Name _____

TA's Name _____

Lab Section _____

Please sign your name below to give permission to post your course scores on homework, laboratories and exams. If you do not sign no scores will be posted.

_____
(signature)

INSTRUCTIONS:

1. This examination consists of a total of 5 different pages. The last page includes a periodic table and some useful information. All work should be done in this booklet.

2. PRINT your name, TA's name and your lab section number now in the space at the top of this sheet. DO NOT SEPARATE THESE PAGES.

3. Answer all questions that you can and whenever called for show your work clearly. Your method of solving problems should pattern the approach used in lecture. You do not have to show your work for the multiple choice or short answer questions.

4. No credit will be awarded if your work is not shown in problems 1b, 3, 4 and 11.

5. Point values are shown next to the problem number.

6. Budget your time for each of the questions. Some problems may have a low point value yet be very challenging. If you do not recognize the solution to a question quickly, skip it, and return to the question after completing the easier problems.

7. Look through the exam before beginning; plan your work; then begin.

8. Relax and do well.

|	Page 2	Page 3	Page 4		TOTAL
SCORES	_____	_____	_____		_____
	(47)	(41)	(12)		(100)

(12) 1. Gallium has one of the largest liquid ranges of any substance. It melts at 30 ˚C and boils at 1983 ˚C.

a)   Is gallium a metal, nonmetal or a metalloid? _____

b)   What is the boiling point of gallium in ˚F? (Show your work.)

c)   Is gallium a gas, liquid or solid at 273 K? _____

(9) 2. Solve the following mathematical problems and report the answer to the correct number of significant figures. (Note: the numeric answer must be correct for credit.)

a) $104.05 \text{ g} - 6.0945 \text{ g} =$

b) $\dfrac{546}{760.0} =$

c) $\dfrac{(13.38 - 6.823) \cdot 5.228}{20.059} =$

(12) 3. PS101, one of the lecturehalls for this class, is 16.7 meters long, 9.5 meters wide and 2.9 meters high. If the density of air at room temperature is $1.19 \text{ g} \cdot \text{L}^{-1}$, calculate the mass of the air in PS101 during lecture.

(14) 4. Make the following conversions and show the mathematical set-up.

a)   454 grams to nanograms

b)   123 kJoules to milliJoules (mJ)

(12) 5. Complete the following table.

Substance	Formula	Physical Properties
Bromine		
Sulfur		
Sodium carbonate		
Mercury(II) oxide		

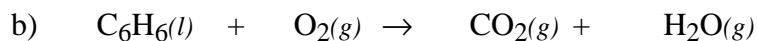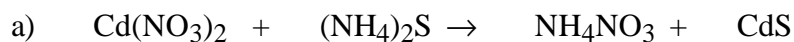(4) 6. For one of the substances in Problem #5, briefly describe a chemical property as seen in lecture.

(9) 7. Chlorine has a freezing point of –101.6 ˚C and a boiling point at –34.6 ˚C. Using the boxes below draw pictures of chlorine molecules (use at least six molecules) in the solid, liquid and gas phase.

          Solid   Liquid   Gas
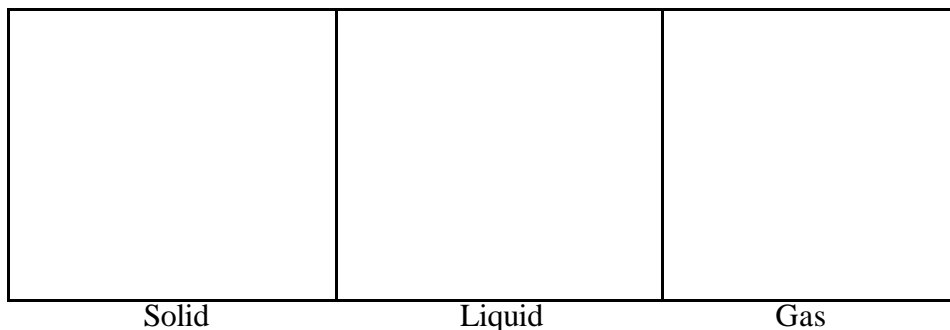
(9) 8. Determine the number of atoms in each of the following compounds

