

CHEM 1215
Exam III
John III. Gelder
April 8, 1988

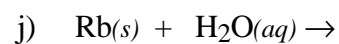
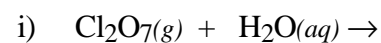
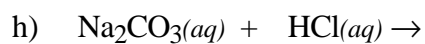
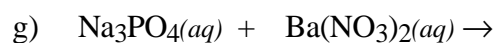
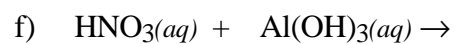
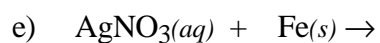
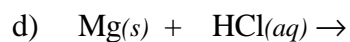
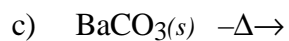
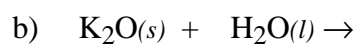
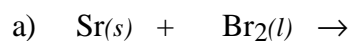
Name _____
TA's Name _____
Lab Section _____

INSTRUCTIONS:

1. This examination consists of a total of 7 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 2, 3, 6, 7, 9, 10 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	Page 5	Page 6	TOTAL
SCORES	<u>(13)</u>	<u>(12)</u>	<u>(10)</u>	<u>(9)</u>	<u>(6)</u>	<u>(100)</u>

(10) 1. Complete and balance the following equations. (If no reaction occurs write NR.)



(3) 2. Calculate the percentage composition, by weight, of NaHCO_3 .

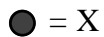
- (4) 3. Determine the empirical formula of a compound which is 40.9% carbon, 4.55% hydrogen and 54.6% oxygen.

If the molar mass of this compound is $176 \text{ g}\cdot\text{mol}^{-1}$, determine the molecular formula of the compound.

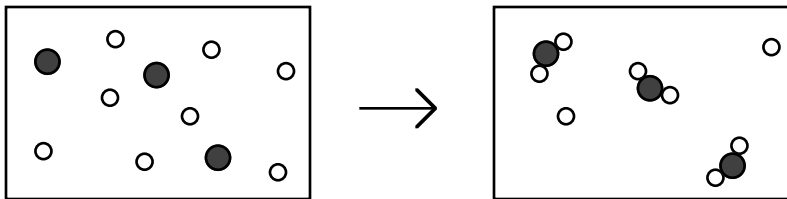
- (8) 4. Complete the following table

Formula	M , Molar Mass $\left(\frac{\text{g}}{\text{mol}}\right)$	m , Mass of sample (g)	n , Moles of sample (mol)	N , Number of atoms, molecules, or formula units
H_2SO_4	98.0	0.825		
Cr_2O_3	152			9.63×10^{23}
unknown		56.8	0.476	
Mo	95.9		62.8	

- (3) 5. The reaction of element X with element Y



is represented in the following diagram

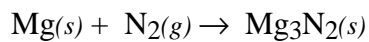


Write a balanced chemical equation describing the reaction.

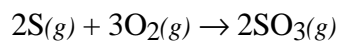
- (3) 6. Using the equation below, and assuming an excess of
- H_2SO_4
- and
- KI
- , how many moles of
- KMnO_4
- are required to produce 1.0 mol of
- I_2
- ?



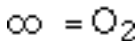
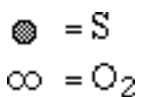
- (4) 7. How many grams of
- N_2
- are required to react with 2.30 moles of
- Mg
- in the process:



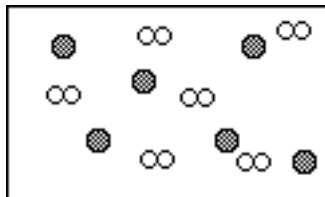
(3) 8. The equation for the reaction is



Consider a mixture of sulfur and oxygen



in a closed container as illustrated below:



In the box below draw a picture depicting the products after the reaction has gone to completion.



(6) 9. What is the maximum mass of $\text{Ni}(\text{OH})_2$ that could be prepared by mixing 26.0 g of NiCl_2 and 10.0 g of NaOH ? (assume a double displacement reaction.)

(3) 10. The volume of a sample of ethane gas, C_2H_6 , is 3.24 L at 477 mmHg. If the volume is reduced to 1.86 L, calculate the new pressure of the gas. Assume the temperature and the quantity of gas are constant.

(3) 11. A 748 mL sample of hydrogen gas, H_2 , at $-210\text{ }^\circ\text{C}$ is warmed to $100\text{ }^\circ\text{C}$. Calculate the new volume of the gas sample. Assuming the pressure and the quantity of gas are constant.

Periodic Table of the Elements

	IA																VIII A	
1	1 H 1.008																	2 He 4.00
		IIA										IIIA	IVA	VA	VIA	VIIA		
2	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	
3	11 Na 22.99	12 Mg 24.30										13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95	
			IIIB	IVB	VB	VIB	VIIB	VIII			IB	IIB						
4	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
5	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
6	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)
7	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)									

Lanthanides	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
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

6.02 x 10