MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Filtered air is a(n)
   A) element.
   B) compound.
   C) homogeneous mixture.
   D) heterogeneous mixture.
   E) none of the above – air is not matter.

2) Which of the following is a chemical change?
   A) melting gold to make jewelry
   B) boiling water for tea
   C) burning gasoline in a lawn mower
   D) tearing a piece of aluminum foil
   E) freezing water to make ice cubes

3) Which of the following is a metric measurement of volume?
   A) milligram
   B) kilowatt
   C) deciliter
   D) meter
   E) gallon

4) Which of the following is the smallest unit of measurement?
   A) meter
   B) millimeter
   C) centimeter
   D) kilometer
   E) decimeter

5) What is a correct reading on this burette?

   A) 10 mL   B) 11 mL   C) 10.5 mL   D) 10.50 mL   E) 10.500 mL

6) The measurement 0.0000000430 m, expressed using scientific notation, is
   A) $4.3 \times 10^6$ m.
   B) $4.3 \times 10^{-7}$ m.
   C) $4.30 \times 10^{-8}$ m.
   D) $4.3 \times 10^{-8}$ m.
   E) $4.30 \times 10^8$ m.
7) A calculator answer of 423.6059 must be rounded off to three significant figures. What answer should be reported?
   A) 423.6  B) 423.7  C) 420  D) 423  E) 424
   
8) What is the answer to the following calculation:
   \[35.900 \text{ g} + 36.250 \text{ g} + 12.5 \text{ g} =\]
   A) 84.65 g  B) 84.6 g  C) 84.7 g  D) 85.0 g  E) 90.9 g
   
9) What is the answer to the following calculation:
   \[35.900 \text{ cm} \times 36.250 \text{ cm} \times 12.5 \text{ cm} =\]
   A) 16267.1875 cm\(^3\)  B) 16267.1 cm\(^3\)  C) 1.63 \times 10^4 \text{ cm}^3  D) 1.6267 \times 10^4 \text{ cm}^3
   
10) How many milliliters are equal to 2 deciliters?
   A) 0.2 mL  B) 20 mL  C) 200 mL  D) 2000 mL  E) 2 \times 10^4 \text{ mL}
   \[2 \text{ dL} \times \frac{10^1 \text{ L}}{\text{dL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 200 \text{ mL}\]
   
11) A 50.0 mL liquid sample has a mass of 50.7 g. The density of the liquid is ________.
   A) 0.0986 g/mL  B) 0.986 g/mL  C) 1.01 g/mL  D) 12.4 g/mL  E) 50.7 g/mL
   
12) A nugget of gold with a mass of 521 g is added to 50.0 mL of water in a graduated cylinder and the water level rises to 77.0 mL. What is the density of the gold?
   A) 0.0518 g/mL  B) 1.00 g/mL  C) 6.77 g/mL  D) 10.4 g/mL  E) 19.3 g/mL
   
13) How many milliliters of a salt solution with a density of 1.8 g/mL are needed to provide exactly 400 g of solution?
   A) 0.22 mL  B) 22 mL  C) 220 mL  D) 4.0 \times 10^2 \text{ mL}  E) 2.2 \times 10^4 \text{ mL}
   \[\frac{400 \text{ g}}{1.8 \text{ g}} \times \text{mL} = 220 \text{ mL}\]
   
   **DON'T USE FOR SIGNIFICANT FIGURES**
14) A temperature of 105 °F is the same as ________.
   A) 0 °C
   B) 41 °C
   C) 58 °C
   D) 98 °C
   E) 220 °C
   \[ °C = \left(\frac{°F - 32}{1.8}\right) \]

15) A temperature of 41 °F is the same as ________.
   A) 5 K
   B) 90 K
   C) 160 K
   D) 278 K
   E) 420 K
   \[ °C = \left(\frac{°F - 32}{1.8}\right) \Rightarrow K = °C + 273 \]

16) A doctor prescribes 125 mg of ampicillin. An ampicillin solution on hand contains 0.250 g/5.0 mL. How many milliliters of the solution are required?
   A) 0.0063 mL
   B) 0.025 mL
   C) 2.5 mL
   D) 2.7 mL
   E) 2500 mL (are you sure you want to give this much?)
   \[ 125 \text{ mg} \times \frac{10^{-3} \text{ g}}{\text{mg}} \times \frac{5.0 \text{ mL}}{0.250 \text{ g}} = 2.5 \text{ mL} \]

17) Which of the following descriptions of a subatomic particle is NOT correct?
   A) A proton has a positive charge and a mass of approximately 1 amu.
   B) A neutron has no charge and a mass of approximately 1 amu.
   C) An electron has a negative charge and a mass that is much smaller than 1 amu.
   D) A proton has a positive charge and a mass that is much smaller than 1 amu.

