Introductory Chemistry: Concepts and Critical Thinking, 7e **(Corwin)**
Chapter 2 The Metric System

Key Terms

1) What is the term for the amount of energy required to raise one gram of water one degree on the Celsius scale?
A) Calorie
B) calorie
C) joule
D) kilocalorie
E) none of the above
Answer: B
Section: Key Terms

2) What is the term for the base unit of temperature in the metric system?
A) Celsius degree (°C)
B) Fahrenheit degree (°F)
C) Kelvin unit (K)
D) all of the above
E) none of the above
Answer: A
Section: Key Terms

3) What is the term for a unit that expresses the volume occupied by a cube 1 centimeter on a side?
A) cm^2
B) cm^3
C) mm^2
D) mm^3
E) none of the above
Answer: B
Section: Key Terms

4) What is the term for the amount of mass in a unit volume?
A) density
B) specific mass
C) specific gravity
D) specific volume
E) none of the above
Answer: A
Section: Key Terms

5) What is the term for a nondecimal system of measurement without any base unit for length, mass, or volume?
A) English system
B) metric system
C) International System (SI)
D) all of the above
E) none of the above
Answer: A
Section: Key Terms

6) What is the term for a statement of two exactly equal values?
A) exact equivalent
B) exact value
C) identical equivalent
D) identical value
E) none of the above
Answer: A
Section: Key Terms

7) What is the term for the base unit of temperature in the English system?
A) Celsius degree (°C)
B) Fahrenheit degree (°F)
C) Kelvin unit (K)
D) all of the above
E) none of the above
Answer: B
Section: Key Terms

8) What is the term for the base unit of mass in the metric system?
A) gram
B) liter
C) meter
D) second
E) none of the above
Answer: A
Section: Key Terms

9) What is the term that refers to the flow of energy from an object at a higher temperature to an object at a lower temperature?
A) calorie
B) heat
C) specific heat
D) joule
E) none of the above
Answer: B
Section: Key Terms

10) What is the term that refers to a measurement system with seven base units?
A) English system
B) metric system
C) International System (SI)
D) all of the above
E) none of the above
Answer: C
Section: Key Terms

11) What is the term for a unit of energy in the SI system?
A) Calorie
B) calorie
C) joule
D) kilocalorie
E) none of the above
Answer: C
Section: Key Terms

12) What is the term for the base unit of temperature in the SI system?
A) Celsius degree (°C)
B) Fahrenheit degree (°F)
C) Kelvin unit (K)
D) all of the above
E) none of the above
Answer: C
Section: Key Terms

13) What is the term for the base unit of volume in the metric system?
A) gram
B) liter
C) meter
D) second
E) none of the above
Answer: B
Section: Key Terms

14) What is the term for the base unit of length in the metric system?
A) gram
B) liter
C) meter
D) second
E) none of the above
Answer: C
Section: Key Terms

15) What is the term for a decimal system of measurement with base units for length, mass, and volume?
A) English system
B) metric system
C) troy system
D) all of the above
E) none of the above
Answer: B
Section: Key Terms

16) What is the term that expresses the amount of a single quantity compared to an entire sample; an expression of parts per hundred parts?
A) percent
B) proportion
C) quotient
D) reciprocal
E) none of the above
Answer: A
Section: Key Terms

17) What is the term for the relationship between a fraction and its inverse?
A) percent
B) proportion
C) ratio
D) reciprocal
E) none of the above
Answer: D
Section: Key Terms

18) What is the term for the base unit of time in the metric system?
A) gram
B) liter
C) meter
D) second
E) none of the above
Answer: D
Section: Key Terms

19) What is the term for the ratio of the density of a substance compared to the density of water at 4 °C?
A) density
B) specific mass
C) specific gravity
D) specific volume
E) none of the above
Answer: C
Section: Key Terms

20) What is the term for the amount of energy required to raise one gram of any substance one degree on the Celsius scale?
A) calorie
B) heat
C) specific heat
D) joule
E) none of the above
Answer: C
Section: Key Terms

