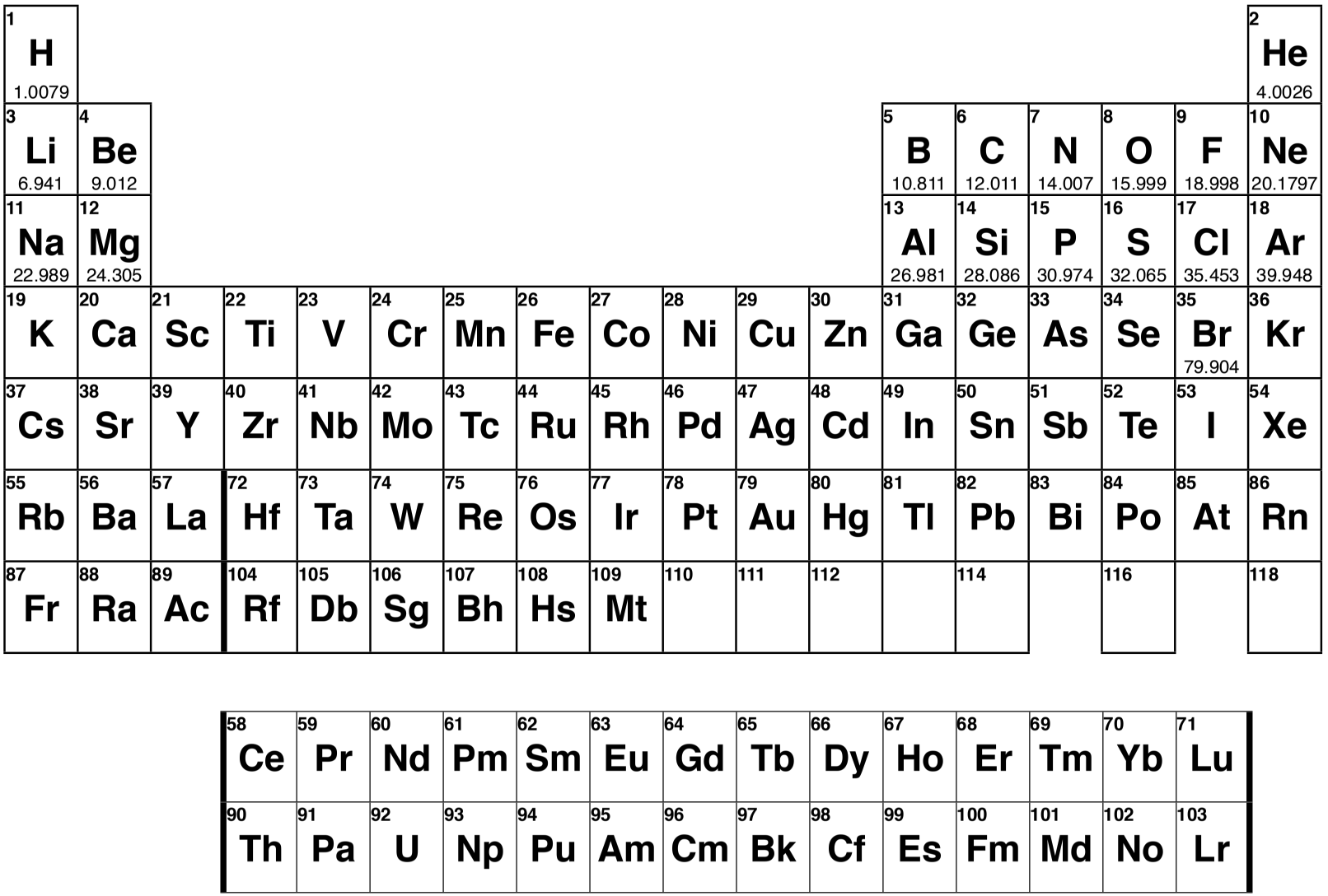
a.



b.



c.


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