Question #: 1

Diamond is classified as a(n) _______.

A. liquid  
B. crystalline solid  
C. gas  
D. amorphous solid

Question #: 2

A freshly baked chocolate chip cookie is a ____________.

A. pure element  
B. pure compound  
C. homogeneous mixture  
D. heterogeneous mixture

Question #: 3

You are running late for class and have 15.4 km to run before you reach the classroom. How many μm do you have to travel?

A. $1.54 \times 10^{10}$ -μm  
B. $1.54 \times 10^{8}$ -μm  
C. $1.54 \times 10^{14}$ -μm  
D. $1.54 \times 10^{4}$ -μm
Question #: 4

Express 0.0005236 in scientific notation. Use the format 2.222E2 or 2.222E-2 for scientific notation.

1.

Question #: 5

A cube of copper has a mass of 2.3 mg and a density of 8.96 g/cm³. What is its volume?

A. $2.6 \times 10^{-10}$ m³
B. $1.4 \times 10^{-8}$ m³
C. $2.6 \times 10^{-7}$ m³
D. $2.6 \times 10^{-6}$ m³

Question #: 6

What is the result of the following equation?

$$(0.234 - 0.100) \times 4.1 = \underline{1}$$

Report your answer with the correct number of significant figures, using the format 2.2E2 or 2.2E-2 for scientific notation.

1. \underline{1}
Question #: 7

Kangaroos are reported to jump up to 25 feet in a single leap. This distance equals 1 centimeters.
Report your answer to the correct number of significant figures without units. Use the format 2.2E2 or 2.2E-2 for scientific notation.

1. __________

Question #: 8

Susan, an office clerk, burns an average of 1,650 Calories per day. If Susan burns an additional 250 Calories by walking 5,140 more steps per day, how many weeks would it take her to lose 12 lbs? 1 lb = 3,500 Calories

A. 20 weeks
B. 24 weeks
C. 12 weeks
D. 54 weeks

Question #: 9

Choose the two statements that agree with Dalton’s atomic theory.

A. The atoms of one element can be changed into atoms of a different element through chemical reactions.
B. Compounds are formed when atoms of more than one element combine.
C. Each element is composed of extremely small particles called atoms.
D. All atoms of a given element are identical to one another in mass, other properties, and are the same as atoms of another element.
Question #: 10

Which two statements do not describe Millikan's oil drop experiment?

A. A magnetic field was applied to an electron beam.
B. Oil droplets were suspended in an electric field.
C. It proved that protons are found in the nucleus.
D. The charge of an electron was determined.

Question #: 11

Select the two pairs of isotopes. X and Y may be the same or different elements.

A. $^{37}_{17}X$ and $^{35}_{17}Y$
B. $^{44}_{17}X$ and $^{98}_{42}Y$
C. $^{109}_{47}X$ and $^{107}_{47}Y$
D. $^{196}_{78}X$ and $^{198}_{77}Y$

Question #: 12

How many protons, neutrons, and electrons are in the most common ion of calcium-40?

1. ___________ protons
2. ___________ neutrons
3. ___________ electrons
Question #: 13

Classify each description below as a **metal**, **nonmetal**, or **metalloid**.

1. Found on the **left** side of the periodic table: __1__
2. Form **cations** in compounds: __2__
3. Tend to **gain** electrons in compounds: __3__
4. Make up ~5% of the elements: __4__

Question #: 14

Silver has an average atomic mass of 107.8682 amu from two naturally occurring isotopes, $^{107}\text{Ag}$ and $^{108}\text{Ag}$. $^{107}\text{Ag}$ has an atomic mass of 106.9051 amu and $^{108}\text{Ag}$ has an atomic mass of 108.9048 amu. What is the natural abundance of $^{107}\text{Ag}$?

A. 51.84%
B. 48.16%
C. 82.62%
D. 14.54%

Question #: 15

Element X has 134 protons and 156 neutrons. What are its atomic number and atomic mass?

A. $Z = 134$, $A = 156$
B. $Z = 156$, $A = 290$
C. $Z = 134$, $A = 290$
D. $Z = 156$, $A = 134$
Question #: 16

There are \( 1 \) mole of uranium in 1.42 pg of uranium. Use the format 2.22E2 or 2.22E-2 for scientific notation. Do not include units in your answer.

1. \( \underline{\underline{\text{______}}} \)

Question #: 17

Calculate the mass of \( 2.945 \times 10^{21} \) bromine atoms.

A. 0.3907 g  
B. \( 1.417 \times 10^{47} \) g  
C. 16340 g  
D. 2.559 g

Question #: 18

Choose the two answers that pair a molecular formula with its empirical formula.

