Question #: 1

Which state of matter has a definite shape and is rigid?

A. gas
B. solid
C. plasma
D. liquid

Question #: 2

Identify each substance as an element, compound, homogeneous mixture, or heterogeneous mixture.

1. air
2. carbon dioxide
3. hydrogen
4. granite

1. ________
2. ________
3. ________
4. ________
**Question #: 3**

Which **two** of the following processes are **NOT** chemical changes?

A. Melting of solid gallium metal.
B. Fermentation of sugar in brewing.
C. Conversion of mercury(II) oxide into oxygen gas and elemental mercury by heating.
   Evaporation of water on a hot summer day.
E. Production of glucose during photosynthesis.

**Question #: 4**

What is the correct way to write 0.000300 meters in scientific notation?

A. $3 \times 10^{-3}$ meters
B. $3.0 \times 10^{-4}$ meters
C. $3.00 \times 10^{-4}$ meters
D. $3 \times 10^{-4}$ meters
E. $3.00 \times 10^{-3}$ meters

**Question #: 5**

How many millimeters are in $6.8 \times 10^6$ picometers?

1 mm

Report your answer with **two** significant figures. Do **NOT** include units in your answer. Use the format 2.2E2 or 2.2E-2 for numbers in scientific notation.

1. _________
Question #: 6

Write the metric prefix associated with each multiplier (meaning).

1. \(1 \times 10^3\)
2. \(10^{-2}\)
3. \(10^{-9}\)

1. __________
2. __________
3. __________

---

Question #: 7

If a world-class sprinter runs a distance of \(1.000 \times 10^2\) meters in a time of 9.37 seconds, what is the sprinter’s average speed for the race, in miles per hour? \(1\) mph

Report your answer to three significant figures. Do NOT include units in your answer.

1. __________

---

Question #: 8

A metal rod in the lab was found to weigh 330.0 g. By water displacement, the volume was determined to be 46.5 mL. Identify the metal based on the following densities.

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<td>2.71</td>
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<tr>
<td>zinc</td>
<td>7.13</td>
</tr>
</tbody>
</table>

A. aluminum  
B. iron  
C. lead  
D. zinc
Question #: 9

How many significant figures are in the value 0.007090600?

A. 9  
B. 5  
C. 7  
D. 3  
E. 10

Question #: 10

Perform the following calculation and choose the answer with the correct number of significant figures.

\[
\frac{99.97 \text{ g} - 94.3 \text{ g}}{82.25 \text{ g}}
\]

A. 0.07  
B. 0.069  
C. 0.0689  
D. 0.0690  
E. 0.6894

Question #: 11

A college football lineman weighs in at \(3.40 \times 10^2\) pounds. What is his mass in kilograms? \(1\) kg

Report your answer with three significant figures. Do NOT include units with your answer.

1. __________
**Question #: 12**

A rocket launched from Earth needs to reach a speed of 7.9 km/s to get into space. If the rocket maintains this speed, how many years will it take to reach the sun? (Distance to the sun: 92.96 million miles; 1 year = 365 days)

1 year(s)

Report your answer **two** significant figures. Do **NOT** include units in your answer.

1. __________

**Question #: 13**

A room has a volume of 729 m³. What mass of air, in pounds, is in the room? Air has a density of 34.70 g/ft³.

1 lb

Report your answer with **three** significant figures. Do **NOT** include units. Use the format 2.22E2 or 2.22E-2 for numbers in scientific notation.

1. __________

**Question #: 14**

Fill in the missing name or symbol for each element.

<p>| | | | |</p>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
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1. __________
2. __________
3. __________
4. __________
Question #: 15

Which two of the following statements are FALSE concerning the interpretation of atomic structure that was made by Rutherford based on his famous gold foil experiment?

- Thomson's plum pudding model of the atom is correct.
- The volume of the atom is mostly empty space.
- The nucleus contains nearly all of the mass of the atom.
- The nucleus of the atom is positively charged.
- Neutrons are the source of the positive charge of the nucleus.

Question #: 16

Which postulate is not part of Dalton's atomic theory?

A. Lead can be changed into gold by chemical means.
B. Atoms cannot be created or destroyed by chemical means.
C. A compound consists of two or more elements combined in whole-number ratios.
D. Matter is composed of exceedingly small particles called atoms.
E. Elements consist of only one type of atom that have identical chemical properties.

Question #: 17

How many protons are in one cobalt atom with mass number of 60?

1 protons

Do NOT include units in your answer. Report your answer as a whole number.

1. ___________
Question #: 18

Which one is the correct isotopic symbol for an ion that contains 36 electrons, 35 protons, and 44 neutrons?

