

SID Last KeyFirst AnswerQuestion 1  
7 Pointsa) How many **significant figures** are there in each of the following numbers?0.927790 6      0.060464 5       $1.00 \times 10^3$  3b) There are **12 eggs in a dozen**. A farm produces **747 dozen** eggs a month, how should the **number of eggs** per month be reported?  $8.96 \times 10^3$ c) The number **447.496** rounded to **4 significant figures** is: 447.5Question 2  
4 Pointsa) When **17.2** is **subtracted** from **45.58**, the result should be reported with **digit(s)** 1 after the decimal point.b) When **85.49** is divided by **59.6**, the answer should be reported to significant 3 digit(s).Question 3  
3 PointsA copy of your chemistry textbook is found to have a volume of  $2.81 \times 10^3$  mL. Using unit analysis, show what the **volume** of this copy of your chemistry textbook is in L.

1 g = 1000 mg

1000 mL = 1 L

100 cm = 1 m

1000 mg = 1 g

1 mL = 1 cm<sup>3</sup>

1000 mm = 1 m

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

$$2.81 \times 10^3 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{\quad}{\quad}$$

Question 4  
6 Points

Decide if the following statements are true (T) or false (F):

You must get all three correct to obtain credit - no partial credit awarded.a) **Protons** and **neutrons** are **equal in mass**, but **opposite in charge**. Fb) The **mass of a proton** is **about the same** as the **mass of a neutron**. Tc) The **electron** acts as a **buffer zone** in the **nucleus**. FQuestion 5  
6 Pointsa) What is the **mass number** of an atom that contains **31 protons**, **36 neutrons**, and **31 electrons**? 67b) How **many protons** and **neutrons** are in an atom that has an **atomic number** of **39** and a **mass number** of **90**? 51 Neutrons      39 Protonsc) What is the **symbol** of an atom that contains **27 protons**, **32 neutrons**, and **27 electrons**? CoQuestion 6  
3 PointsLithium has two stable isotopes, **lithium-7**, atomic mass of **7.016 amu** and **lithium-6**, atomic mass of **6.015 amu**. From the **atomic weight** of **Li = 6.94** one can conclude that:

- lithium-7** has the **highest percent natural abundance**
- both isotopes** have the **same percent natural abundance**
- lithium-6** has the **highest percent natural abundance**

Question 7  
10 Points

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

- a. The **atomic number** for the element that is in **group 4A** and **period 2**? 6
- b. The **atomic weight** for the element in **group 3A** and **period 4**? 69.72
- c. Check the **elements** that would be expected to have **similar properties**?
- Pb     Cl     Be     I     Rn
- d. What is the **symbol** of the **alkali metal** that is in **period 5**? Rb
- e. Check any of the following that are **metals**? (Z = atomic number)
- Fe (Z=26)     N (Z=7)     Br (Z=35)     Ba (Z=56)     None of these

Question 8  
8 Points

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

- a) Phosphide  $P^{3-}$
- b) Phosphate  $PO_4^{3-}$
- c) Dihydrogen phosphate  $H_2PO_4^-$
- d) Ammonium  $NH_4^+$

Question 9  
8 Points

- a. Name the compound with the formula **MgS**?
- b. Name the compound with the formula **Fe(NO<sub>2</sub>)<sub>2</sub>**?
- c. What is the **formula** for **sodium hydrogen carbonate**?
- d. What is the **formula** for **copper(II) sulfite**?

Magnesium sulfide  
Iron(II) nitrite  
NaHCO<sub>3</sub>  
CuSO<sub>3</sub>

Question 10  
4 Points

If a grain of sand weighs **46 mg**, what is the weight (in **grams**) of **610 grains**?

For full credit you must show work.

$$\frac{46 \text{ mg}}{1000 \text{ mg}} = 4.6 \times 10^{-2} \text{ g}$$
$$4.6 \times 10^{-2} \text{ g} (610) = 28.1 \text{ g}$$

28.1 grams

Question 11  
3 Points

How many **moles** of **nitrite ions** are present in a sample that contains **1.88 moles** of **Mg(NO<sub>2</sub>)<sub>2</sub>**?

For full credit you must show work.

$$\frac{1.88 \text{ mol Mg(NO}_2)_2}{1 \text{ Mg(NO}_2)_2} \times \frac{2 \text{ NO}_2^-}{1 \text{ Mg(NO}_2)_2} = 3.76 \text{ mol NO}_2^-$$

3.76 moles

Question 12  
4 Points

How many grams of chromium(III) hydroxide are present in 1.67 moles of this compound?

For full credit you must show work.

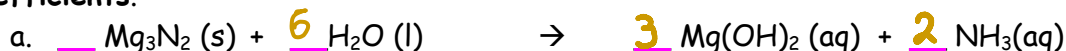
$$\text{Cr(OH)}_3 : 52.00 + 3(16.00 + 1.01) = 103.03 \text{ g}\cdot\text{mol}^{-1}$$

$$\frac{1.67 \text{ mol Cr(OH)}_3 \mid 103.03 \text{ g}}{1 \text{ mol}} = 172 \text{ g}$$

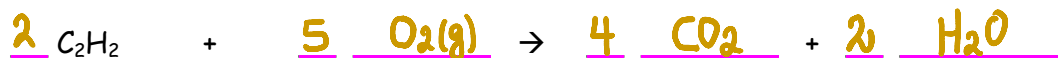
**172** grams

Question 13  
6 Points

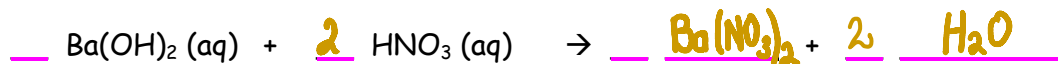
Balance the following chemical equations using the **smallest possible integer coefficients**.



b. Write a **balanced equation** for the **complete oxidation** reaction that occurs when **acetylene** ( $\text{C}_2\text{H}_2$ ) burns in air..

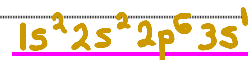


c. When aqueous solutions of barium hydroxide,  $\text{Ba(OH)}_2$ , and nitric acid,  $\text{HNO}_3$  are combined, **barium nitrate** and **water** are formed.



Question 14  
10 Points

a) Write the **electron configuration** for the **sodium** atom:



b) Write the **electronic configuration** for the **argon** atom:



c) Write the **noble gas configuration** for **vanadium** atom:



d) The following Lewis diagram represents the **valence electron configuration** of a main-group element.  $\times \cdot$ . If this element is in **period 2**, its **valence electron configuration** is:



e) The element with an **electron configuration** of  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2$  is in **group IVB** and **period 4**.

Question 15  
6 Points

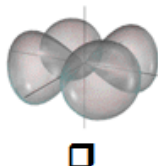
a) What is the **maximum number of electrons** possible in the shell with  $n = 4$  in an atom?   32  

b) How many **types of orbitals** are there in the shell with  $n = 2$  in an atom?   2  

c) How many **4d orbitals** are there in an atom?   5  

Question 16  
4 Points

Each of the orbitals depicted is from the **lowest energy shell possible** for its type. Which one has the **lowest shell number (n)**?



Question 17  
4 Points

Using only the periodic table **arrange** the following elements in order of **increasing** atomic radius: **S, Po, Te, O**

**O**

Smallest

**S**

**Te**

**Po**

Largest

Question 18  
4 Points

Using only the periodic table **arrange** the following elements in order of **decreasing** ionization energy: **Ca, As, K, Ge**

**As**

Highest

**Ge**

**Ca**

**K**

Smallest

Exam I Score