A. \( \text{C}_4\text{H}_8 \) molecular, \( \text{C}_2\text{H}_4 \) empirical  
B. \( \text{N}_2\text{H}_4 \) molecular, \( \text{NH}_2 \) empirical  
C. \( \text{HO} \) molecular, \( \text{H}_2\text{O}_2 \) empirical  
D. \( \text{P}_2\text{F}_5 \) molecular, \( \text{PF}_2 \) empirical

Question #: 19

Which of the following is an ionic compound?

A. \( \text{C}_6\text{H}_8\text{O}_6 \)  
B. \( \text{CO} \)  
C. \( \text{K}_3\text{PO}_4 \)  
D. \( \text{N}_2\text{O} \)
Question #: 20

What is the chemical name for SeO₃?

A. selenium oxide  
B. selenium trioxygen  
C. selenic oxygen  
D. selenium trioxide

Question #: 21

There are \( \frac{1}{120 \text{ g}} \) atoms in a 120 g sample of K₂CrO₄ (molar mass 194.2 g/mol). Report your answer with two significant figures, using the form 2.2E2 or 2.2E-2 for scientific notation.

1. 

Question #: 22

Analysis of a compound shows that it contains 10.4% carbon, 27.8% sulfur, and 61.7% chlorine by mass. What is the empirical formula of the compound?

A. C₂SCl  
B. CS₂Cl₂  
C. CSCl₂  
D. C₂S₄Cl
Question #: 23

How many moles of oxygen are in 9.3 grams of H₂SO₄?

A. 0.38 mol O  
B. 0.095 mol O  
C. 2.3 mol O  
D. 0.58 mol O

Question #: 24

The molecular formula for the compound with an empirical formula of NH₂Cl and a molar mass is 103 g/mol is N ___ 1 ___ H ___ 2 ___ Cl ___ 3 ___. Fill in each blank with a whole number.

1. _________  
2. _________  
3. _________

Question #: 25

Balance this chemical equation for the reaction of hydrofluoric acid with sodium silicate with the smallest possible whole numbers by filling in each blank with the proper coefficient. If the coefficient is 1, fill in 1.

₁ Na₂SiO₃(s) +  ᵃ ₂ HF(aq) → ᵃ ₃ H₂SiF₆(aq) + ᵃ ₄ NaF(aq) + ᵃ ₅ H₂O(l)

1. _________  
2. _________  
3. _________  
4. _________  
5. _________
Question #: 1

Diamond is classified as a(n) ________.

A. liquid
✓ B. crystalline solid
C. gas
D. amorphous solid

Question #: 2

A freshly baked chocolate chip cookie is a ____________.

A. pure element
B. pure compound
C. homogeneous mixture
✓D. heterogeneous mixture

Question #: 3

You are running late for class and have 15.4 km to run before you reach the classroom. How many μm do you have to travel?

✓A. 1.54 ×10^{10} -μm
B. 1.54 ×10^{8} -μm
C. 1.54 ×10^{14} -μm
D. 1.54 ×10^{4} -μm

Question #: 4

Express 0.0005236 in scientific notation. Use the format 2.222E2 or 2.222E-2 for scientific notation.

1. 5.236E-4

Question #: 5

A cube of copper has a mass of 2.3 mg and a density of 8.96 g/cm³. What is its volume?

✓A. 2.6 ×10^{-10} m³
B. 1.4 ×10^{-8} m³
C. 2.6 ×10^{-7} m³
D. 2.6 ×10^{-6} m³

Question #: 6

What is the result of the following equation?

\[(0.234 -0.100) \times 4.1 = \_\_]
Report your answer with the **correct** number of significant figures, using the format 2.2E2 or 2.2E-2 for scientific notation.

1. 0.55

---

**Question #: 7**

Kangaroos are reported to jump up to 25 feet in a single leap. This distance equals **1** centimeters.

Report your answer to the **correct** number of significant figures **without** units. Use the format 2.2E2 or 2.2E-2 for scientific notation.

1. 760 | 7.6E2

---

**Question #: 8**

Susan, an office clerk, burns an average of 1,650 Calories per day. If Susan burns an additional 250 Calories by walking 5,140 more steps per day, how many weeks would it take her to lose 12 lbs? 1 lb = 3,500 Calories

A. 20 weeks
✓ B. 24 weeks
C. 12 weeks
D. 54 weeks

---

**Question #: 9**

Choose the **two** statements that **agree** with Dalton’s atomic theory.

A. The atoms of one element can be changed into atoms of a different element through chemical reactions.
✓ B. Compounds are formed when atoms of more than one element combine.
✓ C. Each element is composed of extremely small particles called atoms.
D. All atoms of a given element are identical to one another in mass, other properties, and are the same as atoms of another element.

