Name: _____

Instructor: Mills

Chemistry 101: 1st Midterm Examination
Practice Questions
(see the class notes for answers to these questions)

Answer all four questions. Each question is worth 25 points. Please ensure you have all *five* pages of questions, as well as a formula sheet and periodic table *before* starting work. Only attempt the extra credit question after you have completed the four assigned problems. For numerical answers, include the correct number of **significant figures** and appropriate **S.I. unit(s)**. For full credit you must….

SHOW ALL WORK

Question	Score
1	
2	
3	
4	
Extra Credit	
Total	

"The Wire"

Question 1a: A spool of copper (Cu) wire has a mass of 2.00 pounds and a diameter of 50.0 μm. **Determine the wire's mass, volume and length in the units specified below. Include any appropriate decimal prefixes in your final answers**.
Assume density copper (Cu) = 8.95 gcm^{-3}

Mass of the wire in kg:

Volume of the wire in cm^3:

Length of the wire in meters:

Question 1b: Write the **complete atomic symbol** for the isotope that contains 29 protons and 34 neutrons.

Complete atomic symbol:

"Ionic"

Question 2: Write the formulas and names of nine ionic compounds that may be formed through combining the anions and cations ions listed immediately below.

H^+ Cu^{2+} Al^{3+} Cl^- SO_4^{2-} PO_4^{3-}

Ionic Formula	Name of Ionic Compound

"Balance"

<u>Question 3:</u> Balance the following chemical equations:

a. <u>The burning of liquid butane (C_4H_{10} (l)) in air</u>

b. <u>The Neutralization of battery acid (sulfuric acid solution) with caustic soda (sodium hydroxide solution)</u>

c. <u>The reaction of solid diphosphorus pentoxide with water to form aqueous phosphoric acid</u>

d. <u>The decomposition of chalk ($CaCO_3$), when heated, to form solid calcium oxide and carbon dioxide gas</u>

e. <u>The reaction of metallic zinc with aqueous sulfuric acid to form aqueous zinc (II) sulfate and hydrogen gas</u>

Extra credit: State which general class of reaction each of the above belongs to

"% Mass"

Question 4: Calculate the % mass of *each* type of atom in the following materials:

$BaSO_4$

NO

Extra Credit

Expect a descriptive style question taken from the reading.

Data sheet

Density = mass/volume   1 kg = 2.205 lb $1 \text{ cm}^3 = 1 \text{ mL} = 1 \times 10^{-6} \text{ m}^3$
Density Lead (Pb) = 11.34 gcm^{-3} 1 inch = 2.54 cm   1 mile = 1.6039 km
1 a.m.u. = 1.6606 x 10^{-24} g   1 ft = 12 inches (exactly)   1 gallon = 3.786 L
Volume cylinder = $\pi r^2 h$ Volume sphere = $(4\pi r^3)/3$ $1 \text{ dm}^3 = 1 \text{ L} = 10^{-3} \text{ m}^3$
Diameter = 2r   1 pound = 16 ounces $N_A = 6.02 \times 10^{23}$

Common Decimal Prefixes

Prefix	Symbol	Exponential Notation
Giga	G	10^9
Mega	M	10^6
Kilo	k	10^3
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}

Solubility Rules

Soluble Compounds		Exceptions
Compounds containing	NO_3^-	None
	Cl^-	Ag^+, Hg^{2+}, Pb^{2+}
	Br^-	Ag^+, Hg^{2+}, Pb^{2+}
	I^-	Ag^+, Hg^{2+}, Pb^{2+}
	SO_4^{2-}	Ba^{2+}, Hg^{2+}, Pb^{2+}

Insoluble Compounds		Exceptions
Compounds containing	CO_3^{2-}	NH_4^+ & group IA cations
	PO_4^{3-}	NH_4^+ & group IA cations
	OH^-	group IA cations Ca^{2+}, Sr^{2+}, Ba^{2+} & NH_4^+