NAME _____

CHEMISTRY 101
EXAM 1   FORM D   SECTION 503

SPRING 2010
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Directions: (1) Put your name and signature on PART 2 of the exam where indicated.
(2) Sign the Aggie Code on PART 2 of this exam.
(3) Each multiple choice question is actually 2 questions on your scanning sheet. If you are sure of an answer, **put the same answer down for both questions** for 5 pts. If you cannot decide between two answers, put your best answer down for the first (odd) question and the other answer down for the second (even) question. If you get the first one correct you'll get 3 pts; if you get the second one correct you'll get 2 pts. If there is an ambiguous multiple choice question, use the last page to explain your answer.
(4) Do NOT write on the envelope.
(5) When finished, put everything in the envelope and wait to be excused. At the table, take everything out of the envelope. You can pick up the multiple choice part with the answers outside my office after 2:30pm.
(6) There are a total of 34 questions (18 actual questions).

PART 1

1&2. Which of the following elemental names is **incorrectly** matched with its symbol?

(a) tin/Sn
(b) silicon/Si
(c) iron/Fe
(d) chromium/Ch
(e) cadmium/Cd

3&4. Which statement is FALSE about magnesium?

(a) It forms the compound MgI_2 with iodine using ionic bonds.
(b) Its ionic charge is generally 2+.
(c) It has chemical and physical properties similar to strontium.
(d) It is in the second period.
(e) Magnesium is a Group 2A alkaline earth metal.

5&6. If you have 3 moles of calcium, how many moles of oxygen are also present in your sample of $Ca(NO_3)_2 \cdot 6H_2O$?

(a) 12
(b) 36
(c) 15
(d) 21
(e) 33

7&8. You can find 4 atoms of oxygen in

    (a) 1 mole of K_2SO_4

    (b) 4 moles of Na_2O

    (c) 1 formula unit of Na_3PO_4

    (d) 2 molecules of H_2O

    (e) 2 grams of $Ba(OH)_2$

9&10. How many electrons can be found in an ion of the isotope $^{31}P^{3-}$?

    (a) 31   (b) 28   (c) 34   (d) 12   (e) 18

11&12. In 1911, Ernest Rutherford conducted his now famous goldfoil experiment. During the experiment, alpha particles bombarded a thin piece of gold foil. The alpha particles were expected to pass easily through the gold foil. Every now and then, however, an alpha particle bounced back—an unexpected result. Rutherford concluded that these particles were striking

    (a) a tiny region of positive charge.
    (b) a dense region of negative charge.
    (c) a dense region of neutrons.
    (d) a tiny region with a strong magnetic field.
    (e) a gold atom with the protons and electrons interspersed throughout the atom.

13&14. Which of the following statements is FALSE?

    (a) The number of atoms in 1 mol of a metal is Avogadro's number.
    (b) A formula unit is composed of ions.
    (c) The smallest representative part of a covalent compound is called a molecule.
    (d) The formula weight for 1 mol of compound can have units of amu.
    (e) The smallest representative part of an ionic compound is called a formula unit.

15&16. Give the ions present and their relative numbers in copper(II) chlorate.

    (a) 1 Cu^{2+} and 1 ClO_3^- (b) 1 Cu^{2+} and 2 ClO_3^- (c) 2 Cu^{2+} and 1 ClO_3^-

    (d) 1 Cu^+ and 2 ClO_3^- (e) 2 Cu^+ and 1 ClO_3^-

17&18. In the following drawing of an ionic crystalline solid, the white spheres represent cations and the black spheres represent anions. The drawing is a representation of which compound?
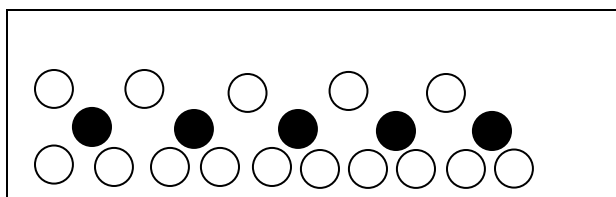
(a) $Ba(ClO_3)_2$ (b) $(NH_4)_2CO_3$ (c) $NaBr$ (d) $AlBr_3$ (e) Na_3PO_4

19&20. The formula weight of $(NH_4)_3AsO_4$ is:

(a) 145 amu   (b) 117 amu   (c) 193 amu   (d) 157 amu   (e) 165 amu

21&22. Which pair of molecular formula and empirical formula is CORRECT?

molecular formula	empirical formula
(a) As_2O_5	AsO_3
(b) SO_2	S_2O_4
(c) C_3H_6	CH_3
(d) $C_6H_{12}O_6$	CH_2O
(e) $C_{12}H_{26}$	CH_2

23&24. How many moles of Vitamin E, $C_{29}H_{50}O_2$, are present in 10.0 g of Vitamin E?

(a) 3.39×10^{-2} mol   (b) 2.07×10^{-2} mol   (c) 2.32×10^{-2} mol
(d) 4.36×10^{-2} mol   (e) 2.86×10^{-2} mol

25&26. What is the percent of carbon by mass in Vitamin E, $C_{29}H_{50}O_2$?

    (a) 80.9%   (b) 86.3%   (c) 77.4%

    (d) 71.2%   (e) 29.0%

27&28. An unknown organic compound composed of carbon, hydrogen and oxygen was analyzed and found to be 50.84% C, 8.53% H and the rest being oxygen. Which of the following represents the correct empirical formula for the compound?

    (a) CH_2O (b) $C_3H_6O_2$ (c) $C_4H_8O_3$ (d) C_2H_4O (e) $C_5H_{10}O_3$

29&30. You buy 0.750 L of liquid cyclohexanol ($C_6H_{11}OH$), which has a specific gravity of 0.962. How many moles of hydrogen atoms have you purchased?

    (a) 128 mol   (b) 86.4 mol   (c) 0.721 mol   (d) 93.4 mol   (e) 855 mol

31&32. You are given the data for all the isotopes of the newly discovered element, Aggiedaddium:

Abundance (%)	Isotopic Mass (amu)
10	122.00
50	125.00
40	128.00

The atomic weight of Aggiedaddium (in amu) is:

    (a) 125.9   (b) 125.0   (c) 125.6   (d) 124.7   (e) 126.0

PART 2

**Please read and sign: "On my honor, as an Aggie, I have neither given
nor received unauthorized aid on this exam."**   _____

(14 pts) **33.**   Give the appropriate name or formula for a compound:

(a) iron(III) iodide   _____

(b) potassium acetate   _____

(c) aluminum sulfite   _____

(d) strontium hydrogen carbonate _____

(e) Na_2S _____

(f) P_2O_3 _____

(g) HF(aq)   _____

OVER $\Rightarrow$

34.   A scientistt has two containers of sulfur and knows that she has 8 moles of sulfur **atoms** in each one. One container has only S_2 molecules in it and the other has only S_4 molecules in it. Answer the following questions and show your work to get full credit.

(4 pts)   (a) Calculate the number of molecules of sulfur in each sample.

(2 pts)   (b) Are the numbers the same? Draw a simple picture (a particle view) of each container to justify your answer. (For example, S_3 would be ⭕⭕⭕)

SCRAP PAPER OR COMMENTS ON EXAM