

CHEM 1225
Exam III
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April 8, 1999

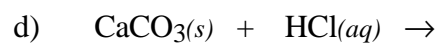
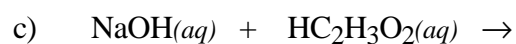
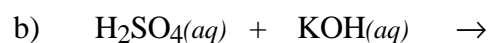
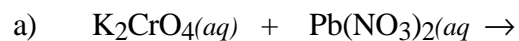
Name _____
TA's Name _____
Lab Section _____

INSTRUCTIONS:

1. This examination consists of a total of 7 different pages. The last two pages includes a periodic table and a solubility table. 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 (if any) or short answer questions.
4. No credit will be awarded if your work is not shown in problems 3 – 5, 7, 8, 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> </u> (20)	<u> </u> (22)	<u> </u> (22)	<u> </u> (18)	<u> </u> (18)	<u> </u> (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.



(8) 2. Write the balanced ionic and balanced net ionic chemical equations for any two of the reactions in Problem 1. (Remember to include the correct charges on all ions and the phase of each species.)

1a, 1b, 1c or 1d)

Ionic equation:

Net Ionic equation:

1a, 1b or 1c)

Ionic equation:

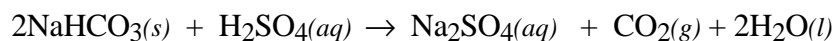
Net Ionic equation:

(12) 3. Describe how you would prepare;

a) 500.00 mls of a 1.25 M Na₂SO₄ solution.

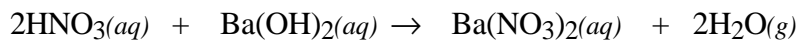
b) 1 liter of 0.733 M KMnO₄ from a solution which is 1.39 M KMnO₄.

(10) 4. Some sulfuric acid is spilled on a bench top in the laboratory. Sodium hydrogen carbonate is sprinkled on the spill. The balanced equation describing the reaction which takes place,



Calculate the mass of sodium hydrogen carbonate that must be weighed out to react with 400. mLs of 6.00 M H₂SO₄ that was spilled.

(10) 5. Nitric acid reacts with barium hydroxide according to the equation;



Calculate the volume of 0.259 M nitric acid required to exactly neutralize 18.0 mLs of 0.185 M barium hydroxide.

(4) 6. Write the equilibrium expression for each of the following chemical equations;

a)



b)



(8) 7. The equation describing the industrial preparation of ammonia is;



Suppose that a reaction mixture at a given temperature, at equilibrium, was analyzed and found to contain 3.45×10^{-4} M NH_3 , 8.17×10^{-4} M N_2 , and 0.580 M H_2 . Calculate the magnitude of the equilibrium constant for the reaction.

- (10) 8. When 0.981 moles of NO, 0.483 moles of Cl₂ and 0.400 moles of NOCl are sealed in a 1.00 L flask at 220 °C, the following equilibrium is established,



After the mixture achieves equilibrium analysis shows the concentration of NOCl to be 0.222 M. Calculate K for the reaction.

- (8) 9. For the system



How will the [NH₃] be effected (increase, decrease or no change) when the equilibrium is disturbed by;

- Removal of O₂
- Addition of H₂O
- Increase in temperature
- Decrease in the volume of the reaction container

(9) 10. Calculate the solubility of PbCO_3 in pure water. $K_{\text{sp}} = 1.0 \times 10^{-13}$

(9) 11. The concentration of Mg^{2+} in a saturated solution of $\text{Mg}(\text{OH})_2$ is 1.16×10^{-4} M. Calculate the magnitude of the equilibrium constant, K_{sp} , for $\text{Mg}(\text{OH})_2$.

Periodic Table of the Elements

	IA																VIII A	
1	1 H 1.008																	2 He 4.00
2	3 Li 6.94	IIA	4 Be 9.01										IIIA	IVA	VA	VIA	VIIA	10 Ne 20.18
3	11 Na 22.99	12 Mg 24.30											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	18 Ar 39.95
4	19 K 39.10	20 Ca 40.08	IIIB	IVB	VB	VIB	VIIB	VIII		IB	IIB	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)

Solubility Table

Ion	Solubility	Exceptions
NO_3^-	soluble	none
ClO_4^-	soluble	none
Cl^-	soluble	except Ag^+ , Hg_2^{2+} , Pb^{2+}
SO_4^{2-}	soluble	except Ca^{2+} , Ba^{2+} , Sr^{2+} , Hg^{2+} , Pb^{2+} , Ag^+
CO_3^{2-}	insoluble	except Group IA and NH_4^+
PO_4^{3-}	insoluble	except Group IA and NH_4^+
CrO_4^{2-}	insoluble	except Group IA, IIA and NH_4^+
-OH	insoluble	except Group IA, Ca^{2+} , Ba^{2+} , Sr^{2+}
S^{2-}	insoluble	except Group IA, IIA and NH_4^+
Na^+	soluble	none
NH_4^+	soluble	none
K^+	soluble	none

*slightly soluble

