

CHEMISTRY 101**EXAM 1 FORM C****SECTION 503****SPRING 2010****DR. KEENEY-KENNICUTT**

- 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).
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PART 1

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

- (a) lead/Ld (b) magnesium/Mg (c) sodium/Na
(d) tin/Sn (e) mercury/Hg

3&4. You can find 2 atoms of sulfur in

- (a) 2 moles of NaOH
(b) 1 mole of H₂SO₄
(c) 1 molecule of H₂SO₄
(d) 2 formula units of BaS
(e) 2 grams of S

5&6. 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 gold atom with the protons and electrons interspersed throughout the atom.
(b) a tiny region of positive charge.
(c) a dense region of neutrons.
(d) a dense region of negative charge.
(e) a tiny region with a strong magnetic field.

- 7&8.** How many electrons can be found in an ion of the isotope $^{90}\text{Sr}^{2+}$?
- (a) 90 (b) 88 (c) 40 (d) 52 (e) 36

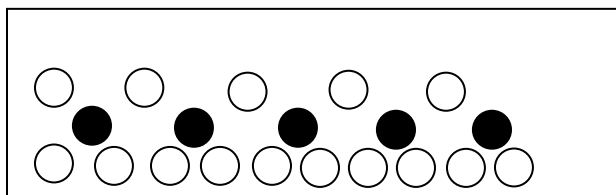
9&10. Which statement is FALSE about sulfur?

- (a) It has chemical and physical properties similar to selenium.
(b) It is in the second period.
(c) Its ionic charge is generally 2-.
(d) Sulfur is a Group 6A non-metal.
(e) It forms the compound Na_2S with sodium using ionic bonds.

11&12. If you have 3 moles of sodium, how many moles of hydrogen are also present in your sample of sodium aluminum sulfate, $\text{NaAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$?

- (a) 12 (b) 24 (c) 72 (d) 6 (e) 36

13&14. In the following drawing of an ionic crystalline solid, the white spheres represent anions and the black spheres represent cations. The drawing is a representation of which compound?

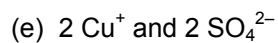
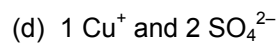
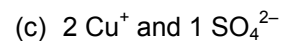
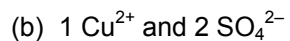
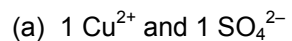


- (a) $\text{Ba}(\text{ClO}_3)_2$ (b) $(\text{NH}_4)_2\text{CO}_3$ (c) NaBr (d) AlBr_3 (e) Na_3PO_4

15&16. Which of the following statements is FALSE?

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

17&18. Give the ions present and their relative numbers in copper(I) sulfate.



19&20. The formula weight of $\text{Al}_2(\text{SO}_4)_3$ is:

(a) 150. amu

(b) 123 amu

(c) 278 amu

(d) 342 amu

(e) 450. amu

21&22. How many moles of vanillin, $\text{C}_8\text{H}_8\text{O}_3$, are present in 3.00 g of vanillin?

(a) 5.07×10^{-2} mol

(b) 3.16×10^{-2} mol

(c) 1.52×10^{-2} mol

(d) 4.13×10^{-2} mol

(e) 1.97×10^{-2} mol

23&24. What is the percent of oxygen by mass in vanillin, $C_8H_8O_3$?

(a) 31.6%

(b) 19.2%

(c) 15.8%

(d) 25.8%

(e) 10.5%

25&26. Which pair of molecular formula and empirical formula is CORRECT?

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

27&28. An unknown organic compound composed of carbon, hydrogen and oxygen was analyzed and found to be 46.15% C, 7.74% H with the rest being oxygen. Which of the following represents the correct empirical formula for the compound?

(a) CH_3O

(b) C_2H_3O

(c) $C_4H_8O_3$

(d) CH_2O

(e) $C_2H_5O_2$

29&30. You are given the data for all the isotopes of the newly discovered element, Aggiemomium:

Abundance (%)	Isotopic Mass (amu)
30.00	143.00
60.00	145.00
10.00	149.00

What is the atomic weight of Aggiemomium (in amu)?

- (a) 145.5 (b) 146.0 (c) 145.2 (d) 145.0 (e) 144.8

31&32. You buy 1.50 L of liquid ethanol (C_2H_5OH), which has a specific gravity of 0.789. How many moles of hydrogen atoms have you purchased?

- (a) 24.1 mol (b) 154 mol (c) 1820 mol (d) 9.81 mol (e) 0.110 mol

PART 2


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

33. A scientist has two containers of sulfur and knows that she has 6 moles of sulfur atoms in each one. One container has only S_2 molecules in it and the other has only S_3 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_4 would be )

OVER ⇒

(14 pts) **34.** Give the appropriate name or formula for a compound:

(a) chromium(II) cyanide _____

(b) sodium sulfite _____

(c) ammonium nitrate _____

(d) magnesium dihydrogen phosphate _____

(e) Li_2O _____

(f) As_2O_5 _____

(g) HBrO_4 _____

SCRAP PAPER OR COMMENTS ON EXAM

CHEMISTRY 101
EXAM 1 Form C

Spring 2010
Section 503

NAME _____
