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

Your Name:	Question	Score	Out of
	1		20
Student ID:	2		20
Recitation (fill in one circle):	3		30
O 211 (Charlie Lu)	4		15
O 212 (Kajal)	5		15
O 213 (Mia Muse)	6		10 e.c.
O 214 (Kyle Fisch)			
	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. 18

1A 1 A															VIIIA 8A	
1	Periodic Table of the Elements															2
Hydrogen 1.008	2 A 2A	Atomic									13 IIIA 3A	14 IVA 4A	15 VA 54	16 VIA 6A	17 VIIA 74	Helium 4.003
³ 11	⁴ BA				Symbol							⁶ C	7 N	8	٩F	
Lithium 6.941	Beryllium 9.012				Name							Carbon 12.011	Nitrogen 14.007	Oxygen 15.999	Fluorine 18.998	Neon 20.180
¹¹ Na		3	4	5	6 7	6 7 8 9 10 11 12							¹⁵ P	¹⁶ S		¹⁸ Ar
Sodium 22.990	Magnesium 24.305	IIIB 3B	IVB 4B	VB 5B	VIB VIIB 6B 7B		v		IB 1B	IIB 2B	Aluminum 26.982	Silicon 28.086	Phosphorus 30.974	Sulfur 32.066	Chlorine 35.453	Argon 39.948
19 K Potassium 39.098	20 Ca calcium 40.078	21 Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996 25 Mn Manganes 54.938	• 26 Fe		28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn _{Zinc} 65.38	31 Gallium 69.723	32 Gemanium 72.631	33 Ass Arsenic 74.922	34 Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 84.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95 43 TC Technetiur 98.907	n 44 Ru Rutheniur 101.07	45 Rho 102	th dium 2006 46 Pd Palladium 106.42	47 Ag silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn ^{Tin} 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 126.904	54 Xe Xenon 131.294
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85 75 Re Rhenium 186.207	76 Os 0smium 190.23	77 77 Irid	r Ium 2.22 78 Pt Platinum 195.08	79 Au _{Gold} 196.967	80 Hg Mercury 200.59	81 TI Thailium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Polonium [208.982]	85 At Astatine 209.987	86 Rn Redon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	108 Hassium [269]	109 Neitr [2	At Berlium 68]	111 Rg Roentgeniun [280]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 LV Livermorium [293]	117 TS Tennessine [294]	118 Og Oganesson [294]
Lanthanide Series Actinide Series Actinide Series																
pKa Values																
		I	HI	-10	CH ₃ COC	DH 4	4.7	ArOH	Ι	10	HC	≡CH	26			
			IBr	-8	HN ₃	2	4.7	RSH	H 10-12		H ₂		35			
			IC1	-6	H_2S		7.0	H ₂ O	I ₂ O 15		N	NH ₃				
			$_{3}O^{+}$	-1.7	$\mathrm{NH4}^+$	(9.3	ROH	H 16-18		H ₂ C=CH ₂		45			
		HF 3.2 HCN		(9.4	.4 O=C-CH 9-2			CH4 60		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)

O OEt a.

b. _OH

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.)

