SID [ ][ ][ ][ ][ ][ ][ ]   Last **Key**   First **Answer**

Question 1
4 Points

How many **significant figures** are there in each of the following numbers?

0.09672 **4**   0.8280 **4**   1000 **1**

The number 174.8558... **rounded to 5 significant figures** is: **174.86**

Question 2
6 Points

a) When 15.7 is **subtracted** from 17.809, the result should be reported with **digit(s)** **after the decimal point**: **1**

b) When 35.085 is **divided** by 57.07, the answer should be reported to **significant digit**(s). **4**

c) Reported to the **correct number of significant figures**, how many hours are there in exactly **13 days**? **312**

Question 3
4 Points

A piece of **copper** has a mass of **950** grams. What is the volume of the sample in **units of liters**.

1 cm^3 Cu = 8.8 g Cu	1 kg = 1000 g	1 L = 1000 cm^3
9.5 x 10^{21} atoms Cu = 1 g Cu		1 cm^3 = 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**.

$$950 \text{ g} \times \frac{1 \text{ cm}^3 \text{ Cu}}{8.8 \text{ g Cu}} \times \frac{1 \text{ L}}{1000 \text{ cm}^3} \times \underline{\hspace{3cm}}$$

Question 4
8 Points

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

a) **Nitride** N^{3-}

b) **Nitrate** NO_3^-

c) **Nitrite** NO_2^-

d) **Carbonate** CO_3^{2-}

Question 5
4 Points

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

☐ mass ~ 9.109x10^{-28} g   ☐ charge = -1

☐ charge = 0   ☑ charge = +1

☑ mass ~ 1.673x10^{-24} g

Question 6
6 Points

a) How many protons and neutrons are in the nucleus of an atom that has an **atomic number** of **27** and a **mass number** of **59**?

_27_ protons _32_ neutrons

b) What is the **symbol** for the element? _Co_

Question 7
8 Points

The following questions pertain to the **periodic table** given at the **front of this exam**:

a. The **atomic weight** for the element that is in group **5B** and period **4**? _50.94_

b. What is the **name** of the **alkali metal** that is in **period 2**? _LITHIUM_

c. How many **diatomic elements** are there in **period 3**? _1_

d. **Circle** any of the following that are **nonmetals**? (Z = atomic number)

Cr (Z=24) (Br) (Z=35) (Ne) (Z=10) Ga (Z=31)

Question 8
10 Points

a. **Name** the compound with the formula **AlP**? _Aluminum phosphide_

b. **Name** the compound with the formula **Fe₂(CrO₄)₃**? _Iron (III) chromate_

c. What is the **formula** for **sodium sulfite**? _Na₂SO₃_

d. What is the **formula** for **copper(II) phosphate**? _Cu₃(PO₄)₂_

e. What is the **formula** for **lithium hydride**? _LiH_

Question 9
4 Points

A certain element consists of two stable isotopes:

	Exact Mass (amu)	Abundance (%)
#1	112.9043	4.28
#2	114.9041	95.72

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

Show Work

$$0.0428(112.9043) + 0.9572(114.9041) = 114.81(851) \, amu$$

_114.82_ **amu**

Question 10
4 Points

How many **moles** of **phosphorus atoms** are present in a sample that contains **4.83** moles of tetraphosphorus decaoxide, **P₄O₁₀**?

Show Work

$$\frac{4.83 \, mol \, P_4O_{10} \mid 4 \, P}{\mid 1 \, P_4O_{10}} = 19.3 \, mol \, P$$

_19.3_ **moles**

Question 11
6 Points

How many **grams** of **magnesium carbonate** are present in **3.74 moles** of this compound??

$MgCO_3$: $24.31 + 12.01 + 3(16.00) = 84.32$ g.mol^{-1}

$$\frac{3.74 \text{ mol } MgCO_3 \mid 84.32 g}{\mid 1 \text{ mol}} = 315 g$$

315 grams

Question 12
6 Points

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

a. **2** NO (g) + **1** O_2(g) → **2** NO_2 (g)

b. Write a **balanced equation** for the **complete oxidation** reaction that occurs when butane (C_4H_{10}) burns in air..

2 C_4H_{10} + **13** O_2 (g) → **8** CO_2(g) + **10** H_2O (l)
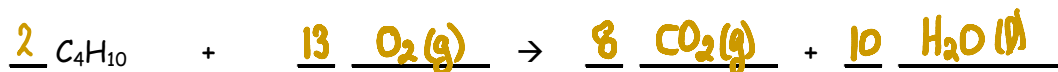
c. Write a **balanced equation** for the reaction of **phosphorus (P_4)** with **chlorine gas** to produce **phosphorus trichloride (PCl_3)**

1 P_4 (g) + **6** Cl_2 (g) → **4** PCl_3(g)

Question 13
4 Points

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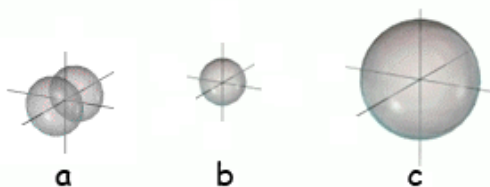
a) The **orbitals b** and **c** depicted above are **what type?** _____ s

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

Question 14
4 Points

a) How many **types** of **orbitals** are there in the shell with n=3 in an atom? _____ 3

b) What is the **maximum** number of electrons in a set of **5d** orbitals? _____ 10

Question 15
12 Points

a) Write the electron configuration for the **silicon** atom. $1s^2 2s^2 2p^6 3s^2 3p^2$

b) Write the **noble gas** configuration for **nickel, (Ni)?** $[Ar]4s^2 3d^8$

c) The **element** with an **electron configuration** of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ _____ Cr

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

e) The Lewis diagram represents the **valence configuration** of a **main-group element** in period 3, , give its **electronic configuration.** $1s^2 2s^2 2p^6 3s^2 3p^4$

f) **X** is a **Main Group** element in **period 4** with **5** valence electrons. X is: As

Question 16   Using only the periodic table **arrange** the following elements in order of **increasing**
5 Points   **atomic** radius: P, Ca, Ga, Sr, Al

_____P_____   _____Al_____   _____Ga_____   _____Ca_____   _____Sr_____
Smallest   Largest

Question 17   Using only the periodic table **arrange** the following elements in order of **decreasing**
5 Points   **ionization energy**:   Si, O, In, Al, S

_____O_____   _____S_____   _____Si_____   _____Al_____   _____In_____
Highest   Lowest

Exam I Score [   ]