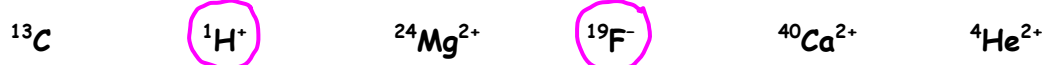


Question 1
10 Points

- a. Give the correct number of significant figures for each of the following:
0.038 : 2 611.0 : 4
- b. Report the answer for the following operation to the correct number of significant figures:
 $23.46 + 1.106 =$ 24.57
- c. When 58.6 is divided by 1.90×10^{-2} , the answer should be reported to 3 significant digit(s).
- d. Reported to the correct number of significant figures, how many hours are there in exactly 13 days? 312
- e. Write the following number in non-exponential notation. 4.94×10^4 49,400

Question 2
6 Points

Circle those of the following (if any) that have the same number of neutrons and electrons.

Question 3
6 Points

A piece of copper contains 1×10^7 atoms of copper. What is its volume in L?

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

$1 \text{ cm}^3 \text{ Cu} = 8.8 \text{ g Cu}$	$1 \text{ kg} = 1000 \text{ g}$	$1 \text{ L} = 1000 \text{ cm}^3$
$9.5 \times 10^{21} \text{ atoms Cu} = 1 \text{ g Cu}$		$1 \text{ cm}^3 = 1 \text{ mL}$

$$1.0 \times 10^7 \text{ atoms} \times \frac{1 \text{ g Cu}}{9.5 \times 10^{21} \text{ atoms Cu}} \times \frac{1 \text{ cm}^3 \text{ Cu}}{8.8 \text{ g Cu}} \times \frac{1 \text{ L}}{1000 \text{ cm}^3}$$

Question 4
6 Points

How many protons, neutrons and electrons are there in $^{63}_{29}\text{Cu}^{2+}$

Protons: 29 Neutrons: 34 Electrons: 27

Question 5
10 Points

Use the Periodic Table accompanying this exam to answer the following questions:

- Mn is in period 4 and group VIII B.
- The symbol for the lightest alkaline metal. Li
- Element 102 is a(n) actinide
- Group VIII A are collectively known as the: Noble gases
- The symbol of the heaviest period 4 transition metal: Zn

Question 6
4 Points

The element copper has an atomic weight of **63.5 amu** and consists of two stable isotopes **copper-63** and **copper-65**.

- The isotope **copper-63** has an atomic mass of **62.9 amu** and a percent natural abundance of **69.1%**.
- The isotope **copper-65** has a percent natural abundance of **30.9%**.

What is the atomic mass of **copper-65**?

Show Work

$$0.691(62.9) + 0.309(x) = 63.5$$

$$43.5 + 0.309x = 63.5$$

$$0.309x = 63.5 - 43.5$$

$$x = \frac{63.5 - 43.5}{0.309}$$

64.8 amu

Question 7
2 Points

It is a general trend that as **one goes down a group** the **atomic radius** (*distance from nucleus to outermost electron*) increases. From the list below circle the salt that you would predict to have the **weakest columbic force of attraction**?

- NaCl
- KBr
- **RbI**
- LiF

2 Points

Briefly justify your choice.

FA depends on charge and distance. Since the magnitude of the charge is the same in all four, then the salt with the largest radius will have the weakest FA.. RbI

Question 8
8 Points

Give the correct **name** for each of the following ionic compounds.

- a. Na_2S Sodium sulfide c. $\text{Al}_2(\text{SO}_4)_3$ Aluminum sulfate
b. CrSO_3 Chromium(II) sulfite d. MgCrO_4 Magnesium chromate

Question 9
8 Points

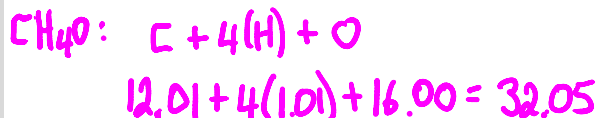
Give the correct **formula** for each of the following ionic compounds.

- a. Calcium hydroxide $\text{Ca}(\text{OH})_2$
b. Magnesium oxide MgO
c. Iron(II) perchlorate $\text{Fe}(\text{ClO}_4)_2$
d. Ammonium phosphate $(\text{NH}_4)_3\text{PO}_4$

Question 10
4 Points

Calculate the percent by weight of carbon in CH_4O .

Show Work



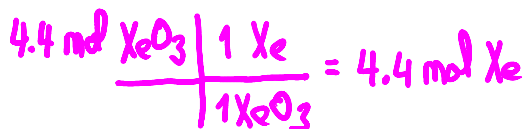
$$\text{C}: \left(\frac{12.01}{32.05} \right) 100 = 37.5\%$$

37.5 %

Question 11
4 Points

How many atoms of xenon are present in 4.44 moles of xenon trioxide?