21) What is the term for the average energy of molecules in motion?
A) heat
B) joule
C) specific heat
D) temperature
E) none of the above
Answer: D
Section: Key Terms

22) What is the term for a systematic method of problem solving which proceeds from a given value to a desired value by the conversion of units?
A) algebraic analysis
B) metric analysis
C) problem analysis
D) unit analysis
E) none of the above
Answer: D
Section: Key Terms

23) What is the term for a statement of two equivalent quantities?
A) unit analysis
B) unit equation
C) unit equivalent
D) unit factor
E) none of the above
Answer: B
Section: Key Terms

24) What is the term for the ratio of two equivalent quantities?
A) unit analysis
B) unit equation
C) unit equivalent
D) unit factor
E) none of the above
Answer: D
Section: Key Terms

25) What is the term for the technique of determining the volume of a solid or a gas by measuring the volume of water it displaces?
A) volume by calculation
B) volume by difference
C) volume by displacement
D) volume by immersion
E) none of the above
Answer: C
Section: Key Terms

Questions for Chapter 2

1) Which of the following is a base unit and symbol in the metric system?
A) meter (m)
B) gram (g)
C) liter (L)
D) all of the above
E) none of the above
Answer: D
Section: 2.1 Basic Units and Symbols

2) Which of the following is a base unit and symbol in the metric system?
A) centimeter (cm)
B) kilogram (kg)
C) milliliter (mL)
D) all of the above
E) none of the above
Answer: E
Section: 2.1 Basic Units and Symbols

3) Which of the following is a base unit and symbol in the metric system?
A) decimeter (dm)
B) gram (gm)
C) liter (L)
D) all of the above
E) none of the above
Answer: C
Section: 2.1 Basic Units and Symbols

4) What is the symbol for the metric unit micrometer?
A) cm
B) mm
C) Mm
D) μm
E) none of the above
Answer: D
Section: 2.1 Basic Units and Symbols

5) What is the symbol for the metric unit nanogram?
A) mg
B) Ng
C) ng
D) µg
E) none of the above
Answer: C
Section: 2.1 Basic Units and Symbols

6) What is the symbol for the metric unit microliter?
A) cL
B) mL
C) ML
D) µL
E) none of the above
Answer: D
Section: 2.1 Basic Units and Symbols

7) What is the name corresponding to the metric symbol km?
A) kilomega
B) kilometer
C) kilomicro
D) kilomilli
E) none of the above
Answer: B
Section: 2.1 Basic Units and Symbols

8) What is the name corresponding to the metric symbol dg?
A) decagram
B) decigram
C) dekagram
D) dekigram
E) none of the above
Answer: B
Section: 2.1 Basic Units and Symbols

9) What is the name corresponding to the metric symbol mL?
A) megaliter
B) metroliter
C) microliter
D) milliliter
E) none of the above
Answer: D
Section: 2.1 Basic Units and Symbols

10) What physical quantity is expressed by the metric unit centimeter?
A) length
B) mass
C) volume
D) density
E) none of the above
Answer: A
Section: 2.1 Basic Units and Symbols

11) What physical quantity is expressed by the metric unit kilogram?
A) length
B) mass
C) volume
D) density
E) none of the above
Answer: B
Section: 2.1 Basic Units and Symbols

12) What physical quantity is expressed by the metric unit milliliter?
A) length
B) mass
C) volume
D) density
E) none of the above
Answer: C
Section: 2.1 Basic Units and Symbols

13) According to the metric system, 1 Tm = _____ m.
A) 1×10^{12}
B) 1×10^{9}
C) 1×10^{6}
D) 1×10^{3}
E) none of the above
Answer: A
Section: 2.2 Metric Conversion Factors

14) According to the metric system, 1 Gg = _____ g.
A) 1×10^{12}
B) 1×10^{9}
C) 1×10^{6}
D) 1×10^{3}
E) none of the above
Answer: B
Section: 2.2 Metric Conversion Factors

15) According to the metric system, 1 ML = _____ L.
A) 1×10^{12}
B) 1×10^{9}
C) 1×10^{6}
D) 1×10^{3}
E) none of the above
Answer: C
Section: 2.2 Metric Conversion Factors

