SID | | | | | | | | | Last Answer Key First Exam I – Fall 2010

Question 1 (6 Points) How many **significant figures** are there in each of the following numbers?

a. 57.4 **3**

b. 0.065 **2**

c. 13.40×10^3 **4**

Question 2 (4 Points)

a. When **36.456** is added to **74.2**, the result should be reported to how many decimal places? **1**

b. The number **26.71560**... rounded to **4** significant figures is: **26.72**

Question 3 (4 Points) The density of whole blood at **37°F** is **1.06 g.cm^{-3}**. What is the mass, in grams of a **15.0 cm^3** sample of blood? **Show work.**

$$\frac{15.0\ \text{cm}^3 \mid 1.06\text{g}}{\qquad\ \ 1\ \text{cm}^3} = 15.9\ \text{g}$$

15.9 g

Question 4 (8 Points) Give the correct **formula** for the following **polyatomic ions**:

a. **Nitrite** NO_2^-

b. **Nitride** N^{3-}

c. **Carbonate** CO_3^{2-}

d. **Permanganate** MnO_4^-

Question 5 (4 Points) Which of the following applies to the **proton**?

☐ mass ~ 9.109×10^{-28} g

☐ charge = -1

☐ charge = 0

☐ **charge = +1**

☐ **mass ~ 1.673×10^{-24} g**

Question 6 (6 Points) How many **protons**, **neutrons** and **electrons** are there in $^{40}Ca^{2+}$?

20 Protons **20 Neutrons** **18 Electrons**

Question 7 (8 Points) The following questions pertain to the periodic table given at the front of this exam:

a. The **symbol** for the **noble gas** in **period 3**? **Ar**

b. The **symbol** for the **group IB**, **period 4** element? **Cu**

c. The **symbol** for the **heaviest alkali earth metal** is? **Ra**

d. The **d block elements** are also known as: **Transition Metals**

Question 8 (8 Points)

1. **Name** the compound with the formula **Na_2CrO_4**? Sodium chromate
2. **Name** the compound with the formula **Fe_2CO_3**? Iron(I) carbonate
3. What is the **formula** for **magnesium phosphide**? Mg_3P_2
4. What is the **formula** for **iron(II) nitrate**? $Fe(NO_3)_2$

Question 9 (5 Points)

A certain element consists of two stable isotopes:

	Exact Mass (amu)	Abundance (%)
#1	120.9038	57.25
#2	122.9041	42.75

What is the atomic weight of this element? **Give answer to 5 significant figures.**

Show Work

$$120.9038(0.5725) + 122.9041(0.4275) = 121.7589$$

121.76 **amu**

Question 10 (5 Points)

How many **moles** of **N_2O_4** molecules are present in a sample that contains **5.52** moles of **nitrogen atoms**?

Show Work

$$\frac{5.52 \text{ mol N} \mid 1 \ N_2O_4}{2 \text{ N}} = 2.76 \text{ mol } N_2O_4$$

2.76 **moles**

Question 11 (6 Points)

How many **moles** of dinitrogen tetrafluoride, **N_2F_4**, are present in **2.61 grams** of this compound?

Show Work

$2(14.01) + 4(19.00) = 104.02 \text{ g.mol}^{-1}$

$$\frac{2.61 \text{ g} \mid 1 \text{ mol}}{104.02 \text{ g}} = 0.0251 \text{ mol}$$

0.0251 **moles**

Question 12 (6 Points)

Balance the following chemical equations using the **smallest possible integer coefficients**.

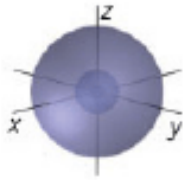
a. $2\ CO(g) + O_2(g) \rightarrow 2\ CO_2(g)$

b. For the **complete oxidation** reaction that occurs when **ethanol** (**C_2H_5OH**) burns in air.
$C_2H_5OH + 3\ O_2 = 2\ CO_2 + 3\ H_2O$

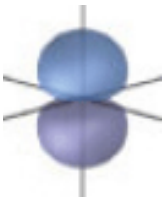
c. When **phosphorus** (**P_4**) reacts with **chlorine**, **phosphorus trichloride** is formed.

$P_4 + 6\ Cl_2 = 4\ PCl_3$

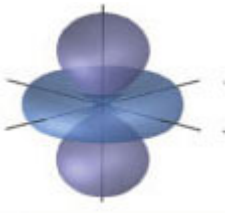
Question 13 Label the following orbital drawings as **s**, **p**, **d** or **f**.
6 Points



s

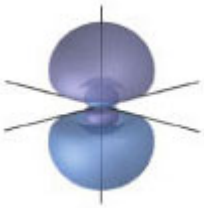


p



d

Question 14 The orbital depicted on the **left is not**:
3 Points



(Circle those that apply)

2p 1s 3d 3p

Question 15 How many **types** of orbitals are there in the shell with **n = 4** in an atom? 4
3 Points

Question 16
10 Points

1. Write the **complete** electronic configuration for **chlorine**? $1s^2 2s^2 2p^6 3s^2 3p^5$
2. Write the **noble gas** configuration for **nickel**, (Ni)? $[Ar]4s^2 3d^8$
3. The **element** with an **electron configuration** of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ Cr
4. **Po, $[Xe]6s^2 5d^{10} 4f^{14} 6p^4$**, has how many **valence electrons**? 6
5. The **element** in **period 3** that has the **Lewis diagram**,  Si

Question 17 Using only the periodic table **arrange** the following elements in order of **increasing atomic radius**: **Ga, N, Si, F**
4 Points

F	N	Si	Ga
Smallest			Largest

Question 18 Using only the periodic table **arrange** the following elements in order of **decreasing ionization energy**: **S, Ca, Al, Mg**
4 Points

S	Al	Mg	Ca
Highest			Lowest

Exam I Score