Dr. Zellmer | Chemistry 1250 | T, R
Time: 7 PM Sun. | Spring Semester 2022 | February 6, 2022
40 min | Quiz III

Name _____ Rec. TA/time _____

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

1. (3 pts) Cisplatin, an anticancer drug, has the molecular formula $Pt(NH_3)_2Cl_2$. How many **moles** of hydrogen **atoms** are in 2.8×10^{-4} g of cisplatin?
(At. Wts.: H = 1.008, N = 14.01, Cl = 35.45, Pt = 195.1 ; Mol. wt: 300.07)

2. (3 pts) Sodium carbonate has the formula, Na_2CO_3. How **many sodium ions** are present in 0.10 g of Na_2CO_3? (At. Wts.: C = 12.01, O = 16.00, Na = 22.99; Form. Wt.: Na_2CO_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 CO_2 and 0.299 g of H_2O. 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 3.860×10^{-1} mol of Fe with excess water? (At. Wts.: H = 1.008, O = 16.00, Fe = 55.85)

$$3\ Fe(s) + 4\ H_2O(g) \rightarrow Fe_3O_4(aq) + 4\ H_2(g)$$

6. (5 pts) How many **grams** of oxygen (O_2), reacting with excess C_2H_6, are required to form 35.0 g of carbon dioxide (CO_2), according to the following equation? (At. Wt.: H = 1.01 O = 16.00, C = 12.01; Mol. Wt: C_2H_6 = 30.08, O_2 = 32.00, CO_2 = 44.01, H_2O = 18.02)

$$2\ C_2H_6 + 7\ O_2 \rightarrow 4\ CO_2 + 6\ H_2O$$

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 $Ca(OH)_2$ reacts with 0.50 mol of H_3PO_4? How many moles of the excess reagent remain after completion of the reaction?

$$3\ Ca(OH)_2\ (s) + 2\ H_3PO_4\ (aq) \rightarrow Ca_3(PO_4)_2\ (aq) + 6\ H_2O\ (\ell)$$

8. (3 pts) Which of the following are **<u>strong</u> electrolytes**?

HF HCl $Cu(ClO_3)_2$ $Ca(OH)_2$ C_2H_5OH

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

A solution of nitric acid, HNO_3, is combined with a solution of $Ca(OH)_2$.

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

$$CaSO_3\ (s) + 2\ HNO_3\ (aq) \longrightarrow$$

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

a) (2 pts) $\underline{\mathbf{Cr}}_2O_7^{2-}$

b) (2 pts) $\underline{\mathbf{P}}_4O_6$

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

1) $Pb(NO_3)_2$ (aq) + NaBr (aq) →

2) $CaSO_4$ (aq) + $(NH_4)_3PO_4$ (aq) →

3) NaI (aq) + Br_2 (ℓ) →

4) Fe (s) + HCl (aq) →

5) Ba (s) + O_2 (g) →

USEFUL INFORMATION

1 amu = 1.66×10^{-24} g

Avogadro's number = 6.02×10^{23} particles/mole

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

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

A PERIODIC CHART OF THE ELEMENTS
(Based on ^{12}C)