16) According to the metric system, 1 m = _____ dm.
A) 1×10^{1}
B) 1×10^{2}
C) 1×10^{3}
D) 1×10^{6}
E) none of the above
Answer: A
Section: 2.2 Metric Conversion Factors

17) According to the metric system, 1 g = _____ cg.
A) 1×10^{1}
B) 1×10^{2}
C) 1×10^{3}
D) 1×10^{6}
E) none of the above
Answer: B
Section: 2.2 Metric Conversion Factors

18) According to the metric system, 1 L = _____ mL.
A) 1×10^{1}
B) 1×10^{2}
C) 1×10^{3}
D) 1×10^{6}
E) none of the above
Answer: C
Section: 2.2 Metric Conversion Factors

19) According to the metric system, 1 s = _____ μs.
A) 1×10^{3}
B) 1×10^{6}
C) 1×10^{9}
D) 1×10^{12}
E) none of the above
Answer: B
Section: 2.2 Metric Conversion Factors

20) According to the metric system, 1 s = _____ ns.
A) 1 x 10^3
B) 1 x 10^6
C) 1 x 10^9
D) 1 x 10^{12}
E) none of the above
Answer: C
Section: 2.2 Metric Conversion Factors

21) According to the metric system, 1 s = _____ ps.
A) 1 x 10^3
B) 1 x 10^6
C) 1 x 10^9
D) 1 x 10^{12}
E) none of the above
Answer: D
Section: 2.2 Metric Conversion Factors

22) What is the *first step* in the unit analysis method of problem solving?
A) Write down the unit asked for in the answer.
B) Write down the given value related to the answer.
C) Apply a unit factor to convert a unit in the given value.
D) Round off the answer in the calculator display.
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

23) What is the *second step* in the unit analysis method of problem solving?
A) Write down the unit asked for in the answer.
B) Write down the given value related to the answer.
C) Apply a unit factor to convert a unit in the given value.
D) Round off the answer in the calculator display.
E) none of the above
Answer: B
Section: 2.3 Metric-Metric Conversions

24) What is the *third step* in the unit analysis method of problem solving?
A) Write down the unit asked for in the answer.
B) Write down the given value related to the answer.
C) Apply a unit factor to convert a unit in the given value.
D) Round off the answer in the calculator display.
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

25) What is the three-step sequence in applying the unit analysis method of problem solving?
A) 1-unknown unit, 2-unit factor, 3-relevant given value
B) 1-unknown unit, 2-relevant given value, 3-unit factor
C) 1-relevant given value, 2-unknown unit, 3-unit factor
D) 1-unit factor, 2-unknown unit, 3-relevant given value
E) 1-unit factor, 2-relevant given value, 3-unknown unit
Answer: B
Section: 2.3 Metric-Metric Conversions

26) What is the three-step sequence in applying the unit analysis method of problem solving?
A) 1-unit factor, 2-unknown unit, 3-relevant given value
B) 1-unit factor, 2-relevant given value, 3-unknown unit
C) 1-unknown unit, 2-relevant given value, 3-unit factor
D) 1-unknown unit, 2-unit factor, 3-relevant given value
E) 1-relevant given value, 2-unknown unit, 3-unit factor
Answer: C
Section: 2.3 Metric-Metric Conversions

27) What is the three-step sequence in applying the unit analysis method of problem solving?
A) 1-relevant given value, 2-unknown unit, 3-unit factor
B) 1-unit factor, 2-unknown unit, 3-relevant given value
C) 1-unknown unit, 2-unit factor, 3-relevant given value
D) 1-unknown unit, 2-relevant given value, 3-unit factor
E) 1-unit factor, 2-relevant given value, 3-unknown unit
Answer: D
Section: 2.3 Metric-Metric Conversions

28) If a 20.0 mL test tube measures 15.0 cm, what is the length in meters?
A) 0.150 m
B) 1.50 m
C) 15.0 m
D) 1500 m
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

29) If a 250 mL beaker weighs 95.4 g, what is the mass in kilograms?
A) 0.0954 kg
B) 0.954 kg
C) 95.4 kg
D) 95,400 kg
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

