Name: _____

Chemistry 150 Exam 1

Be sure to put your name on each page. This page can be removed from your exam so that you will have a Periodic Table handy throughout the exam, it does not need to be turned in. Show all your work for non-multiple choice problems which require any sort of calculation, no credit will be given for answers without work shown. If you have shown a significant amount of work or multiple drawings for a problem, draw a box around what you consider your final answer.

```
Avogadro's Number = 6.022 \times 10^{23} units/mol 32.00^{\circ}F = 0.000^{\circ}C = 273.15K

1 foot = 12 inches

1 inch = 2.54cm (exactly)

1 pound = 453.6 g = 16 ounces

1 gallon = 3.785L

1 amu = 1.6605 \times 10^{-24} g

Masses of subatomic particles:

Proton 1.00728amu = 1.6726 \times 10^{-24} g

Neutron 1.00866amu = 1.6749 \times 10^{-24} g

Electron 0.000549amu = 9.1094 \times 10^{-28} g
```

1	1																2
Н																	He
1.0079																	4.0026
3	4											5	6	7	8	9	10
Li	Be											В	C	N	О	\mathbf{F}	Ne
6.941	9.0122											10.811	12.011	14.007	15.999	18.998	20.180
11	12											13	14	15	16	17	18
Na												Al	Si	P	S	Cl	
	Mg											26.982	28.086	■ 30.974		35.453	Ar
22.990 19	24.305	21	22	23	24	25	26	27	28	29	30	31	32	33	32.066	35.453	39.948
	-		22	23	∠+	23	20	21	20	23	30	31	32	33	54	33	30
		~	FET.9	T 7	\sim	3.4	-	_	3 ⊤•	~	-	~			-	-	T 7
K	Ca	Sc	Ti	\mathbf{V}	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
K 39.098	Ca	Sc 44.956	Ti 47.88	V 50.942	Cr 51.996	Mn 54.938	Fe 55.847	Co 58.933	Ni 58.69	Cu 63.546	Zn 65.39	Ga 69.723	Ge 72.61	As 74.922	Se 78.96	Br 79.904	Kr 83.80
l l																	
39.098 37	40.078	44.956 39	47.88 40	50.942	51.996	54.938	55.847 44	58.933 45	58.69 46	63.546 47	65.39 48	69.723 49	72.61 50	74.922 51	78.96 52	79.904 53	83.80 54
39.098	40.078	44.956	47.88	50.942	51.996	54.938	55.847	58.933	58.69	63.546	65.39	69.723	72.61	74.922	78.96	79.904	83.80
39.098 37 Rb	38 Sr	39 Y	47.88 40 Zr	50.942 41 Nb	51.996 42 Mo	54.938 43 Tc	55.847 44 Ru	58.933 45 Rh	58.69 46 Pd	63.546 47 Ag	65.39 48 Cd	69.723 49 In	72.61 50 Sn	74.922 51 Sb	78.96 52 Te	79.904 53 I	83.80 54 Xe
39.098 37 Rb 85.468 55	40.078 38 Sr 87.62 56	44.956 39 Y 88.906 57	47.88 40 Zr 91.224 72	50.942 41 Nb 92.906 73	51.996 42 Mo 95.94 74	54.938 43 Tc (98) 75	55.847 44 Ru 101.07 76	58.933 45 Rh 102.91 77	58.69 46 Pd 106.42 78	63.546 47 Ag 107.87 79	65.39 48 Cd 112.41 80	69.723 49 In 114.82 81	72.61 50 Sn 118.71 82	74.922 51 Sb 121.76 83	78.96 52 Te 127.60 84	79.904 53 I 126.90 85	83.80 54 Xe 131.29 86
