CHEM 3331 (Richardson) Midterm Exam 3 – Aug. 1, 2023

Your Name: _____

Student ID: _____

Recitation (fill in one circle):

O 211 (Charlie Lu)

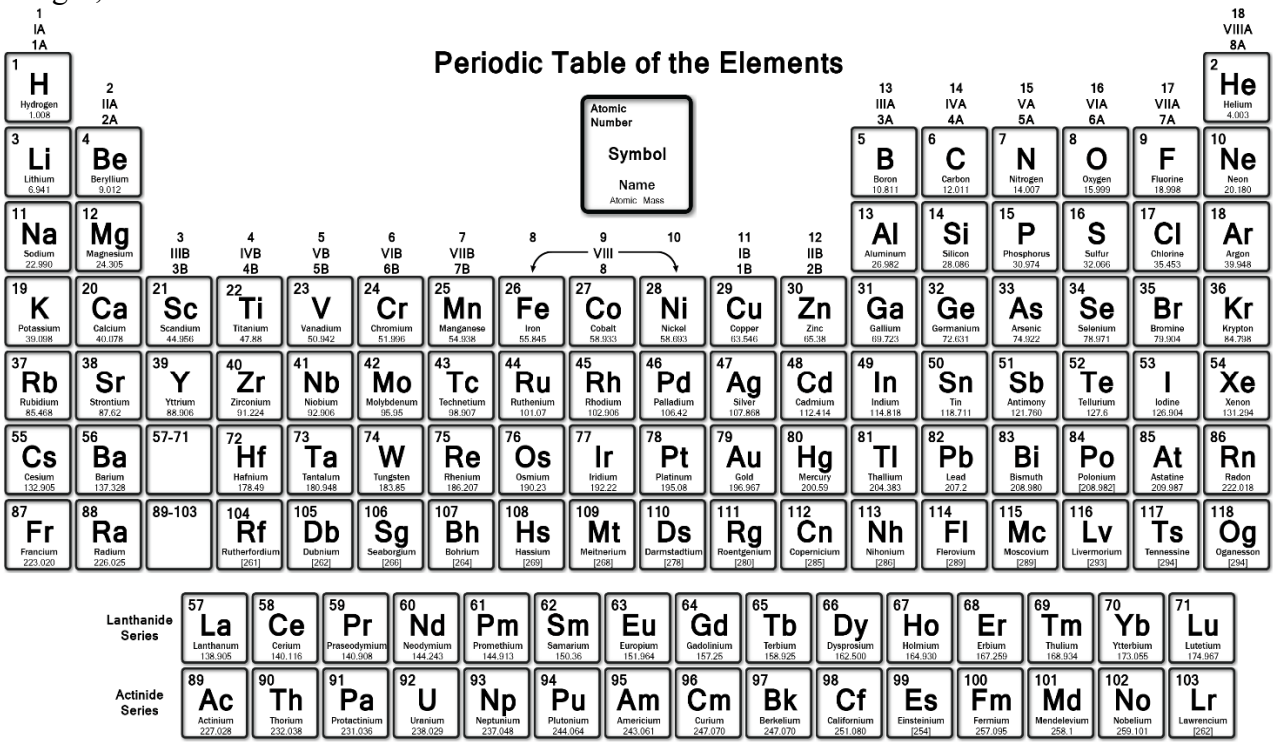
O 212 (Kajal)

O 213 (Mia Muse)

O 214 (Kyle Fisch)

Question	Score	Out of
1		20
2		20
3		30
4		15
5		15
6		10 e.c.
Total		100

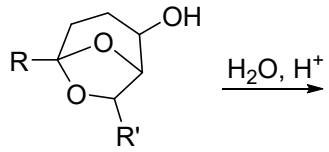
This is a closed-book exam, except for one double-sided sheet of 8.5 x 11" paper. The use of calculators or cell phones will not be allowed during the exam. You may use models sets brought in a clear bag. Use the backs of the pages for scratch work. If your final answer is not clearly specified, you will lose points. For mechanisms, show all intermediates including correct formal charges, but do not show transition states.



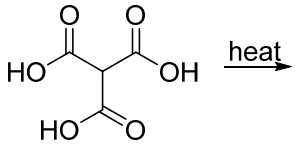
pKa Values

HI	-10	CH_3COOH	4.7	ArOH	10	HC≡CH	26
HBr	-8	HN_3	4.7	RSH	10-12	H_2	35
HCl	-6	H_2S	7.0	H_2O	15.7	NH_3	36
H_3O^+	-1.7	NH_4^+	9.3	ROH	16-18	$H_2C{=}CH_2$	45
HF	3.2	HCN	9.4	O=C-CH	9-25	CH_4	60

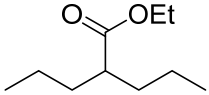
1) The compound shown below was investigated as a possible treatment for leukemia. What would happen if this product were to react with water under acidic conditions? Show the mechanism and final product. (20 pts)

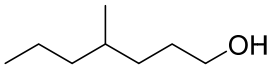


2) Show the mechanism and final product for this reaction. (20 pts)

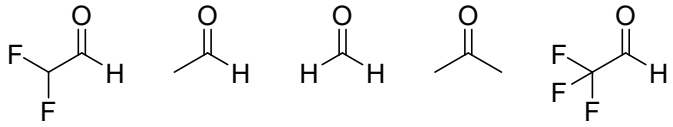


3) Find a way to synthesize the desired product from any molecules containing at most five carbon atoms, or triphenylphosphine. If more than one step is necessary, show the product of each step. Do not show mechanisms. (30 pts - 15 pts each)

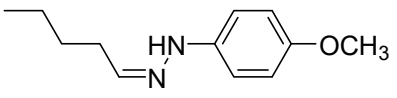
a. 

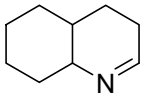
b. 

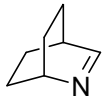
3) Rank these compounds by how much they favor forming the gem-diol (1 = most diol) and explain your rankings in under thirty words. (15 pts)



4) What are the starting materials for the synthesis of each of the following imines? (15 pts)







5) Extra credit! Rank these three compounds in order of pKa (1 = lowest pKa). (10 pts e.c.)