Show Work



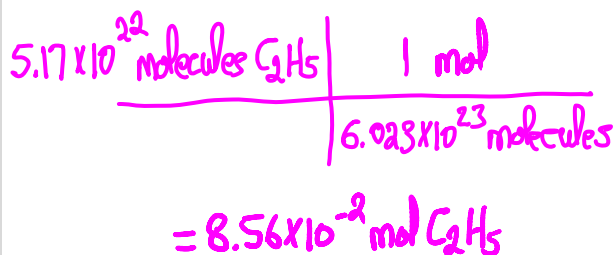
$$4.4 \text{ mol Xe} \left| \frac{6.023 \times 10^{23} \text{ atoms}}{1 \text{ mol}} \right.$$

2.67×10^{24} atoms

Question 12
4 Points

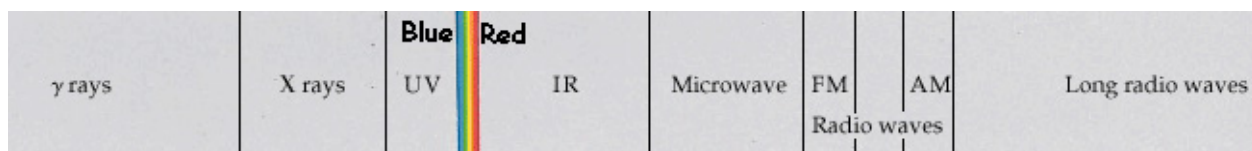
How many moles of carbon are present in 5.17×10^{22} molecules of C_2H_5 ?

Show Work



0.172 moles

Question 13
6 Points



Circle the correct answer to each of the following:

- a. The one with the shortest wavelength: **X rays** IR AM
- b. The one with the smallest frequency: X rays **UV** γ Rays
- c. The one with the greatest energy: **FM** AM Long radio waves

Question 14
6 Points

A compound is found to contain **46.68% nitrogen** and **53.32% oxygen** by weight and has a molar mass of **60.02 g/mol**. What is the **formula** of this compound?

Show Work

$$\begin{array}{r} \text{N} \\ 46.68\text{g} \\ \hline 14.01\text{g}\cdot\text{mol}^{-1} \\ 3.33\text{mol} \\ \hline 3.33\text{mol} \\ 3.33\text{mol} \end{array} \quad \begin{array}{r} \text{O} \\ 53.32\text{g} \\ \hline 16.00\text{g}\cdot\text{mol}^{-1} \\ 3.33\text{mol} \\ \hline 3.33\text{mol} \\ 3.33\text{mol} \end{array}$$

Empirical formula: NO

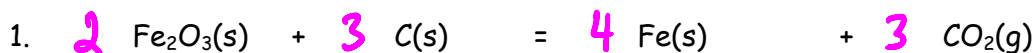
$$\text{NO}: 14.01 + 16.00 = 30.01\text{g}\cdot\text{mol}^{-1}$$

$$\frac{60.02\text{g}\cdot\text{mol}^{-1}}{30.01\text{g}\cdot\text{mol}^{-1}} = 2$$

N₂O₂

Question 15
6 Points

Balance the following chemical equations using the **smallest** whole number integers possible.



2. Sulfuric acid (H₂SO₄) + sodium hydroxide = Sodium sulfate + water



Question 16
8 Points

If your eyes receive a signal consisting of yellow light corresponding to an energy of **2.13 × 10⁵ J·mol⁻¹**. Determine the **wavelength** of this light in **nm**?

Show Work

$$\frac{2.13 \times 10^5 \text{ J}\cdot\text{mol}^{-1}}{6.023 \times 10^{23}} \left| \frac{1 \text{ mol}}{6.023 \times 10^{23}} \right.$$
$$= 3.54 \times 10^{-19} \text{ J}$$

$$E = h\nu$$
$$3.54 \times 10^{-19} \text{ J} = 6.626 \times 10^{-34} \text{ J}\cdot\text{s} (\nu)$$

$$\nu = \frac{3.54 \times 10^{-19} \text{ J}}{6.626 \times 10^{-34} \text{ J}\cdot\text{s}}$$

$$\nu = 5.34 \times 10^{14} \text{ s}^{-1}$$

$$\lambda \nu = c$$
$$\lambda (5.34 \times 10^{14} \text{ s}^{-1}) = 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}$$

$$\lambda = \frac{2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}}{5.34 \times 10^{14} \text{ s}^{-1}}$$
$$= 5.62 \times 10^{-7} \text{ m}$$

$$\frac{5.62 \times 10^{-7} \text{ m}}{1 \times 10^{-9} \text{ m}} \left| \frac{1 \text{ nm}}{1 \times 10^{-9} \text{ m}} \right. = 562 \text{ nm}$$

562

nm

Do Not Write Below This

Exam I Score