

NAME Key  
CHEM 1301/Exam 2/Dooley

100 Points Total

*Multiple Choice: (3 Points Each) Place the letter corresponding to the correct answer to the left of each problem number.*

- e 1. Which of the following statements is FALSE according to Dalton's Atomic Theory?
- a. Atoms combine in simple whole number ratios to form compounds. ✓
  - b. All atoms of chlorine have identical properties that distinguish them from other elements. ✓
  - c. One carbon atom will combine with one oxygen atom to form a molecule of carbon monoxide. ✓
  - d. Atoms of sodium do not change into another element during chemical reaction with chlorine. ✓
  - e. An atom of nitrogen can be broken down into smaller particles that will still have the unique properties of nitrogen. ✗
- C 2. Which is the best modern description of the structure of an atom.
- a. neutrons and electrons in nucleus; protons outside nucleus
  - b. neutrons in nucleus; protons and electrons ~~in~~ outside nucleus
  - c. protons and neutrons in nucleus; electrons ~~in~~ outside nucleus
  - d. protons, neutrons, and electrons in nucleus, empty space otherwise
  - e. electrons in nucleus; protons and neutrons outside nucleus
- a 3. Identify the relative charges of the protons, neutrons, and electrons.
- a. protons +1, neutrons 0, electrons -1
  - b. protons 0, neutrons -1, electrons +1
  - c. protons -1, neutrons 0, electrons +1
  - d. protons 0, neutrons +1, electrons -1
  - e. protons +1, neutrons -1, electrons 0
- C 4. Identify the element that has an atomic number of 40.
- a. argon
  - b. calcium
  - c. zirconium
  - d. bromine
  - e. iodine
- d 5. Isotopes differ in the number of what particle?
- a. beta particles
  - b. protons
  - c. electrons
  - d. neutrons
  - e. gamma particles

b 6. Which of the following represent isotopes?  
A:  $\overset{32}{15}\text{P}$     B:  $\overset{32}{16}\text{S}$     C:  $\overset{34}{15}\text{P}$     D:  $\overset{33}{14}\text{Si}$

- a. A and B
- b. A and C
- c. A and D
- d. B and D
- e. C and D

Same element (Z).  
Different mass# (A)

b 7. Determine the number of protons, neutrons and electrons in the following:



- a.  $p^+ = \underline{18}$      $n^0 = 18$      $e^- = 22$
- b.  $p^+ = \underline{18}$      $n^0 = \underline{22}$      $e^- = \underline{18}$
- c.  $p^+ = 22$      $n^0 = 18$      $e^- = \underline{18}$
- d.  $p^+ = \underline{18}$      $n^0 = 22$      $e^- = 40$
- e.  $p^+ = 40$      $n^0 = 22$      $e^- = \underline{18}$

C 8. Which of the following elements is NOT a metal?

- a. Ba
- b. Mg
- c. Xe
- d. Pb
- e. Ga

C 9. Which of the following elements is an alkaline earth metal?

- a. Cs
- b. Cu
- c. Mg
- d. Ti
- e. Br

b 10. Which of the following statements is FALSE?

- a. Halogens are very reactive elements. ✓
- b. The alkali metals are unreactive, and do not form compounds. ✗
- c. Sulfur is a main group element. ✓
- d. Noble gases do not usually form ions. ✓
- e. Zn is a transition metal. ✓

C 11. Which of the following does NOT describe a metal?

- a. good conductor of heat ✓
- b. good conductor of electricity ✓
- c. tends to gain electrons ✗
- d. forms ionic compounds with nonmetals ✓
- e. found on the left side of the periodic table. ✓

a 12. Predict the charge that the ion formed from bromine would have.

- a. 1-
- b. 2+
- c. 1+
- d. 4+
- e. 2-

c 13. Which of the following is a molecular element?

- a. Kr
- b. Ag
- c. O
- d. Mg
- e. Ti

a 14. All samples of a given compound, regardless of their source or how they were prepared, have the same proportions of their constituent elements. Which law does this refer to?

- a. Law of Definite Proportions
- b. Law of the Conservation of Mass
- c. Law of Modern Atomic Theory
- d. Law of Multiple Proportions
- e. First Law of Thermodynamics

a 15. A covalent or molecular bond is best described as

- a. the sharing of electrons.
- b. an electrostatic interaction between a cation and an anion. *ionic*
- c. the attraction that holds the protons and neutrons together in an atom. *Nope*
- d. the attraction between a metal and a nonmetal atom. *ionic*
- e. the attraction between electrons and protons. *nope*

1. (10 Points) Calculate the atomic mass of element "X", if it has 2 naturally occurring isotopes with the following masses and natural abundances:

X-45	44.8776 amu	32.88%
X-47	46.9443 amu	67.12%

$$.3288(44.8776 \text{ amu}) + .6712(46.9443 \text{ amu})$$

$$= 46.2648 \text{ amu}$$

2. The following table has information about three samples of compounds containing only nitrogen and oxygen. The identities of the first two samples are known. Use the laws of definite and multiple proportions to determine the identity of the third sample.

	Mass of N (g)	Mass of O (g)
Sample 1: N <sub>2</sub> O <sub>4</sub>	173.724	396.80
Sample 2: NO <sub>3</sub>	33.624	115.200
Sample 3: ??	134.50	460.80

- a. (3 Points) Calculate mass ratios for each sample:

$$1. \text{ N:O } \frac{173.724 \text{ g}}{396.80 \text{ g}} = .4378 \quad \text{O:N} = 2.284$$

$$2. \frac{33.624 \text{ g}}{115.200 \text{ g}} = .291875 \quad = 3.426$$

$$3. \frac{134.50 \text{ g}}{460.80 \text{ g}} = .29188 \quad = 3.426$$

- b. (2 Points) What is the Identity of the unknown sample based on you work in part a?

Sample 3 Identity:

NO<sub>3</sub> same ratio as sample 2

2. Fill in the table below (15 Points):

Symbol (with charge)	Number of Protons	Number of neutrons	Number of electrons	Atomic Number (Z)	Mass Number (A)	Atomic Mass (amu)	Charge
$\text{Cu}^{2+}$	29	38	27	29	67	63.55	+2
$\text{K}^+$	19	21	18	19	40	39.10	+1
$\text{N}^{3-}$	7	$16-7$ 9	10	7	16	14.01	-3

Use the space below for scratch paper, if needed.

### Naming Compounds and Molecules (30 Pts Total)

11-20 Identify the compound as either Molecular, Ionic Type 1, or Ionic Type 2. (1 Pt)

21-30 Write the name/formula for the listed compounds. (2 Pts)

	11-20: Identify Type	21-30: Name/Formula
sodium nitrate	Ionic T1	$\text{NaNO}_3$
dinitrogen pentoxide	Molecular	$\text{N}_2\text{O}_5$
$\text{Cu}_3\text{PO}_4$	Ionic T2	Copper (I) phosphate <del>uranium</del>
molybdenum (IV) fluoride	Ionic T2	$\text{MoF}_4$
selenium dibromide	Molecular	$\text{SeBr}_2$
$\text{NCl}_3$	Molecular	nitrogen trichloride
$\text{Al}_2(\text{CO}_3)_3$	Ionic T1	Aluminum carbonate
tin (II) oxide	Ionic T2	$\text{SnO}$
$\text{Ni}(\text{NO}_3)_4$	Ionic T2	nickel (II) nitrate
$\text{Ca}(\text{OH})_2$	Ionic T1	calcium hydroxide