Question #: 1

The state of matter in which atoms or molecules have a fixed volume but are free to move relative to each other is a [solid, liquid, gas].

1. __________

Question #: 2

Match the substance (1-4) with an appropriate description (A-D).

1. Aluminum  A. Compound
   2. Noodle soup  B. Element
   3. Tea  C. Homogeneous mixture
   4. Table salt  D. Heterogeneous mixture

1. __________
Question #: 3

Which of the following processes describes a chemical change?

A. Irons rusts when exposed to air.
B. Water evaporates on a hot day.
C. Ice cubes placed in a glass of water melt over time.
D. Water placed in a freezer becomes solid ice.

Question #: 4

Which statement about energy is false?

A. Potential energy is associated with the position or composition of an object.
B. Kinetic energy is associated with the motion of an object.
C. Energy cannot be created or destroyed.
D. Thermal energy is a form of potential energy.

Question #: 5

You are running late for class and have 5.01 km to run before you reach the classroom. How many μm do you have to travel?

A. $5.01 \times 10^{9}$ -μm
B. $5.01 \times 10^{8}$ -μm
C. $5.01 \times 10^{14}$ -μm
D. $5.01 \times 10^{-4}$ -μm

Question #: 6
Write the number 5715 in proper scientific notation.
Report your answer with the format 2.222E2 or 2.222E-2.

1. __________

Question #: 7

If a car travels \(2.5419 \times 10^5\) m, and then an additional \(2.38 \times 10^3\) m, what is the total distance traveled?

A. \(4.92 \times 10^5\) m
B. \(2.5657 \times 10^5\) m
C. \(4.92 \times 10^3\) m
D. \(2.5657 \times 10^3\) m

Question #: 8

The density of a particular liquid is 3.12 g/mL. What volume (in mL) is occupied by 8.48 g of the liquid?
Report your answer with three significant figures. Do NOT include units in your answer.

1. __________

Question #: 9

Which of the following is not an extensive property?

A. mass
B. melting point
C. length
D. volume
Question #: 10

How many significant figures are in 0.00389030?

A. 6  
B. 7  
C. 9  
D. 4

Question #: 11

What is the result of the following calculation?  
Report your answer to the correct number of significant figures. Report your answer in scientific notation with the format 2.2E2 or 2.2E-2.

\[
\frac{(3.267 \times 10^{16})}{(2.05 \times 10^{13})} + 7.313 \times 10^{3} = \_1\_ 
\]

1. __________

Question #: 12

A cyclist rides at an average speed of 6.8 \times 10^{-2} kilometers per second (km/s). This speed is equal to \_1\_ centimeters per hour (cm/h).  
Report your answer with two significant figures. Do NOT include units in your answer.  
Report your answer in scientific notation with the format 2.2E2 or 2.2E-2.

1. __________

Question #: 13

The density of a particular stainless steel alloy is 0.279 lb/in^3 at 20.0^\circ C.
If a ball bearing made of this alloy weighs 8.28 g, what is the volume of the bearing in cm\(^3\)?

A. 486 cm\(^3\)
B. 1.07 cm\(^3\)
C. 0.0258 cm\(^3\)
D. 21.4 cm\(^3\)

**Question #: 14**

Which of the following concepts was **not** a part of Dalton’s atomic theory?

A. Law of multiple proportions
B. Law of definite proportions
C. Isotopes
D. Elements are composed of atoms.

**Question #: 15**

Match the experiments (A or B) shown below with the result(s) of the experiment.

1. Measured the charge of an electron
2. Measured the mass-to-charge ratio of an electron
3. Discovered the electron

A. 
B. 

![Diagram of an experiment with charged plates and a magnet]
Question #: 16

Select two choices.
Rutherford’s experiment in which alpha particles were incident on a gold foil demonstrated that

A. Thomson’s plum pudding model is an incorrect picture of the structure of the atom.
B. the atom is very dense and contains little empty space.
C. the nucleus contains most of the mass of the atom.
D. the core of the atom is negatively charged.

Question #: 17

Select the three true statements about subatomic particles in atoms.

A. Electrons and protons have approximately the same mass.
B. Protons and electrons have charges of opposite sign.
C. Neutrons and protons have approximately the same mass.
D. The atomic number of an element is equal to the number of protons in each atom of that element.
E. Neutrons and protons have approximately the same charge.

Question #: 18

Which statement concerning isotopes is **incorrect**?

A. Isotopes are atoms that have the same atomic number but have different numbers of neutrons.
B. The isotope $^1$H has no neutrons.
C. The number of neutrons is determined by subtracting the atomic number from the mass number.
D. The mass number is determined by adding the atomic masses of each isotope.

Question #: 19

Choose the isotope symbol for a neutral atom with a mass number of 46 and an atomic number of 15.

A. $^{46}_{15}P$
B. $^{15}_{46}P$
C. $^{46}_{15}Pd$
D. $^{15}_{46}Pd$
E. $^{46}_{16}S^+$
Question #: 20
Potassium typically forms an ion with a charge of __1__ . Include both a number (1, 2, 3, etc) and a sign (+ or -) in your answer.

1. __________

Question #: 21
What is the charge of an iron ion with 24 electrons? Include both a number (1, 2, 3, etc) and a sign (+ or -) in your answer.

1. __________

Question #: 22
Looking at the figure below, match the group names (A-D) with their locations on the periodic table (1-4).