30) If a 125 mL Erlenmeyer flask weighs 88.5 g, what is the volume in liters?
A) 0.125 L
B) 1.25 L
C) 125 L
D) 125,000 L
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

31) If an automobile airbag inflates in 25 μs, what is the time in seconds?
A) 0.000 025 s
B) 0.000 25 s
C) 25,000 s
D) 25,000,000 s
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

32) If a downhill ski measures 185 cm, what is the length in decimeters?
A) 1.85 dm
B) 18.5 dm
C) 1850 dm
D) 18,500 dm
E) none of the above
Answer: B
Section: 2.3 Metric-Metric Conversions

33) If a glass marble weighs 3150 mg, what is the mass in centigrams?
A) 3.15 cg
B) 31.5 cg
C) 315 cg
D) 31,050 cg
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

34) If a can of soda contains 355 mL, what is the volume in deciliters?
A) 0.355 dL
B) 3.55 dL
C) 35.5 dL
D) 3550 dL
E) none of the above
Answer: B
Section: 2.3 Metric-Metric Conversions

35) If a computer chip switches off-on-off in 0.015 μs, what is the switching time in nanoseconds?
A) 0.000 000 015 ns
B) 0.000 015 ns
C) 15 ns
D) 15,000 ns
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

36) If Earth is 1.50×10^{8} km from the Sun, what is the distance in Tm?
A) 1.50×10^{-1} Tm
B) 1.50×10^{2} Tm
C) 1.50×10^{5} Tm
D) 1.50×10^{23} Tm
E) none of the above
Answer: A
Section: 2.3 Metric-Metric Conversions

37) If Earth is 1.50×10^{8} km from the Sun, what is the distance in Gm?
A) 1.50×10^{-1} Gm
B) 1.50×10^{2} Gm
C) 1.50×10^{5} Gm
D) 1.50×10^{20} Gm
E) none of the above
Answer: B
Section: 2.3 Metric-Metric Conversions

38) If Earth is 1.50×10^{8} km from the Sun, what is the distance in Mm?
A) 1.50×10^{-1} Mm
B) 1.50×10^{2} Mm
C) 1.50×10^{5} Mm
D) 1.50×10^{17} Mm
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

39) If the radius of a potassium atom is 2.27×10^{-7} mm, what is the radius in μm?
A) 2.27×10^{-16} μm
B) 2.27×10^{-10} μm
C) 2.27×10^{-4} μm
D) 2.27×10^{5} μm
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

40) If the radius of a silicon atom is 1.18×10^{-8} cm, what is the radius in nm?
A) 1.18×10^{-15} nm
B) 1.18×10^{-10} nm
C) 1.18×10^{-1} nm
D) 1.18×10^{3} nm
E) none of the above
Answer: C
Section: 2.3 Metric-Metric Conversions

41) If the radius of a nickel atom is 1.25×10^{-9} dm, what is the radius in pm?
A) 1.25×10^{-20} pm
B) 1.25×10^{-18} pm
C) 1.25×10^{-10} pm
D) 1.25×10^{2} pm
E) none of the above
Answer: D
Section: 2.3 Metric-Metric Conversions

42) Which of the following English-metric equivalents is correct?
A) 1 in. = 2.54 cm
B) 1 lb = 454 g
C) 1 qt = 946 mL
D) all of the above
E) none of the above
Answer: D
Section: 2.4 Metric-English Conversions

43) Which of the following English-metric equivalents is correct?
A) 1 in. = 454 cm
B) 1 lb = 2.54 g
C) 1 qt = 946 mL
D) all of the above
E) none of the above
Answer: C
Section: 2.4 Metric-English Conversions

44) Which of the following English-metric equivalents is correct?
A) 1 in. = 2.54 cm
B) 1 lb = 454 g
C) 1 qt = 946 mL
D) 1 sec = 1.00 s
E) all of the above
Answer: E
Section: 2.4 Metric-English Conversions

