

Dr. Zellmer  
Time: 7 PM Sun.  
40 min

Chemistry 1250  
Spring Semester 2022  
Quiz III

T, R  
February 6, 2022

Name \_\_\_\_\_ Rec. TA/time \_\_\_\_\_

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Show **ALL** your work or **EXPLAIN** to receive full credit.

1. (3 pts) Cisplatin, an anticancer drug, has the molecular formula  $\text{Pt}(\text{NH}_3)_2\text{Cl}_2$ . How many moles of hydrogen atoms are in  $2.8 \times 10^{-4}$  g of cisplatin?  
(At. Wts.:  $\text{H} = 1.008$ ,  $\text{N} = 14.01$ ,  $\text{Cl} = 35.45$ ,  $\text{Pt} = 195.1$  ; Mol. wt: 300.07)

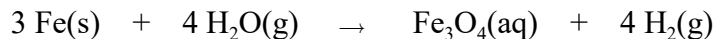
2. (3 pts) Sodium carbonate has the formula,  $\text{Na}_2\text{CO}_3$ . How many sodium ions are present in 0.10 g of  $\text{Na}_2\text{CO}_3$ ? (At. Wts.:  $\text{C} = 12.01$ ,  $\text{O} = 16.00$ ,  $\text{Na} = 22.99$ ; Form. Wt.:  $\text{Na}_2\text{CO}_3 = 105.99$ )

3. (7 pts) An analysis of a compound containing only carbon and fluorine gives a mass percent composition of 21.32% C and 78.68% F. The experimentally determined molecular weight is 507 amu. (At. Wt.: C = 12.011, F = 18.998)
- a) (5 pts) What is the **empirical formula**?

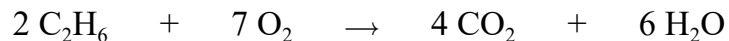
b) (2 pts) What is the **molecular formula**? Not asked for on the quiz.

4. (7 pts) A 0.589 g sample of an organic compound containing only carbon, hydrogen and oxygen was burned completely in air to produce 0.733 g of  $\text{CO}_2$  and 0.299 g of  $\text{H}_2\text{O}$ . What is the empirical formula of the compound? (Atomic weights: C = 12.01, H = 1.008, O = 16.00)

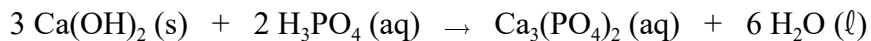
5. (4 pts) Given the balanced equation below, how many moles of hydrogen can be produced from the complete reaction of  $3.860 \times 10^{-1}$  mol of Fe with excess water? (At. Wts.: H = 1.008, O = 16.00, Fe = 55.85)



6. (5 pts) How many **grams** of oxygen ( $\text{O}_2$ ), reacting with excess  $\text{C}_2\text{H}_6$ , are required to form 35.0 g of carbon dioxide ( $\text{CO}_2$ ), according to the following equation? (At. Wt.: H = 1.01, O = 16.00, C = 12.01; Mol. Wt:  $\text{C}_2\text{H}_6 = 30.08$ ,  $\text{O}_2 = 32.00$ ,  $\text{CO}_2 = 44.01$ ,  $\text{H}_2\text{O} = 18.02$ )



7. (6 pts) Calcium hydroxide reacts with phosphoric acid according to the following equation. Which substance is the limiting reagent when 1.00 mol of  $\text{Ca(OH)}_2$  reacts with 0.50 mol of  $\text{H}_3\text{PO}_4$ ? How many moles of the excess reagent remain after completion of the reaction?



8. (3 pts) Which of the following are **strong electrolytes**?

HF      HCl       $\text{Cu}(\text{ClO}_3)_2$        $\text{Ca}(\text{OH})_2$        $\text{C}_2\text{H}_5\text{OH}$

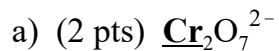
9. (4 pts) **Predict the products** of the following reaction. **Complete and balance** the equation. **Indicate the physical state** of reactants and products (i.e. (s), (g), (l), (aq)). **(Show all work.)**

A solution of nitric acid,  $\text{HNO}_3$ , is combined with a solution of  $\text{Ca}(\text{OH})_2$ .

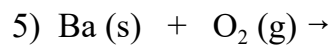
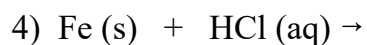
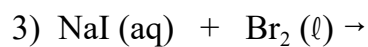
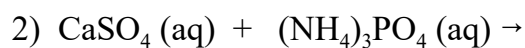
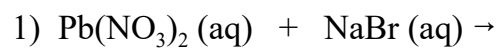
10. (3 pts) What are the expected products of the following reaction?



