Name _____

TA's Name _____

Lab Section _____

Please sign your name below to give permission to post, by the last 4 digits of your student I.D. number, your course scores on homework, laboratories and exams. If you do not sign no scores will be posted.
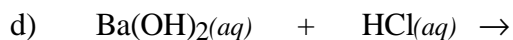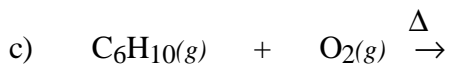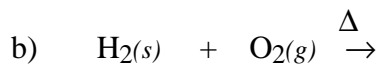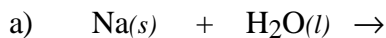
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INSTRUCTIONS:

1. This examination consists of a total of 6 different pages. The last two pages include a periodic table, a table of vapor pressures for water, a solubility table and some useful equations. 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 2 and 6.

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	Page 5		TOTAL
SCORES	_____	_____	_____	_____		_____
	(30)	(19)	(28)	(23)		(100)

(12) 1. Write the chemical formula(s) of the product(s) and balance the following reactions. Identify all products phases as either (g)as, (l)iquid, (s)olid or (aq)ueous.

a) $Na_{(s)}$ + $H_2O_{(l)}$ $\rightarrow$

b) $H_{2(s)}$ + $O_{2(g)}$ $\xrightarrow{\Delta}$

c) $C_6H_{10(g)}$ + $O_{2(g)}$ $\xrightarrow{\Delta}$

d) $Ba(OH)_{2(aq)}$ + $HCl_{(aq)}$ $\rightarrow$

(12) 2. Perform the following conversions.

a) the distance which separates two oxygen atoms in an oxygen molecule is 4.76×10^{-9} inches. Calculate the distance in picometers (pm).

b) What is 0 Kelvin on the Fahrenheit scale?

c) An automobile engine has a displacement of 320 in^3. Calculate the displacement in liters.

(6) 3. Perform the following calculations and give the answer to the correct number of significant figures.

a) $812 \cdot 0.000023 =$

b) $4.7553 + 7.345 + 1.4 =$

c) $1.27 \times 10^{-2} - 4.26 \times 10^{-3} =$

(9)   4. A mixture is prepared by pouring 10.0 mL H_2O into a graduated cylinder containing 5.0 mL of hexane. Draw a picture of a graduated cylinder and what the mixture in the graduated cylinder looks like at the macroscopic level a few minutes after the two components are added together. Choose a small section of the mixture which best represents the type of mixture and draw a microscopic level picture. In each case clearly label the two components of the mixture. For the microscopic picture you may use circles to represent the different components.

Macroscopic Picture	Microscopic Picture
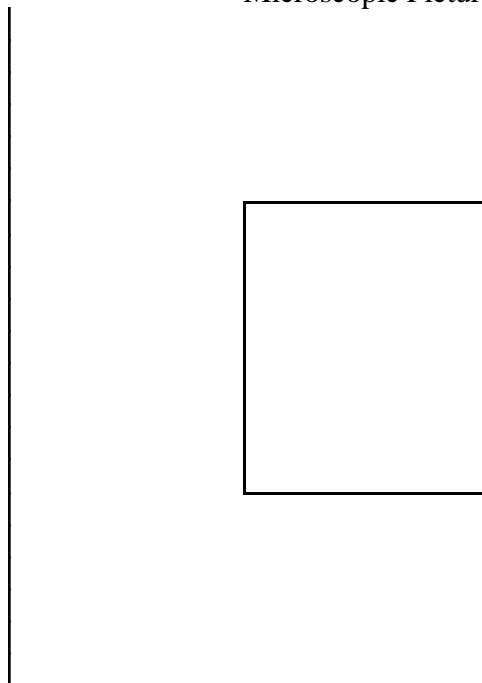
(10) 5. Complete the following table

Formula	M, Molar Mass $\left(\frac{g}{mol}\right)$	m, mass of sample (gms)	n, moles of sample (mol)	N, number of atoms, molecules, or formula units
Na_2O			0.459	
H_2SO_4				5.12×10^{24}
$X(NO_3)_2$		146	0.816	

What is the symbol for the unknown element, X?

(28) 6. Given the compound, $Al_2(SO_4)_3$

(3)   a) Determine its molar mass.

(9)   b) Determine the percent by mass of each of the elements in the compound.

(2)   c) What is the name of the compound?

(4)   d) How many atoms of oxygen are in one formula unit of the compound?

(4)   e) How many moles of the compound are contained in 2.450 grams of $Al_2(SO_4)_3$

(6)   f) What mass of Na_2SO_4 contains the same number of formula units as 125 gms of $Al_2(SO_4)_3$?

(8)   7. Complete the following table;

Name of the compound	Formula of the compound	Ionic or Covalent Compound
sodium carbonate		
diphosphorus pentoxide		
	PbS	
	HBr$_{(g)}$	

Multiple Choice: (15 points)

Print the letter (A, B, C, D) which corresponds to the answer selected.

8. _____   9. _____   10. _____   11. _____   12. _____

ONLY THE ANSWERS IN THE AREA ABOVE WILL BE GRADED.   Select the most correct answer for each question. Each question is worth 3 points.

8. A solution of sugar dissolved in water has a density of $1.05 \frac{g}{cm^3}$. If the volume of a sample of this solution is 75.0 mL, and if the solution is 8.10% sugar, how many grams of sugar are there in the solution?

A) 72.4 g sugar   B) 70.6 g sugar   C) 6.40 g sugar   D) 6.10 g sugar

9. Copper has two isotopes, ^{63}Cu and ^{65}Cu. How many protons, electrons and neutrons does an atom of ^{65}Cu contain

	Protons	Electrons	Neutrons
A)	29	36	29
B)	36	29	29
C)	36	29	29
D)	29	29	36

10. You have 0.125 mol of each of the following elements in their standard state at 25 ˚C: potassium, chlorine, nickel and neon. Which element has the largest mass?

A) potassium   B) chlorine   C) nickel   D) neon

11. What is the mass of one atom of gold?

A) 3.27×10^{-22} gms
B) 3.06×10^{21} gms
C) 1.79×10^{-21} gms
D) 1.31×10^{-22} gms

12. A solution was prepared by dissolving 260.1 g of pure HNO_3 in 900.0 g of water. The density of the resulting solution is $1.132 \frac{g}{cm^3}$. How many mLs of this solution would contain 0.143 mol HNO_3?

A) 39.01 mLs   B) 35.46 mLs   C) 7.951 mLs   D) 2.944 mLs

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)

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

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

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

Avogadro's number = 6.022×10^{23}