A. \( _{35}^{71}\text{Br}^- \)
B. \( _{35}^{79}\text{Br}^- \)
C. \( _{36}^{79}\text{Kr}^+ \)
D. \( _{35}^{80}\text{Br}^- \)
E. \( _{36}^{80}\text{Kr}^+ \)

Question #: 19

Determine the number of protons, neutrons, and electrons in one chlorine-37 atom, respectively?

1. __________ protons
2. __________ neutrons
3. __________ electrons

Report your answers as a whole number. Do NOT include units in your answer.

1. __________
2. __________
3. __________

Question #: 20

Neon is a noble gas that has 10 total electrons orbiting the nucleus of each atom. What is the charge of the ion created when a sodium ion has the same number of electrons as neon?

1. __________

Do NOT include units with your answer.
Question #: 21

Europium (Eu) has two naturally occurring isotopes. $^{151}$Eu has a mass of 150.92 amu and $^{153}$Eu has a mass of 152.92 amu. What is the percent abundance of $^{151}$Eu? The average atomic mass of Eu is 151.964 amu.

A. 51.0%  
B. 47.8%  
C. 52.5%  
D. 45.5%

Question #: 22

Using the periodic table, classify each of the following elements as a metal, metalloid, or a nonmetal.

1. strontium  
2. bromine  
3. germanium  
4. cobalt  
5. potassium

1. _________  
2. _________  
3. _________  
4. _________  
5. _________

Question #: 23

Which element will form a stable ion with a 2+ charge?

A. O  
B. Al  
C. Ba  
D. K  
E. Br
Question #: 24

Write the empirical formula for each compound. Formulas will be entered with numbers but without subscripts. For example H$_2$O will be entered as H$_2$O.

C$_6$H$_{12}$O$_6$  1
FeCl$_3$  2

1. 
2. 

Question #: 25

Provide the missing name or formula.

| phosphorus pentachloride |  \[ \frac{1}{2} \] N$_2$O$_4$ |

Enter formulas with numbers but without subscripts. For example, H$_2$O would be entered as H$_2$O.

1. 
2. 

Question #: 26

Given the name, write the chemical formula for each of the compounds. Formulas will be entered without subscripting any numbers. For example, H$_2$O will be written as H$_2$O.

1. iron(III) hydroxide
2. aluminum nitride

1. 
2. 
**Question #**: 27

What is the chemical formula of the ionic compound created from the most common ions of calcium and sulfur?

A. CaS₂  
B. Ca₂S₂  
C. CS  
D. CaS

**Question #**: 28

Which two incorrectly pair the name and formula for a polyatomic ion?

A. chlorate, ClO₃⁻  
B. ammonium, NH₄⁻  
C. dichromate, Cr₂O₇²⁻  
D. cyanide. CN⁻  
E. sulfate, SO₄⁻

**Question #**: 29

What is the name of Cl₂O₇⁻?

A. dichloride hexoxide  
B. dichlorine heptoxide  
C. chlorine(II) oxide  
D. chlorine(VII) oxide

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Write the chemical formula for potassium carbonate.  
Numbers in the formula will not be subscripted. For example, H₂O should be written as H₂O.

1. __________
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Which state of matter has a definite shape and is rigid?

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Write the metric prefix associated with each multiplier (meaning).

\[ \begin{align*}
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2 & \quad 10^{-2} \\
3 & \quad 10^{-9}
\end{align*} \]

1. k
2. c
3. n

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\[ \text{1. } 23.9 \text{ mph} \]

Report your answer to **three** significant figures. Do **NOT** include units in your answer.

1. 23.9|2.39E1|2.39e+1|

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Report your answer **two** significant figures. Do **NOT** include units in your answer.

1. 0.60

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1 lb

Report your answer with **three** significant figures. Do **NOT** include units. Use the format 2.22E2 or 2.22E-2 for numbers in scientific notation.

1. 1.97E3

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<th>1</th>
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<tbody>
<tr>
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<td>potassium</td>
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<tr>
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<td></td>
</tr>
<tr>
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1. Ag
2. K
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Do **NOT** include units in your answer. Report your answer as a whole number.

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Which one is the correct isotopic symbol for an ion that contains 36 electrons, 35 protons, and 44 neutrons?

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1. +1|1+|1|

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5. potassium

1. metal
2. nonmetal
3. metalloid
4. metal
5. metal

---

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B. Al
√C. Ba
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\[
\begin{align*}
\text{C}_6\text{H}_{12}\text{O}_6 & \quad 1 \\
\text{FeCl}_3 & \quad 2 \\
\end{align*}
\]

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<tr>
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1. PCl₅
2. dinitrogen tetroxide|dinitrogen tetraoxide|

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Given the name, write the chemical formula for each of the compounds. Formulas will be entered without subscripting any numbers. For example, H₂O will be written as H₂O.

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