This is a practice exam prepared by another instructor. Your exam will cover similar concepts but be in a different format. Questions 18 – 22 cover concepts (Chapt. 5) that will not be on our exam. The answer key will be posted across from my office CHE 218.

Name_______________________

Chemistry 103
Spring 2008
EXAM I
100 points

1. Show your work for credit: (36pts/6pts each)

a. (6pts) If a train travels at a speed of 85 miles/hour, how many seconds does it take to travel 17,000 ft?

b. (6pts) A unit of length in horse racing is the “furlong.” The height of a horse is measured in “hands.” There are exactly 8 furlongs per mile, and one hand is exactly 4 inches. How many hands are there in 12.0 furlongs? (Express your final answer in standard scientific notation.)

c. (6pts) Indicate whether the following is a physical or a chemical property (circle one).

  i. An iron nail is attracted to a magnet.   CHEMICAL    PHYSICAL
  ii. A silver spoon tarnishes in air.      CHEMICAL    PHYSICAL
  iii. Snow melts.                         CHEMICAL    PHYSICAL
  iv. Helium is “lighter” than air.        CHEMICAL    PHYSICAL
  v. Water evaporates from a lake.         CHEMICAL    PHYSICAL
  vi. A pizza is digested                  CHEMICAL    PHYSICAL
d. (6pts) The volume of water in a graduated cylinder reads 25.5 mL. What does the volume read when 25.0g quantity of pure nickel is added to the cylinder? The density of pure nickel is 8.91g/mL.

e. (6pts) Convert 127 cm\(^3\) to ft\(^3\).

f. (6pts) In a candy factory, the nutty chocolate bars contain 22.0% by mass pecans. If 5.0kg of pecans were used for candy last Tuesday, how many pounds of nutty chocolate bars were made?
2. (10pts) Naturally occurring Cu is 69.09% $^{63}\text{Cu}$ (62.96amu). The only other isotope present is $^{65}\text{Cu}$ (64.96amu). What is the atomic weight of copper?

3. (10pts) Write proper atomic symbol notation for each of the following: (Be sure to include the mass number, atomic number, and electrical charge.)

a. (3pts) An ion of Sn which contains 68 neutrons and 48 electrons.

b. (3pts) An isotope of nitrogen which contains 7 neutrons and 10 electrons.

c. (4pts) An ion with a +3 charge has 78 electrons and a mass number of 204.
Multiple Choice - Start with number “1” on the SCANTRON form.

(1). Which of the following measurements contains 3 significant figures?
   a. 0.013g  b. 0.0130g  c. 0.130g  d. both “b” and “c”

(2). How many significant figures should be retained in the result of the following calculation?
   \[
   \frac{(11.07 - 7.398)}{3.527}
   \]
   a. 1  b. 2  c. 3  d. 4  e. 5

(3). A nugget of gold with a mass of 521g is added to 50.0mL of water. The water level rises to a volume of 77.0mL. What is the density (g/mL) of the gold?
   a. 6.77  b. 10.4  c. 19.3  d. 0.0518  e. 1.00

(4). One form of stainless steel contains 18.0% nickel. How much nickel is present in 200.g of this alloy?
   a. 0.0122g  b. 11.1g  c. 18.0g  d. 36.0g  e. 164g

(5). The number 785 x 10^{-8} expressed in standard (proper) scientific notation is
   a. 7.85 x 10^{-10}  
   b. 78.5 x 10^{-7}  
   c. 7.85 x 10^{-6}  
   d. 0.785 x 10^{-6}
(6). Which of the following distinguishes an element from a compound?

a. An element can be broken down into compounds  
b. A compound has variable properties  
c. An element can not be broken down by chemical means  
d. An element has definite properties  
e. None of the above.

(7). Homogeneous mixtures are also known as __________.

a. solids  
b. compounds  
c. elements  
d. pure substances  
e. solutions

(8). Ammonia, NH₃, is an example of a (an)

a. element  
b. compound  
c. homogeneous mixture  
d. heterogeneous mixture

(9). Identify the metalloid in the following list

a. sulfur (S)  
b. copper (Cu)  
c. fluorine (F)  
d. germanium (Ge)  
e. silver (Ag)

(10). The chemical symbol for the element sodium is

a. S  
b. W  
c. So  
d. Na  
e. none of these

(11). The name of the element with symbol “Ag” is

a. gold  
b. silver  
c. auger  
d. platinum  
e. none of these
(12). The periodic table predicts which pair of elements to be most alike in chemical property?

a. N and O  b. Cl and Br  c. K and Ca  d. K and Mg

(13). Which individual conducted the famous “gold foil” experiment?


(14). Which individual is considered to be the “Father” of the modern Periodic Table?


(15). The subatomic particle that defines a particular element is the

a. neutron  b. quark  c. proton  d. electron

(16). An ion contains 14 protons, 16 neutrons, and 17 electrons. The charge on the ion is

a. 2-  b. 2+  c. 3-  d. 3+  e. none of these

(17). Which of the following describes an isotope with a mass number of 99 that contains 56 neutrons in its nucleus?

a. \(^{99}_{56}\text{Ba}\)  b. \(^{43}_{56}\text{Ba}\)  c. \(^{99}_{43}\text{Tc}\)  d. \(^{56}_{43}\text{Tc}\)  e. \(^{155}_{99}\text{Es}\)

(18). Electromagnetic radiation of which of the following wavelengths (in nm) is of the highest energy?

a. 526  b. 493  c. 623  d. 277  e. 532
(19). The model of Quantum Mechanics is best described by the following two words (given in lecture):

a. Discrete, Probability
b. Continuous, Probability
c. Discrete, Certainty
d. Continuous, Certainty

(20). Which of the following does not exist in our orbital model?

a. 6s    b. 3p    c. 2d    d. 5f    e. all would exist

(21). How many electrons can the n = 4 shell hold (consider all orbitals in this shell)?

a. 2    b. 6    c. 18    d. 32    e. 64

(22). Which set of quantum numbers cannot be correct?

a. n=6, l=0, m=0
b. n=3, l=2, m=3
c. n=3, l=2, m=2
d. n=1, l=0, m=0
e. all could exist

Useful Conversion:

<table>
<thead>
<tr>
<th>Conversion</th>
<th>Unit 1</th>
<th>Unit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 m = km</td>
<td>1mL = 1cm³</td>
<td>1km = 0.6214mi</td>
</tr>
<tr>
<td>100cm = 1m</td>
<td>1lb = 453.6g</td>
<td>1lb = 16oz</td>
</tr>
<tr>
<td>1 inch = 2.54cm (exact)</td>
<td>1L = 1.057qt</td>
<td>1gallon = 4qt</td>
</tr>
<tr>
<td>10mm = 1cm</td>
<td>1000mL = 1L</td>
<td>1000g = 1kg</td>
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