45) Which of the following unit factors is derived from 1 meter = 39.4 inches?
A) 1 m/1 in.
B) 1 m/39.4 in.
C) 39.4 in./39.4 m
D) 1 in./39.4 m
E) none of the above
Answer: B
Section: 2.4 Metric-English Conversions

46) Which of the following unit factors is derived from 1 kilogram = 2.20 pounds?
A) 1 kg/1 lb
B) 1 kg/2.20 lb
C) 1 lb/1 kg
D) 1 lb/2.20 kg
E) none of the above
Answer: B
Section: 2.4 Metric-English Conversions

47) Which of the following unit factors is derived from 1 liter = 1.06 quarts?
A) 1 L/1 qt
B) 1 L/1.06 qt
C) 1 qt/1 L
D) 1 qt/1.06 L
E) none of the above
Answer: B
Section: 2.4 Metric-English Conversions

48) If a copper wire is 195 cm long, what is the length in inches?
A) 43.0 in.
B) 76.8 in.
C) 195 in.
D) 495 in.
E) 885 in.
Answer: B
Section: 2.4 Metric-English Conversions

49) If a silver chain has a mass of 25.0 g, what is the mass in pounds?
A) 0.0551 lb
B) 0.0264 lb
C) 18.1 lb
D) 37.8 lb
E) 11,400 lb
Answer: A
Section: 2.4 Metric-English Conversions

50) If a water bottle contains 375 mL, what is the volume in quarts?
A) 0.396 qt
B) 0.826 qt
C) 1.21 qt
D) 2.52 qt
E) 355,000 qt
Answer: A
Section: 2.4 Metric-English Conversions

51) If the Moon is 246,000 miles from Earth, what is the distance in kilometers?
(Given: 1 mi = 1.61 km)
A) 0.000 006 54 km
B) 15,300 km
C) 153,000 km
D) 396,000 km
E) 3,960,000 km
Answer: D
Section: 2.4 Metric-English Conversions

52) If 842 pounds of Moon samples have been collected from lunar landings, what is the mass expressed in kilograms? (Given: 1 kg = 2.20 lb)
A) 309 kg
B) 383 kg
C) 3830 kg
D) 1850 kg
E) 11,100 kg
Answer: B
Section: 2.4 Metric-English Conversions

53) If an automobile gas tank holds 17.4 gallons, what is the volume in liters?
(Given: 1 gal = 3.785 L)
A) 0.218 L
B) 3.785 L
C) 4.60 L
D) 17.4 L
E) 65.9 L
Answer: E
Section: 2.4 Metric-English Conversions

54) If a 10K race is 10.0 km, what is the distance in yards?
(Given: 1 yd = 0.914 m)
A) 0.00914 yd
B) 0.0109 yd
C) 9140 yd
D) 10,000 yd
E) 10,900 yd
Answer: E
Section: 2.4 Metric-English Conversions

55) If the mass of Mars is 6.42×10^{23} kg, what is the mass in pounds?
(Given: 1 lb = 454 g)
A) 1.41×10^{18} lb
B) 2.91×10^{23} lb
C) 6.42×10^{23} lb
D) 1.41×10^{24} lb
E) 2.91×10^{24} lb
Answer: D
Section: 2.4 Metric-English Conversions

56) If a patient is injected with 0.500 L of IV saline, what is the volume in quarts?
(Given: 1 qt = 946 mL)
A) 5.29×10^{-7} qt
B) 0.500 qt
C) 0.529 qt
D) 4.73 qt
E) 4.73×10^{5} qt
Answer: C
Section: 2.4 Metric-English Conversions

57) If a 125 micron tissue slice is 125 μm thick, what is the thickness in inches?
A) 4.92×10^{-7} in.
B) 4.92×10^{-3} in.
C) 3.18×10^{-2} in.
D) 3.18×10^{6} in.
E) 4.92×10^{9} in.
Answer: B
Section: 2.4 Metric-English Conversions

58) If 500 mL of liquid mercury weighs 6.53 kg, what is the mass in pounds?
A) 1.44 lb
B) 2.96 lb
C) 7.19 lb
D) 14.4 lb
E) 2960 lb
Answer: D
Section: 2.4 Metric-English Conversions