39.098 37 Rb 85.468 55 Cs	38 Sr 87.62 56 Ba	44.956 39 Y 88.906 57 La	47.88 40 Zr 91.224 72 Hf	50.942 41 Nb 92.906 73 Ta	51.996 42 Mo 95.94 74 W	54.938 43 Tc (98) 75 Re	55.847 44 Ru 101.07 76 Os	58.933 45 Rh 102.91 77 Ir	58.69 46 Pd 106.42 78 Pt	63.546 47 Ag 107.87 79 Au	65.39 48 Cd 112.41 80 Hg	69.723 49 In 114.82 81 Tl	72.61 50 Sn 118.71 82 Pb	74.922 51 Sb 121.76 83 Bi	78.96 52 Te 127.60 84 Po	79.904 53 I 126.90 85 At	83.80 54 Xe 131.29 86 Rn
39.098 37 Rb 85.468 55 Cs 132.91	38 Sr 87.62 56 Ba 137.33	39 Y 88.906 57 La 138.91	47.88 40 Zr 91.224 72 Hf 178.49	50.942 41 Nb 92.906 73 Ta 180.95	51.996 42 Mo 95.94 74 W 183.84	54.938 43 Tc (98) 75 Re 186.21	55.847 44 Ru 101.07 76 Os 190.23	58.933 45 Rh 102.91 77 Ir 192.22	58.69 46 Pd 106.42 78 Pt 195.08	63.546 47 Ag 107.87 79 Au 196.97	65.39 48 Cd 112.41 80 Hg 200.59	69.723 49 In 114.82 81	72.61 50 Sn 118.71 82 Pb 207.2	74.922 51 Sb 121.76 83	78.96 52 Te 127.60 84 Po (209)	79.904 53 I 126.90 85	83.80 54 Xe 131.29 86
39.098 37 Rb 85.468 55 Cs 132.91 87	38 Sr 87.62 56 Ba 137.33 88	39 Y 88.906 57 La 138.91 89	47.88 40 Zr 91.224 72 Hf 178.49 104	50.942 41 Nb 92.906 73 Ta 180.95	51.996 42 Mo 95.94 74 W 183.84 106	54.938 43 Tc (98) 75 Re 186.21 107	55.847 44 Ru 101.07 76 Os 190.23 108	58.933 45 Rh 102.91 77 Ir 192.22 109	58.69 46 Pd 106.42 78 Pt	63.546 47 Ag 107.87 79 Au	65.39 48 Cd 112.41 80 Hg	69.723 49 In 114.82 81 Tl	72.61 50 Sn 118.71 82 Pb	74.922 51 Sb 121.76 83 Bi	78.96 52 Te 127.60 84 Po	79.904 53 I 126.90 85 At	83.80 54 Xe 131.29 86 Rn
39.098 37 Rb 85.468 55 Cs 132.91	38 Sr 87.62 56 Ba 137.33	39 Y 88.906 57 La 138.91	47.88 40 Zr 91.224 72 Hf 178.49	50.942 41 Nb 92.906 73 Ta 180.95	51.996 42 Mo 95.94 74 W 183.84	54.938 43 Tc (98) 75 Re 186.21	55.847 44 Ru 101.07 76 Os 190.23	58.933 45 Rh 102.91 77 Ir 192.22	58.69 46 Pd 106.42 78 Pt 195.08	63.546 47 Ag 107.87 79 Au 196.97	65.39 48 Cd 112.41 80 Hg 200.59	69.723 49 In 114.82 81 Tl	72.61 50 Sn 118.71 82 Pb 207.2	74.922 51 Sb 121.76 83 Bi	78.96 52 Te 127.60 84 Po (209)	79.904 53 I 126.90 85 At	83.80 54 Xe 131.29 86 Rn

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.12	140.91	144.24	(145)	150.36	151.97	157.25	158.93	162.50	164.93	167.26	168.94	173.04	174.97
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	$\mathbf{B}\mathbf{k}$	Cf	Es	Fm	Md	No	Lr
232.04	231.04	238.03	237.05	(244)	(243)	(247)	(247)	(251)	(252)	(258)	(258)	(259)	(260)

Fall 2010

Multiple Choice: Circle the letter of the most correct response. (5pts. per question)