A. Alkali metals  B. Halogens  C. Noble gases  D. Transition metals


1. __________
2. __________
3. __________
4. __________
**Question #: 23**

Silver has two naturally occurring isotopes. $^{109}\text{Ag}$ has a natural abundance of 48.161% and an isotopic mass of 108.90475 amu. What is the **isotopic mass** of the other isotope?

A. 105.2 amu  
B. 106.3 amu  
C. 107.0 amu  
D. 110.8 amu

---

**Question #: 24**

How many moles are present in 13.9 g of lithium?

A. 13.9 mol  
B. 2.00 mol  
C. 0.500 mol  
D. 6.94 mol

---

**Question #: 25**

A piece of copper wire contains $8.29 \times 10^{22}$ atoms of copper. How many **moles** of copper are in the wire?

A. $1.30 \times 10^{21}$ mol  
B. $4.99 \times 10^{16}$ mol  
C. 0.138 mol  
D. 8.71 mol

---

**Question #: 26**

A solid silver ring has a mass of 7.84 g. How many silver atoms are in the ring?
A. $4.38 \times 10^{22}$ atoms
B. $5.09 \times 10^{26}$ atoms
C. $8.45 \times 10^{3}$ atoms
D. $4.72 \times 10^{24}$ atoms

---

**Question #**: 27

Fill in the blanks with either covalent or ionic.

In a(n) 1 bond, electrons are transferred from one atom to another. Nonmetals typically form 2 bonds with other nonmetals. Metals typically form 3 bonds with nonmetals.

1. __________
2. __________
3. __________

---

**Question #**: 28

What is the empirical formula for $C_6H_{12}O_6$?

A. CHO
B. $C_2H_4O_2$
C. CH$_2$O
D. $C_{12}H_{24}O_{12}$

---

**Question #**: 29

Select the two molecular compounds below.

A. CH$_2$Cl$_2$
B. K$_2$O
C. Fe$_2$O$_3$
D. SF$_6$
Question #: 30

Lead has a density of $11.4 \text{ g/cm}^3$. How many atoms are present in a sample of lead with a volume of $25.0 \text{ cm}^3$? Report your answer with **three** significant figures. Do **NOT** include units in your answer. Report your answer in scientific notation with the format $2.22E2$ or $2.22E-2$.

____ atoms

1. __________
Question #: 1

The state of matter in which atoms or molecules have a fixed volume but are free to move relative to each other is a _1_ [solid, liquid, gas].

1. liquid|Liquid|

Question #: 2

Match the substance (1-4) with an appropriate description (A-D).

1   Aluminum         A. Compound
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Write the number 5715 in proper scientific notation.
Report your answer with the format 2.222E2 or 2.222E-2.

1. 5.715E3 [5.715 E 3]

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If a car travels \(2.5419 \times 10^5\) m, and then an additional \(2.38 \times 10^3\) m, what is the total distance traveled?

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✓ B. \(2.5657 \times 10^5\) m
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D. \(2.5657 \times 10^3\) m

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The density of a particular liquid is 3.12 g/mL. What volume (in mL) is occupied by 8.48 g of the liquid?
Report your answer with **three** significant figures. Do **NOT** include units in your answer.

1 mL

1. 2.72 [2.71|2.73]

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A. mass
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\frac{(3.267 \times 10^{16})}{(2.05 \times 10^{13})} + 7.313 \times 10^3 = \_\_
\]

1. 8.91E3|8.91e3|

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A cyclist rides at an average speed of 6.8 \times 10^{-2} kilometers per second (km/s). This speed is equal to \_\_\_\_ centimeters per hour (cm/h).
Report your answer with two significant figures. Do NOT include units in your answer.
Report your answer in scientific notation with the format 2.2E2 or 2.2E-2.

1. 2.4E7|2.4 E 7|2.4E 7|2.4 E7|

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Match the experiments (A or B) shown below with the result(s) of the experiment.

1. Measured the charge of an electron
2. Measured the mass-to-charge ratio of an electron
3. Discovered the electron

A. Evacuated tube, anode, cathode, deflected beam, magnet
B. Electrically charged plates, undeflected electron beam, deflected beams, electric and magnetic fields, deflect electron beam.
Question #: 16

Select **two** choices.

Rutherford's experiment in which alpha particles were incident on a gold foil demonstrated that

✓ A. Thomson's plum pudding model is an incorrect picture of the structure of the atom.

✓ B. the atom is very dense and contains little empty space.

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B. $^{46}_{15}$P

C. $^{46}_{15}$Pd

D. $^{15}_{46}$Pd

E. $^{46}_{16}$S

Question #: 20
Potassium typically forms an ion with a charge of $+1$. Include both a number (1, 2, 3, etc) and a sign (+ or -) in your answer.

1. +1|1+|

**Question #:** 21

What is the charge of an iron ion with 24 electrons? Include both a number (1, 2, 3, etc) and a sign (+ or -) in your answer.

1

1. 2+|+2|two plus|plus two|2 plus|plus 2|

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A. Alkali metals   B. Halogens   C. Noble gases   D. Transition metals

1 Group 8A  2 Group 7A  3 Group 1 A  4 Groups 1B through 8B

1. C.|C|c|c.|
2. B.|B|b|b.|
3. A|A.|a|a.|
4. D.|D|d|d.|
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Metals typically form 3 bonds with nonmetals.

1. ionic
2. covalent
3. ionic

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**1** atoms

1. 8.28E23 [8.28e23]