Question #: 10

Which two statements do not describe Millikan's oil drop experiment?

✓ A. A magnetic field was applied to an electron beam.
   B. Oil droplets were suspended in an electric field.
✓ C. It proved that protons are found in the nucleus.
   D. The charge of an electron was determined.

Question #: 11

Select the two pairs of isotopes. X and Y may be the same or different elements.

✓ A. 
   \( ^{37}_{17}X \) and \( ^{35}_{17}Y \)

B. 
   \( ^{101}_{44}X \) and \( ^{98}_{42}Y \)
✓ C. 
   \( ^{109}_{47}X \) and \( ^{107}_{47}Y \)

D. 
   \( ^{196}_{78}X \) and \( ^{198}_{77}Y \)

Question #: 12

How many protons, neutrons, and electrons are in the most common ion of calcium-40?

1 protons
2 neutrons
3 electrons

1. 20
2. 20
3. 18

Question #: 13

Classify each description below as a **metal**, **nonmetal**, or **metalloid**.

- Found on the **left** side of the periodic table: **1**
- Form **cations** in compounds: **2**
- Tend to **gain** electrons in compounds: **3**
- Make up ~5% of the elements: **4**

1. metal|metals|
2. metal|metals|
3. nonmetal|nonmetals|
4. metalloid|metalloids|metaloids|

Question #: 14

Silver has an average atomic mass of 107.8682 amu from two naturally occurring isotopes, $^{107}\text{Ag}$ and $^{108}\text{Ag}$. $^{107}\text{Ag}$ has an atomic mass of 106.9051 amu and $^{108}\text{Ag}$ has an atomic mass of 108.9048 amu. What is the natural abundance of $^{107}\text{Ag}$?

✓ A. 51.84%
B. 48.16%
C. 82.62%
D. 14.54%

Question #: 15

Element X has 134 protons and 156 neutrons. What are its atomic number and atomic mass?

A. $Z = 134, A = 156$
B. $Z = 156, A = 290$
Question #: 16

There are _1_ moles of uranium in 1.42 pg of uranium. Use the format 2.22E2 or 2.22E-2 for scientific notation. Do not include units in your answer.

1. 5.97E-15

Question #: 17

Calculate the mass of 2.945 ×10^{21} bromine atoms.

✓ A. 0.3907 g
   B. 1.417 ×10^{47} g
   C. 16340 g
   D. 2.559 g

Question #: 18

Choose the two answers that pair a molecular formula with its empirical formula.

✓ A. C_4H_8 molecular, C_2H_4 empirical
✓ B. N_2H_4 molecular, NH_2 empirical
   C. HO molecular, H_2O_2 empirical
   D. P_2F_5 molecular, PF_2 empirical

Question #: 19

Which of the following is an ionic compound?

A. C_6H_8O_6
B. CO
C. K₃PO₄
D. N₂O

Question #: 20

What is the chemical name for SeO₃?

A. selenium oxide
B. selenium trioxygen
C. selenic oxygen
D. selenium trioxide

✓ D. selenium trioxide

Question #: 21

There are 1 atoms in a 120 g sample of K₂CrO₄ (molar mass 194.2 g/mol). Report your answer with two significant figures, using the form 2.2E2 or 2.2E-2 for scientific notation.

1. 3.7E23 3.8E23 3.6E23

Question #: 22

Analysis of a compound shows that it contains 10.4% carbon, 27.8% sulfur, and 61.7% chlorine by mass. What is the empirical formula of the compound?

A. C₂SCl
B. CS₂Cl₂
C. CS₂Cl₂
D. C₂S₄Cl

✓ C. CS₂Cl₂

Question #: 23

How many moles of oxygen are in 9.3 grams of H₂SO₄?

✓ A. 0.38 mol O
Question #: 24

The **molecular** formula for the compound with an empirical formula of NH₂Cl and a molar mass is 103 g/mol is N 1 H 2 Cl 3. Fill in each blank with a **whole number**.

1. 2
2. 4
3. 2

Question #: 25

Balance this chemical equation for the reaction of hydrofluoric acid with sodium silicate with the smallest possible **whole** numbers by filling in each blank with the proper coefficient. If the coefficient is 1, fill in 1.

\[
\text{[1]} \quad \text{Na}_2\text{SiO}_3(s) + \text{[2]} \quad \text{HF}(aq) \rightarrow \text{[3]} \quad \text{H}_2\text{SiF}_6(aq) + \text{[4]} \quad \text{NaF}(aq) + \text{[5]} \quad \text{H}_2\text{O}(l)
\]

1. 1
2. 8
3. 1
4. 2
5. 3