SID ☐☐☐☐☐☐☐   Last **Key** _____   First **Answer** _____

Question 1
6 Points

Report the follow operations to the **correct** number of **significant figures?**

a) 36.456 + 74.2   __**110.7**__

b) 18.4 × (1.000x10⁻³)   __**1.84 X 10⁻²**__

c) 2.01(23.56-2.3)   __**42.7**__

Question 2
4 Points

A piece of **copper** has a volume of **740L**. What is the mass of the same in **units of grams**.

1 cm³ Cu = 8.8 g Cu	1 kg = 1000 g	1 L = 1000 cm³
9.5 x 10²¹ atoms Cu = 1 g Cu		1 cm³ = 1 mL

No need to do the calculation – just set up the correct dimensional analysis conversions – **you may not need to fill in all the boxes.**

$$740 \text{ L} \times \frac{1000 \text{ cm}^3}{1 \text{ L}} \times \frac{8.8 \text{ g Cu}}{1 \text{ cm}^3 \text{ Cu}} \times \underline{\hspace{3cm}}$$

Question 3
10 Points

Give the correct **formula** for the following **polyatomic ions:**

a) **Phosphide**   __P^{3-}__

b) **Phosphate**   __PO_4^{3-}__

c) **Sulfite**   __SO_3^{2-}__

d) **Chromate**   __CrO_4^{2-}__

e) **Cyanide**   __CN^-__

Question 4
4 Points

Which of the following apply to the **electron?**

☑ mass ~ 9.109×10^{-28} g   ☑ charge = -1

☐ charge = 0   ☐ charge = +1

☐ mass ~ 1.673×10^{-24} g

Question 5
8 Points

a) How many **protons** and **neutrons** are there in the nucleus of an atom that has an **atomic number of 83** and a **mass number of 214?**

Protons: __**83**__

Neutrons: __**131**__

b) What is the **symbol** for the **element?**   Symbol: __**Bi**__

c) The atom bears a charge of **+3**, then number of **electrons** is: __**80**__

Question 6 8 Points	The following questions pertain to the **periodic table** given at the **front of this exam**: a. The **atomic weight** of the element in **group 6A** and **period 3**? *32.07* b. What is the **name** of the **halogen** that is in **period 3**? *Chlorine* c. The **symbol** for the **lightest alkali metal** is? *Li* d. **Circle** any of the following that are **main group elements**? (Z = atomic number) **Sc** (Z=21) (**Te**) (Z=52) **V** (Z=23) (**Cs**) (Z=55)

Question 7 10 Points	a. **Name** the compound with the formula $Ca(NO_2)_2$? *Calcium Nitrite* b. **Name** the compound with the formula $Cu(ClO_4)_2$? *Copper (II) perchlorate* c. What is the **formula** for **sodium phosphide**? Na_3P d. What is the **formula** for **iron(III) sulfate**? $Fe_2(SO_4)_3$ e. What is the **formula** for **ammonium hydroxide**? NH_4OH

Question 8 4 Points	A certain element consists of two stable isotopes: Exact Mass (amu) Abundance (%) #1 106.9051 51.82 #2 108.9047 48.18 What is the atomic weight of this element? **Give answer to 4 decimal places**. <u>Show Work</u> $0.5182(106.9051) + 0.4818(108.9047) =$ **107.8685** amu

Question 9 4 Points	How many **moles** of boron trifluoride, BF_3, are present in a sample that contains **7.95 moles** of **fluorine atoms**? <u>Show Work</u> $7.95 \text{ mol F} \left| \dfrac{1 BF_3}{3 F} \right. =$ **2.65** moles

Question 10	How many **moles** of **copper(II) hydroxide** are present in **4.44 grams** of this compound?
6 Points	

$$Cu(OH)_2 : 63.55 + 2(16.00 + 1.01) = 97.57 \text{ g . mol}^{-1}$$

$$4.44g \frac{Cu(OH)_2}{} \left| \frac{1 \text{ mol}}{97.57 g} \right. =$$

0.0455	moles

Question 11	Balance the following chemical equations using the **smallest possible integer coefficients**.
6 Points	

a. **4** HCl (aq) + ___O_2(g) → **2** H_2O (l) + **2** Cl_2 (g)
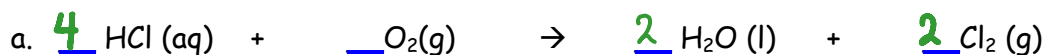
b. Write a **balanced equation** for the **complete oxidation** reaction that occurs when ethanol (**C_2H_5OH**) burns in air.

___ C_2H_5OH + **3** O_2 → **2** CO_2 + **3** H_2O
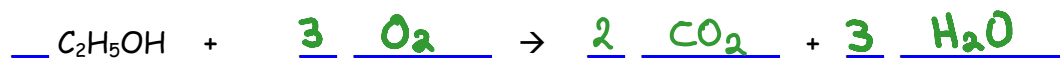
c. Write a **balanced equation** for the reaction of **nitrogen gas** with **hydrogen gas** to produce **ammonia** (**NH_3**)

___ **N_2** (g) + **3** H_2 (g) → **2** NH_3(g)

Question 12	
6 Points	

a   b   c
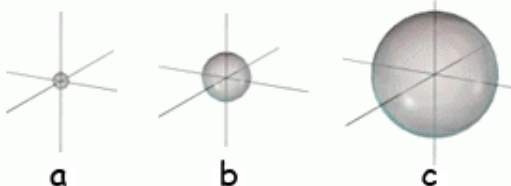
a) The **orbitals** depicted above are **what type?** **s**

b) Which orbital would have the **highest ionization energy?** **a**

c) Which orbital would possess the **smallest force of attraction?** **c**

Question 13	a) **How many 4d** orbitals are there in an atom? **5**
4 Points	b) What is the **maximum** number of electrons in a set of **3p** orbitals? **6**

Question 14	a) Write the electron configuration for the **magnesium** atom. $1s^2 2s^2 2p^6 3s^2$
12 Points	b) Write the **noble gas** configuration for **iron, (Fe)?** $[Ar] 4s^2 3d^6$

c) The **element** with an **electron configuration** of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$ **Cu**

d) **Xe, $[Kr]5s^2 4d^{10} 5p^6$**, has how many **valence electrons?** **8**

e) The **element** in **period 4** that has the **Lewis diagram,** ·Ẍ: **Ge**

f) **X** is a **Main Group** element in **period 3** with **4** valence electrons. **X** is: **Si**

Question 15 **4 Points**	Using only the periodic table **arrange** the following elements in order of **increasing** **atomic** radius: Na, N, K, P N P Na K **Smallest** **Largest**
Question 16 **4 Points**	Using only the periodic table **arrange** the following elements in order of **decreasing** **ionization energy**: As, Cl, Ge, P Cl P As Ge **Highest** **Lowest**

Exam I Score