- 1. Which of the following sets of elements contains a metal, a metalloid and a nonmetal?
 - a. Mg, Ru, Pb
 - b. Cu, Te, N
 - c. Na, Sr, Co
 - d. F, Ar, Ti
 - e. P, I, Ne
- 2. Which of the following organic molecules has the *most carbon atoms*?
 - a. Methyl amine
 - b. Hexene
 - c. Butanol
 - d. Ethane
 - e. Propyne
- 3. Which of the following formulas is *most ionic*?
 - a. PbO
 - b. RbBr
 - c. Fe_2S_3
 - d. SF₆
 - e. FrCl
- 4. Different isotopes of an element:
 - a. Have the same number of protons
 - b. Have the same charge
 - c. Have the same number of electrons
 - d. Have the same mass number
 - e. Have the same number of neutrons
- 5. Which of the following represents the *smallest mass*?
 - a. 0.112mg
 - b. $1.62 \times 10^8 \, \mu g$
 - c. 7.25g
 - d. $9.37 \times 10^{-9} \text{ kg}$
 - e. 4.38×10^{-7} g
- 6. Which of the following polyatomic ions has the *fewest oxygen atoms*?
 - a. phosphite
 - b. hydroxide
 - c. cyanide
 - d. perchlorate
 - e. nitrite

Fall 2010

7. Complete each row of the following table (3pts per box):

Symbol	Number of Protons	Number of Neutrons	Number of Electrons	Atomic Number	Mass Number	Charge
				15	33	0
Fe			23		57	
	34	46	36			
Cu		37	29			

Multiple Choice Calculations (9pts each):

- 8. What is the formula weight of rubidium carbonate? (Atomic # of rubidium = 37)
 - a. $97.479^{g}/_{mol}$
 - b. 145.476 ^g/_{mol}
 - c. 230.944 g/mol
 - d. 246.943 g/mol
 - e. $316.412^{g}/_{mol}$
- 9. How many vanadium atoms are present in a 17.681g sample of vanadium (Atomic # = 23)?
 - a. 0.3471 atoms
 - b. 406.7 atoms

 - c. 2.090x10²³ atoms
 d. 4.629x10²³ atoms
 e. 6.022x10²³ atoms
- 10. 3.116mols of phosphorus (Atomic #=15) has a mass of how many grams?
 - a. 0.1006 g
 - b. 9.940 g
 - c. 30.974 g
 - d. 46.74 g
 - e. 96.51 g
- 11. What is the mass of a sample of zirconium (Atomic # = 40) that contains 1.31×10^{24} Zr atoms?
 - a. 2.18 g
 - b. 87.0 g
 - c. 198 g
 - d. 8.65x10⁴⁵ g
 e. 7.20x10⁴⁹ g

Chem 150 – Exam	<i>1a</i>
Fall 2010	

- 12. The flow of the Red River yesterday was approximately 2.434x10⁴ gallons every second. What is this volume in milliliters?
 - a. 6.431mL
 - b. 92.13mL
 - c. $6.431 \times 10^6 \text{mL}$
 - d. $2.434 \times 10^7 \text{mL}$
 - e. $9.213 \times 10^7 \text{mL}$

Problems:

13. The element Ubiquium (Ub) is found in all interstellar space and has two stable isotopes. ³⁸²Ub has a mass of 382.993amu and 18.374% abundant. If the average atomic mass of Ub is 385.114amu, what is the mass of the other isotope? (13pts)

14. You are working in a facility that produces a new energy drink and have found a barrel of one of the ingredients, but the label has fallen off. From inventory records, you know that it is either aspartame which has a molecular weight near $300^g/_{mol}$ or niacin which has a molecular weight of about $125^g/_{mol}$. You send a sample for analysis and receive the following results: %C = 57.14, %H = 6.16, %N = 9.52, %O = 27.18. What is the *empirical* formula of this substance? What is the molecular weight of this empirical formula? Does the barrel contain aspartame or niacin? Explain. (14pts)

Page 4