11. (4 pts) Determine the oxidation number of the underlined element in the following compound. **(Must show all work.)**



12. (5 pts) Which of the following is (are) an example(s) of a **redox** reaction (assume all reactions occur to give products)?



## USEFUL INFORMATION

$$1 \text{ amu} = 1.66 \times 10^{-24} \text{ g}$$

$$\text{Avogadro's number} = 6.02 \times 10^{23} \text{ particles/mole}$$

	IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII B					IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 <b>H</b> 1																		4.003 <b>He</b> 2	
2	6.941 <b>Li</b> 3	9.012 <b>Be</b> 4												10.811 <b>B</b> 5	12.011 <b>C</b> 6	14.007 <b>N</b> 7	15.999 <b>O</b> 8	18.998 <b>F</b> 9	20.179 <b>Ne</b> 10	
3	22.990 <b>Na</b> 11	24.305 <b>Mg</b> 12												26.98 <b>Al</b> 13	28.09 <b>Si</b> 14	30.974 <b>P</b> 15	32.06 <b>S</b> 16	35.453 <b>Cl</b> 17	39.948 <b>Ar</b> 18	
4	39.098 <b>K</b> 19	40.08 <b>Ca</b> 20	44.96 <b>Sc</b> 21	47.88 <b>Ti</b> 22	50.94 <b>V</b> 23	52.00 <b>Cr</b> 24	54.94 <b>Mn</b> 25	55.85 <b>Fe</b> 26	58.93 <b>Co</b> 27	58.69 <b>Ni</b> 28	63.546 <b>Cu</b> 29	65.38 <b>Zn</b> 30	69.72 <b>Ga</b> 31	72.59 <b>Ge</b> 32	74.92 <b>As</b> 33	78.96 <b>Se</b> 34	79.904 <b>Br</b> 35	83.80 <b>Kr</b> 36		
5	85.47 <b>Rb</b> 37	87.62 <b>Sr</b> 38	88.91 <b>Y</b> 39	81.22 <b>Zr</b> 40	92.91 <b>Nb</b> 41	95.94 <b>Mo</b> 42	98 <b>Tc</b> 43	101.07 <b>Ru</b> 44	102.91 <b>Rh</b> 45	106.42 <b>Pd</b> 46	107.87 <b>Ag</b> 47	112.41 <b>Cd</b> 48	114.82 <b>In</b> 49	118.69 <b>Sn</b> 50	121.75 <b>Sb</b> 51	127.60 <b>Te</b> 52	126.90 <b>I</b> 53	131.39 <b>Xe</b> 54		
6	132.91 <b>Cs</b> 55	137.33 <b>Ba</b> 56	138.91 <b>La</b> 57	178.39 <b>Hf</b> 72	180.95 <b>Ta</b> 73	183.85 <b>W</b> 74	186.21 <b>Re</b> 75	190.23 <b>Os</b> 76	192.22 <b>Ir</b> 77	195.08 <b>Pt</b> 78	196.97 <b>Au</b> 79	200.59 <b>Hg</b> 80	204.38 <b>Tl</b> 81	207.2 <b>Pb</b> 82	208.98 <b>Bi</b> 83	209 <b>Po</b> 84	210 <b>At</b> 85	222 <b>Rn</b> 86		
7	223 <b>Fr</b> 87	226.03 <b>Ra</b> 88	227.03 <b>Ac</b> 89	261 <b>Rf</b> 104	262 <b>Ha</b> 105	263 <b>Sg</b> 106	262 <b>Ns</b> 107	265 <b>Hs</b> 108	266 <b>Mt</b> 109	269 <b>Uu</b> 110	272 <b>Uub</b> 111	277 <b>Uuq</b> 112								

Lanthanide Series	140.12 <b>Ce</b> 58	140.91 <b>Pr</b> 59	144.24 <b>Nd</b> 60	145 <b>Pm</b> 61	150.36 <b>Sm</b> 62	151.96 <b>Eu</b> 63	157.25 <b>Gd</b> 64	158.93 <b>Tb</b> 65	162.50 <b>Dy</b> 66	164.93 <b>Ho</b> 67	167.26 <b>Er</b> 68	168.93 <b>Tm</b> 69	173.04 <b>Yb</b> 70	173.04 <b>Lu</b> 71
Actinide Series	232.04 <b>Th</b> 90	231.04 <b>Pa</b> 91	238.03 <b>U</b> 92	237.05 <b>Np</b> 93	<b>Pu</b> 94	<b>Am</b> 95	<b>Cm</b> 96	<b>Bk</b> 97	<b>Cf</b> 98	<b>Es</b> 99	<b>Fm</b> 100	<b>Md</b> 101	<b>No</b> 102	<b>Lr</b> 103

A PERIODIC CHART OF THE ELEMENTS  
(Based on <sup>12</sup>C)