
1. Which of the following is a **liquid** at room temperature?

- A. oxygen
B. copper
C. salt
D. mercury

2. Which of the following compositions of matter is a **pure substance**?

- A. water
B. wet sand
C. 2% milk
D. sweet tea

3. Which of the following is a **compound**?

- A. magnesium
B. oxygen
C. nickel(II) sulfide
D. helium

4. Which of the following processes describes a **physical change** of matter?

- A. the oxidation of methanol (CH_3OH) to formaldehyde (CH_2O) upon ingestion
B. the rusting of iron to form iron oxide
C. the distillation of ethanol ($\text{CH}_3\text{CH}_2\text{OH}$) from a mixture of ethanol and water
D. the combustion of gasoline producing water and carbon dioxide

5. Thermal energy is

- A. always conserved.
B. the energy associated with the temperature of an object.
C. the energy associated with the position of an object.
D. associated with the effect of gravity of an object.

6. Which of the following prefix multipliers is the result of this calculation?

$$(1 \times 10^{-13}) \div (1 \times 10^{-4}) =$$

- A. milli
B. micro
C. mega
D. nano
-

7. In scientific notation, 677600 is expressed as

- A. $10^{6.776}$ C. 6.77600×10^{-5}
B. 6.77600×10^{-3} D. 6.776×10^5
-

8. A copper cube has a mass of 62.7 g. What is the length of the edge of the cube? (density of copper = 8.96 g/cm^3)

- A. 1.91 cm C. 3.19 cm
B. 4.48 cm D. 7.89 cm
-

9. What is the density of an object with a mass of 149.8 g and a volume of 12.1 mL?

- A. 1.38 g/mL C. 12.4 g/mL
B. 8.08 g/mL D. 18.1 g/mL
-

10. Which property of matter is the **most** useful for identifying an unknown substance?

- A. mass C. density
B. volume D. weight
-

11. Which answer should be reported, with the correct number of significant figures, for the following calculation?

$$433.621 - 333.9 = ?$$

- A. 100 C. 99.72
B. 99.721 D. 99.7
-

12. What is the result of the following calculation?

$$0.223 \times 41.0 \div 4570 \times 3006 = ?$$

- A. 6.6×10^{-8} C. 6.01
B. 6.66×10^{-7} D. 1.5×10^7
-

13. How is a wavelength of 7.60×10^{-10} m expressed in nm?

- A. 0.760 nm C. 7.60×10^{-19} nm
B. 760 nm D. 7.60×10^{-3} nm
-

14. If NASA developed a spacecraft capable of traveling at **half** the speed of light, how many **years** would it take the craft to travel to Proxima Centauri, a star approximately 2.53×10^{13} miles away from Earth?

$$\text{speed of light} = 3.00 \times 10^8 \text{ m/s}; 1.00 \text{ mile} = 1.609 \text{ km}$$

- A. 2.63 years C. 5.20 years
B. 8.61 years D. 223 years
-

15. Which of the following statements is **not** consistent with Dalton's Atomic Theory?

- A. All atoms of chlorine have identical properties that distinguish them from other elements.
B. An atom of nitrogen can be broken down into smaller particles that still have the unique properties of nitrogen.
C. Atoms of sodium do not change into atoms of another element during chemical reaction with chlorine.
D. One carbon atom combines with one oxygen atom to form a molecule of carbon monoxide.
-

16. An automobile gasoline tank holds 21 kg of gasoline. When all of the gasoline is consumed, 86 kg of oxygen is consumed as well. If the only products of the reaction are carbon dioxide and water vapor, what is the mass of the products?

A. 107 kg

C. 60 kg

B. 44 kg

D. 18 kg

17. In a neutral atom, the **mass number** equals

A. the sum of the number of electrons and neutrons.

B. twice the number of protons.

C. the sum of the number of electrons and protons.

D. the sum of the number of protons, neutrons, and electrons.

18. Which group identifies each particle with its charge?

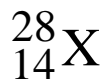
A. proton +1, neutron -1, electron 0

B. proton +1, neutron 0, electron -1

C. proton -1, neutron 0, electron +1

D. proton 0, neutron +1, electron -1

19. Which element does X represent in the following symbol?



A. nickel

C. sulfur

B. zinc

D. silicon

20. Complete the following table:

<i>Atomic Number</i>	<i>Charge</i>	<i>Electrons</i>	<i>Ion Symbol</i>
8	2-	W =	X =
55	Y =	54	Z =

- A. $W = 10, X = O^{2-}, Y = 1+, Z = Cs^+$
- B. $W = 8, X = O^{2-}, Y = 1-, Z = Mn^+$
- C. $W = 8, X = O^{2+}, Y = 1+, Z = Mn^+$
- D. $W = 6, X = O^{2+}, Y = 1+, Z = Cs^+$

21. Which of the following is a **transition element**?

- A. K
- B. Sn
- C. F
- D. Pd

22. Chlorine has an average atomic mass of 35.45 amu and consists of two stable isotopes, ^{35}Cl and ^{37}Cl . ^{35}Cl has a mass of 34.97 amu and ^{37}Cl has a mass of 36.97 amu. What is the natural abundance of ^{37}Cl ?

- A. 50%
- B. 24%
- C. 33%
- D. 66%

23. Naturally occurring gallium has two stable isotopes and an atomic mass of 69.723 amu. If ^{69}Ga (68.926 amu) is 60.11% of natural Ga, what is the mass of the other isotope?

- A. 70.92 amu
- B. 70.96 amu
- C. 70.72 amu
- D. 70.99 amu
-

24. Which of the following statements is **not correct**?

- A. 183.84 g of tungsten and 10.811 g of boron contain the same number of atoms.
- B. Avogadro's number is equal to the number of atoms in exactly 12 g of pure ^{12}C .
- C. One mole of oxygen atoms contains more atoms than one mole of carbon atoms.
- D. Two moles of ammonia (NH_3) contains the same number of nitrogen atoms as one mole of nitrogen gas (N_2).

25. How many **atoms** are contained in 5.92 g of methane (CH_4)?

- A. 5.32×10^8 atoms
- B. 6.02×10^{21} atoms
- C. 1.11×10^{24} atoms
- D. 3.42×10^{23} atoms

26. Which of the following molecules has a **molecular formula** that is the same as the **empirical formula** of the other three?

- A. $\text{HO}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$
 - B. $\text{H}_3\text{C}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_3$
 - C. $\text{H}_3\text{C}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$
 - D. $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$
-

27. Which of the following is an **ionic** compound?

A. LiCl

C. PCl₃

B. NO₂

D. CF₄

28. What is the chemical formula of sodium hypochlorite?

A. NaClO₂

C. Na₂CrO₄

B. NaClO

D. NaHCO₃

29. What is the chemical name of CS₂?

A. carbon sulfide

C. dicesium

B. carbon disulfide

D. carbon(IV) sulfide

30. Naturally occurring fluorine has only one stable isotope. Which statement is true for the most stable **ion** of fluorine?

A. The number of protons equals the number of electrons.

B. The number of protons is larger than the number of electrons.

C. The number of neutrons equals the number of electrons.

D. The sum of the number of protons, neutrons, and electrons equals 19.

Answer Key:

1. D
2. A
3. C
4. C
5. B
6. D
7. D
8. A
9. C
10. C
11. D
12. C
13. A
14. B
15. B
16. A
17. A
18. B
19. D
20. A
21. D
22. B
23. A
24. C
25. C
26. D
27. A
28. B
29. B
30. C