59) If 10.0 kg of water occupies 10.0 liters, what is the volume in quarts?
A) 9.46×10^{6} qt
B) 10.6 qt
C) 10.0 qt
D) 9.46 qt
E) 1.06×10^{-5} qt
Answer: B
Section: 2.4 Metric-English Conversions

60) A sample of white gold is: 18.0 g gold, 3.0g silver, 2.0 g cobalt, and 1.0 g platinum. What is the percent platinum in the sample?
A) 4.2%
B) 8.3%
C) 13%
D) 25%
E) 75%
Answer: A
Section: 2.5 The Percent Concept

61) A sample of rose gold is: 12.0 g gold, 5.0g silver, and 7.0 g copper. What is the percent copper in the sample?
A) 12%
B) 29%
C) 50%
D) 58%
E) 75%
Answer: B
Section: 2.5 The Percent Concept

62) A sample of lime gold is: 14.0 g gold, 7.0g silver, and 3.0 g copper. What is the percent copper in the sample?
A) 3.0%
B) 13%
C) 29%
D) 58%
E) 67%
Answer: B
Section: 2.5 The Percent Concept

63) A sample of 10K gold contains the following: 10.0 g gold, 4.0 g silver, 5.0g copper, and 5.0 g nickel. What is the percent gold in the sample?
A) 10%
B) 14%
C) 42%
D) 58%
E) 71%
Answer: C
Section: 2.5 The Percent Concept

64) A sample of 18K gold contains the following: 18.0 g gold, 3.0 g silver, and 3.0 g copper. What is the percent gold in the sample?
A) 6.0%
B) 18%
C) 25%
D) 33%
E) 75%
Answer: E
Section: 2.5 The Percent Concept

65) A sample of 22K gold contains the following: 22 g gold, 1.0 g silver, and 1.0 g copper. What is the percent gold in the sample?
A) 1.0%
B) 4.5%
C) 9.1%
D) 92%
E) 96%
Answer: D
Section: 2.5 The Percent Concept

66) Sterling silver contains 925 parts silver and 75 parts copper by mass. What is the percent silver in sterling silver in the sample?
A) 7.50%
B) 8.11%
C) 12.3%
D) 92.5%
E) 100%
Answer: D
Section: 2.5 The Percent Concept

67) Sterling silver contains 925 parts silver and 75 parts copper by mass. What is the percent copper in sterling silver in the sample?
A) 7.5%
B) 8.1%
C) 12%
D) 93%
E) 100%
Answer: A
Section: 2.5 The Percent Concept

68) If a penny has a mass of 3.015 g and is 95.0% copper, what is the mass of copper in the coin?
A) 0.151 g
B) 0.286 g
C) 0.603 g
D) 1.51 g
E) 2.86 g
Answer: E
Section: 2.5 The Percent Concept

69) If a penny has a mass of 3.015 g and is 5.00% zinc, what is the mass of zinc in the coin?
A) 0.151 g
B) 0.286 g
C) 0.603 g
D) 1.51 g
E) 2.86 g
Answer: A
Section: 2.5 The Percent Concept

70) If a penny has a mass of 2.507 g and is 2.5% copper, what is the mass of copper in the coin?
A) 0.063 g
B) 0.24 g
C) 0.63 g
D) 2.4 g
E) 6.3 g
Answer: A
Section: 2.5 The Percent Concept

71) If a penny has a mass of 2.507 g and is 97.5% zinc, what is the mass of zinc in the coin?
A) 0.0627 g
B) 0.244 g
C) 0.627 g
D) 2.38 g
E) 2.44 g
Answer: E
Section: 2.5 The Percent Concept

72) If a 5¢ coin has a mass of 5.07 g and is 75.0% copper, what is the mass of copper in the coin?
A) 0.203 g
B) 0.676 g
C) 1.27 g
D) 1.69 g
E) 3.80 g
Answer: E
Section: 2.5 The Percent Concept

