

Name \_\_\_\_\_  
TA's Name \_\_\_\_\_  
Lab Section \_\_\_\_\_

### INSTRUCTIONS:

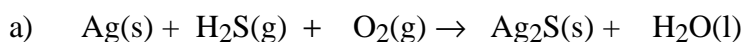
1. This examination consists of a total of 6 different pages. The last page includes a periodic table and some useful information. All work should be done in this booklet.
2. PRINT your name, TA's name and your lab section number now in the space at the top of this sheet. **DO NOT SEPARATE THESE PAGES.**
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/discussion. 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 4, 5, 6 and 7.
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	<u>        </u> (34)	<u>        </u> (36)	<u>        </u> (30)	<u>        </u> (100)

(16) 1. Complete the following table with the missing information.

Symbol	# protons	# neutrons	# electrons	charge
$^{107}_{46}\text{Pd}^{2+}$				
	7	8		-3
U		149		0
		53	37	+5

(6) 2. Balance each of the following equations.



(3) c)  $\text{NH}_3(g) + \text{NO}(g) \rightarrow \text{N}_2(g) + \text{H}_2\text{O}(g)$  **(BONUS: do not attempt until after completing the exam!)**

(12) 3. Write and balance the equation for each of the following.

a) the formation equation for  $\text{CCl}_4(g)$ .

b) the formation equation for  $\text{P}_2\text{O}_5(s)$ .

c) the combustion reaction for hexane,  $\text{C}_7\text{H}_{14}(l)$ .

(24) 4. Calculate the mass, in grams, of each of the following;  
(Important atomic weights: C 12 u: Ag 107.9 u: Na 23 u: Cl 35.5 u: Br 79.9 u)

a) 5.67 mol  $C_7H_{14}$

b)  $4.72 \times 10^{-6}$  mol NaCl

c) an atom of Ag

d)  $3.92 \times 10^{24}$  molecules  $Br_2$ .

(12) 5. Calculate the number of moles in each of the following;  
(Important atomic weights: P 31 u)

a)  $7.00 \times 10^{-2}$  grams  $P_2O_5$

b)  $8.15 \times 10^{21}$  atoms Na.

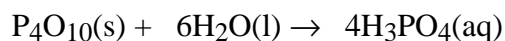
- (21) 6. Calculate each of the following;
- the number of fluorine atoms in one molecule of  $\text{PF}_5$ .

- the number of O atoms in one mol of  $\text{O}_2$ .

- the number of N atoms in 2.5 mol of  $\text{N}_2\text{O}_5$ .

- the number of Cl atoms in  $3.00 \times 10^{-5}$  grams  $\text{CCl}_4$ .

- (9) 7. Given the equation for the preparation of phosphoric acid,  $\text{H}_3\text{PO}_4$ ,



Calculate,

- the number of mol of water required to react with 2.5 mol of  $\text{P}_4\text{O}_{10}$ .

- the number of mol of water required to produce 0.0455 grams of  $\text{H}_3\text{PO}_4$ .

- the number of grams of  $\text{P}_4\text{O}_{10}$  required to react with 45 g of  $\text{H}_2\text{O}$ .

**Periodic Table of the Elements**

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

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

### Useful Information

$$6.023 \times 10^{23}$$

$$\text{mol} = \frac{\text{grams}}{\text{molar mass}}$$