18) A particular atom has 30 protons, 34 neutrons, and 30 electrons. What is its atomic number?
   A) 15
   B) 30
   C) 34
   D) 64
   E) 64.35

19) A mass number that you would expect an isotope of iron to have is ________.
   A) 26
   B) 27.78
   C) 29.85
   D) 56
   E) 55.85

20) Which of the following gives the correct numbers of protons, neutrons, and electrons in \( ^{198}_{79}\text{Hg} \)?
   A) 80 protons, 80 neutrons, 80 electrons
   B) 118 protons, 80 neutrons, 116 electrons
   C) 80 protons, 118 neutrons, 118 electrons
   D) 80 protons, 118 neutrons, 80 electrons
   E) 99 protons, 99 neutrons, 99 electrons

21) How many neutrons are in an isotope of sodium with a mass number of 25?
   A) 36
   B) 14
   C) 11
   D) 25
   E) 15

22) The mass reported in the periodic table is
   A) the mass of the most abundant isotope.
   B) the mass of the heaviest isotope.
   C) one-twelfth of the mass of a carbon-12 atom.
   D) the weighted-average mass of an element.
   E) the elements mass number.
23) The atomic mass of lithium is ________.
   A) 3.00 amu  B) 6.941 amu  C) 7.00 amu  D) 7.41 amu  E) 13.98 amu

24) What is the molar mass of hexane, CH₃CH₂CH₂CH₂CH₂CH₃?
   A) 14.02 g/mol  B) 74.21 g/mol  C) 85.01 g/mol  D) 86.17 g/mol  E) 90.00 g/mol

25) What is the mass of 0.100 mol of sodium chloride?
   A) 58.55 g  B) 34.49 g  C) 5.84 g  D) 0.00589 g  E) 5.87 x 10⁻⁵ g

26) 0.500 mol of ammonia contains how many hydrogen atoms?
   A) 3.01 x 10²⁴  B) 9.03 x 10²³  C) 6.03 x 10²³  D) 6.02 x 10²⁴  E) 1.20 x 10²⁴

27) What is the mass of 5.05 x 10²⁶ molecules of water?
   A) 18.02 g  B) 1.802 x 10²⁴ g  C) 15.1 g  D) 1.51 x 10⁴ g  E) 1.000 g

28) The elements lithium, sodium, and potassium ________.
   A) are in the same group  B) have the same mass number  C) are in the same period
   D) have the same number of protons, but different numbers of neutrons  E) have the same number of electrons

29) Except for helium, the number of electrons in the outermost energy level of the noble gases is ________.
   A) 2  B) 4  C) 6  D) 8  E) 10

30) Energy level 2 can hold up to ________ electrons.
   A) 3  B) 2  C) 6  D) 8  E) 10

\[ 2s^2 \ 2p^6 \]

\[ \text{42 + 6 = 8} \]
31) The element with the largest atomic radius is _________.
   A) Li  B) K  C) Na  D) Rb  
   31) D

32) The element with the smallest first ionization energy is _________.
   A) K  B) Ca  C) As  D) Br  
   32) A

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

33) An increase in atmospheric carbon dioxide from burning fossil fuels is causing the global
    temperature to increase. This statement is an example of a theory.  
   33) T

34) The physical process of going directly from a solid to a gas is called sublimation.  
   34) T

35) Iodine is a metal.  
   35) F

36) Lithium is a metal.  
   36) T

37) The elemental symbol for lead is Pb.  
   37) F

38) The elemental symbol for copper is Cu.  
   38) T

39) Mn is the elemental symbol for manganese.  
   39) T

40) Br is the elemental symbol for boron.  
   40) F

41) The element oxygen always has 8 neutrons.  
   41) F

42) The ground state electron configuration of chlorine is 1s^2 2s^2 2p^6 3s^2 3p^5.  
   42) T

43) A single p-orbital can hold 6 electrons.  
   43) F