CHEM 3311 (Richardson) Second Hour Exam – March 14, 2017

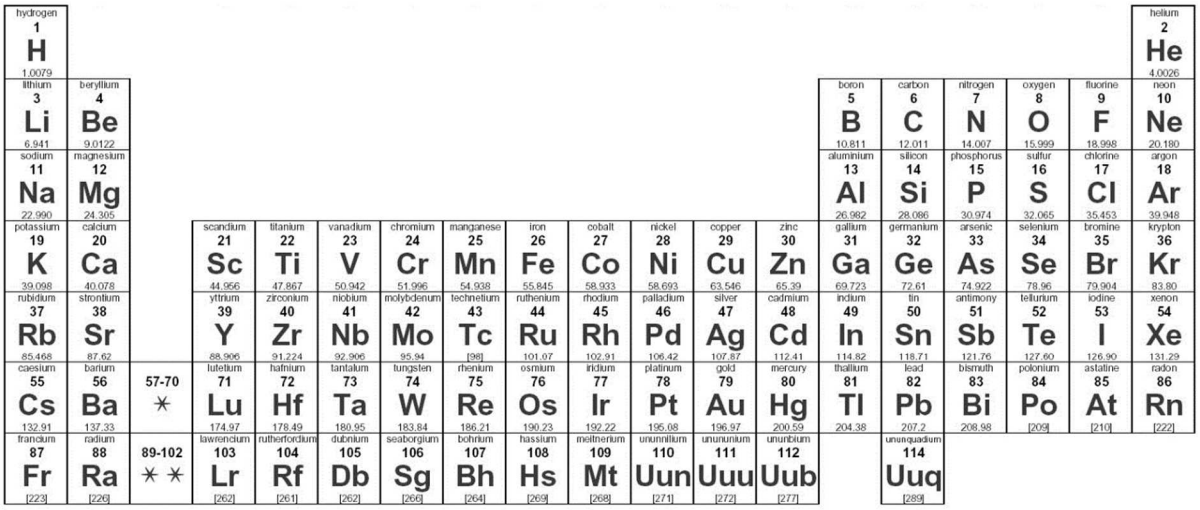
Your Name _____

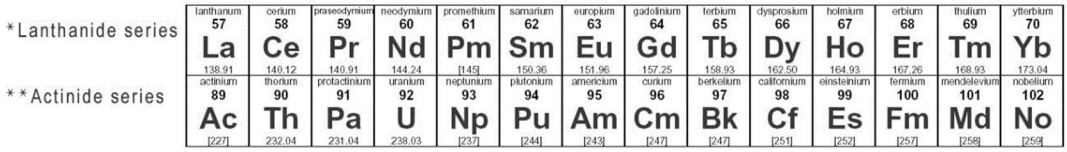
Student ID _____

Recitation Time (check one)
- O 8:00 Wednesday w/ Josh Kamps
- O 2:00 Wednesday w/ Josh Kamps
- O 10:00 Thursday w/ Brendan Griffiths
- O 11:00 Thursday w/ Brendan Griffiths
- O 12:00 Friday w/ Brendan Griffiths

Question	Score	Out of
1		20
2		10
3		15
4		10
5		25
6		20
7		10 e.c.
Total		100

This is a closed-book exam. The use of notes, calculators, or cell phones will not be allowed during the exam. You may use models sets brought in a clear ziplock bag. Use the backs of the pages for scratch work. If your final answer is not clearly specified, you will lose points. For mechanisms, show all intermediates including correct formal charges, but do not show transition states.





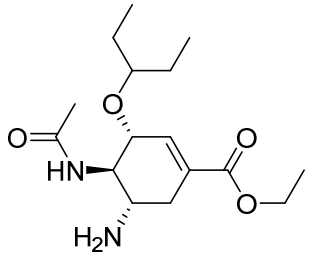
pKa Values

HI	-10	CH_3COOH	4.7	ArOH	10	H_2	35
HBr	-8	HN_3	4.7	RSH	10-12	NH_3	36
HCl	-6	H_2S	7.0	H_2O	15.7	$H_2C{=}CH_2$	45
H_3O^+	-1.7	NH_4^+	9.3	ROH (R=alkyl)	16-18	CH_4	60
HF	3.2	HCN	9.4	HC≡CH	26		