$H_3C_6H_5O_7$ C _____   H _____   O _____

$Al_3(PO_4)_3$ Al _____   P _____   O _____

$(NH_4)_2C_2O_2$ C _____   H _____   N _____   O _____
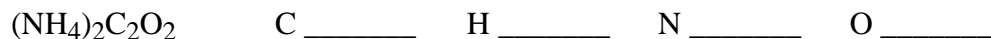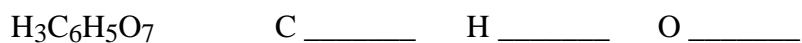
(4) 9. Balance the following equations

a) $Cd(NO_3)_2$ + $(NH_4)_2S$ → NH_4NO_3 + CdS

b) $C_6H_6{(l)}$ + $O_{2(g)}$ → $CO_{2(g)}$ + $H_2O_{(g)}$

(3) 10. Name each of the following binary compounds

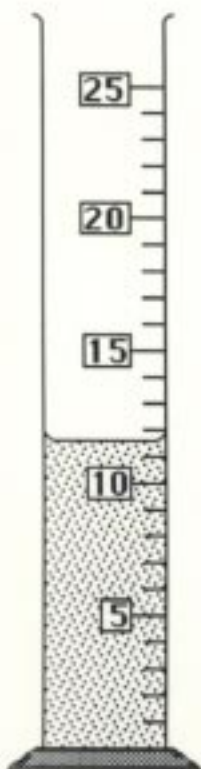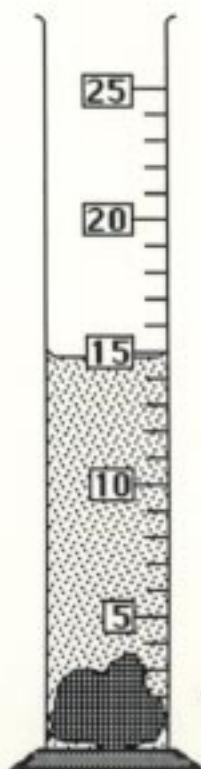   KCl

     MgI_2

     N_2O_5

Figure 1a.

Figure 1b.

(12) 11. A student fills the graduated cylinder on the far left with water (Figure 1a.). The student then adds a solid metallic substance to the graduate cylinder (Figure Ib.). If the mass of the solid object in the graduated cylinder is 5.216 g, calculate the density of the substance. (Show your work.)

Periodic Table of the Elements

IA																		VIIIA
1 **H** 1.008	IIA											IIIA	IVA	VA	VIA	VIIA		2 **He** 4.00
3 **Li** 6.94	4 **Be** 9.01											5 **B** 10.81	6 **C** 12.01	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00		10 **Ne** 20.18
11 **Na** 22.99	12 **Mg** 24.30	IIIB	IVB	VB	VIB	VIIB	—VIII—			IB	IIB	13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.06	17 **Cl** 35.45		18 **Ar** 39.95
19 **K** 39.10	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.88	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.69	29 **Cu** 63.55	30 **Zn** 65.38	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90		36 **Kr** 83.80
37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** (98)	44 **Ru** 101.1	45 **Rh** 102.9	46 **Pd** 106.4	47 **Ag** 107.9	48 **Cd** 112.4	49 **In** 114.8	50 **Sn** 118.7	51 **Sb** 121.8	52 **Te** 127.6	53 **I** 126.9		54 **Xe** 131.3
55 **Cs** 132.9	56 **Ba** 137.3	57 **La** 138.9	72 **Hf** 178.5	73 **Ta** 180.9	74 **W** 183.8	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.1	79 **Au** 197.0	80 **Hg** 200.6	81 **Tl** 204.4	82 **Pb** 207.2	83 **Bi** 209.0	84 **Po** (209)	85 **At** (210)		86 **Rn** (222)
87 **Fr** (223)	88 **Ra** 226.0	89 **Ac** 227.0	104 **Rf** (261)	105 **Db** (262)	106 **Sg** (263)	107 **Bh** (262)	108 **Hs** (265)	109 **Mt** (266)										

	58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 152.0	64 **Gd** 157.2	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.9	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173.0	71 **Lu** 175.0
Lanthanides														
Actinides	90 **Th** 232.0	91 **Pa** 231.0	92 **U** 238.0	93 **Np** 237.0	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)	103 **Lr** (260)

Useful Information

1 pound (lb) = 453.59237 gram (gm)

1 liter (L) = 1.056718 quart (qt)   4 qt = 1 gallon (gal)

1 inch (in) = 2.54 centimeters (cm)   1 mile = 5280 feet (ft)

$$^{\circ}C = \frac{5}{9}(^{\circ}F - 32)$$ density of water = $1.00 \frac{g}{mL}$

$$K = {^{\circ}C} + 273.15$$

average atomic mass = Σ(isotopic mass $\cdot$ fractional abundance)