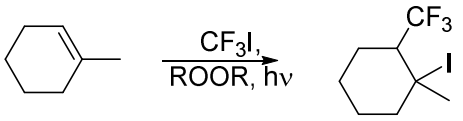
1) Fill in the table below. For each compound name, draw the structure, rank its stability (1=most stable), and draw the major product(s) for this molecule reacting with HBr. (20 pts)

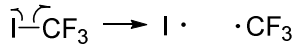
Name	**Structure**	**Stability Ranking**	**Major product(s) formed by HBr addition**
(*E*)-4,5-dimethyl-2-hexene			
(*E*)-2,3-dimethyl-3-hexene			
2,3-dimethyl-2-hexene			
4,5-dimethyl-1-hexene			
(*Z*)-4,5-dimethyl-2-hexene			

2) Tamiflu, shown below, is used for the prevention and treatment of flu. What is the absolute configuration at each of its asymmetric carbons? How many stereoisomers are possible for this molecule, ignoring E/Z stereochemistry at the double bond? (10 pts)

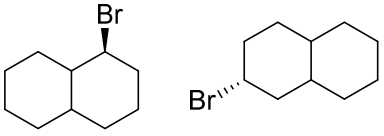


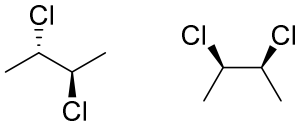
3) The reaction shown below is very similar to a reaction that we covered in lecture. Suggest a reasonable mechanism for this reaction. The initiation step is already shown, but give the propagation steps and at least two possible termination steps. (15 pts)

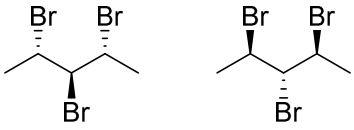


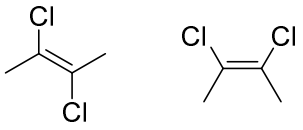
Initiation step: 

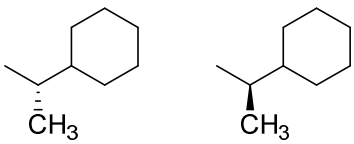
4) Describe the following pairs of molecules as homomers, enantiomers, diastereomers, or constitutional isomers. (10 pts)

a. 

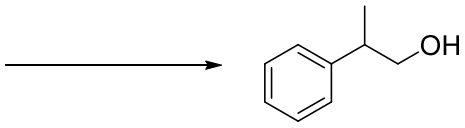
b. 

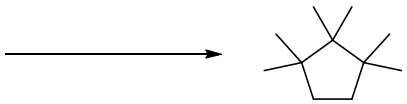
c. 

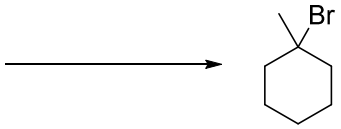
d. 

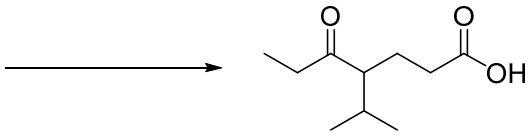
e. 

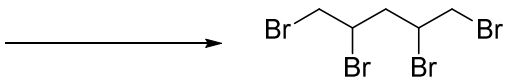
5) Starting from any hydrocarbon with the same number of carbon atoms as the product, and using any reactions that have been covered so far in class, show how you would create the products shown as the only major product of the reaction. Write your hydrocarbon starting material before the arrow, and the other reagents above or below the arrow. (25 pts)

a. 

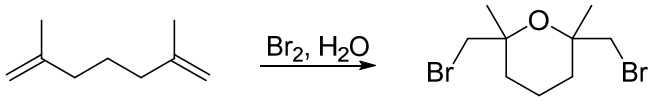
b. 

c. 

d. 

e. 

6) Suggest a reasonable mechanism for this reaction. (20 pts)



7) Extra credit! Using only C, H and O, draw the structures for the lowest-molecular-weight acyclic chiral molecule with the functional group listed. You do not need to show absolute configuration. (10 pts extra credit)

a. Alkane

b. Ester

c. Alcohol

d. Aldehyde

e. Ketone