73) If a 5¢ coin has a mass of 5.07 g and is 25.0% nickel, what is the mass of nickel in the coin?
A) 0.203 g
B) 0.676 g
C) 1.27 g
D) 1.69 g
E) 3.80 g
Answer: C
Section: 2.5 The Percent Concept

74) Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00g sample is 18.0% chromium, what is the mass of chromium in the sample?
A) 0.0450 g
B) 0.0900 g
C) 0.450 g
D) 0.900 g
E) 1.80 g
Answer: D
Section: 2.5 The Percent Concept

75) Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00g sample is 10.5% nickel, what is the mass of nickel in the sample?
A) 0.0263 g
B) 0.0525 g
C) 0.263 g
D) 0.525 g
E) 1.05 g
Answer: D
Section: 2.5 The Percent Concept

76) Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00g sample is 2.00% manganese, what is the mass of manganese in the sample?
A) 0.00500 g
B) 0.0100 g
C) 0.0500 g
D) 0.100 g
E) 0.200 g
Answer: D
Section: 2.5 The Percent Concept

77) Sterling silver is composed of 92.5% silver and 7.5% copper. If a sterling silver ring contains 6.55 g of silver, what is the mass of the ring?
A) 0.0708 g
B) 0.491 g
C) 6.06 g
D) 7.08 g
E) 87.3 g
Answer: D
Section: 2.5 The Percent Concept

78) A ruby contains 52.7% aluminum, 47.1% oxygen, and traces of chromium. If the ruby contains 0.125 g of aluminum, what is the mass of the gemstone?
A) 0.0659 g
B) 0.125 g
C) 0.237 g
D) 0.265 g
E) 0.625 g
Answer: C
Section: 2.5 The Percent Concept

79) A sapphire contains 52.7% aluminum, 47.1% oxygen, and traces of titanium. If the sapphire contains 0.155 g of oxygen, what is the mass of the gemstone?
A) 0.0730 g
B) 0.155 g
C) 0.294 g
D) 0.329 g
E) 0.775 g
Answer: D
Section: 2.5 The Percent Concept

80) If a brass block measures 3.80 cm by 2.55 cm by 1.25 cm, what is the volume of the rectangular solid?
A) 0.0826 cm^3
B) 1.19 cm^3
C) 1.86 cm^3
D) 7.75 cm^3
E) 12.1 cm^3
Answer: E
Section: 2.6 Volume by Calculation

81) If a copper block measures 5.15 cm by 1.25 cm by 1.25 cm, what is the volume of the rectangular solid?
A) 0.124 cm^3
B) 3.30 cm^3
C) 4.12 cm^3
D) 6.44 cm^3
E) 8.05 cm^3
Answer: E
Section: 2.6 Volume by Calculation

82) If a stainless steel block measures 5.05 cm by 1.50 cm by 1.25 cm, what is the volume of the rectangular solid?
A) 0.106 cm^3
B) 2.69 cm^3
C) 4.21 cm^3
D) 6.06 cm^3
E) 9.47 cm^3
Answer: E
Section: 2.6 Volume by Calculation

83) A sheet of aluminum foil has a volume of 0.555 cm^3. If the foil measures 10.0cm by 10.0 cm, what is the thickness of the foil?
A) 0.000 555 cm
B) 0.005 55 cm
C) 0.0555 cm
D) 55.5 cm
E) 180 cm
Answer: B
Section: 2.6 Volume by Calculation

84) A piece of tin foil has a volume of 0.645 mm^3. If the foil measures 10.0 mm by 12.5mm, what is the thickness of the foil?
A) 0.000 516 mm
B) 0.005 16 mm
C) 0.0516 mm
D) 80.6 mm
E) 194 mm
Answer: B
Section: 2.6 Volume by Calculation

85) A sheet of gold foil has a volume of 0.750 cm^3. If the foil measures 50.0cm by 10.0cm, what is the thickness of the foil?
A) 0.000 150 cm
B) 0.001 50 cm
C) 0.0150 cm
D) 375 cm
E) 667 cm
Answer: B
Section: 2.6 Volume by Calculation

86) If a steel solid has a volume of 46.5 cm^3, what is the volume in cubic inches?
A) 2.84 $in.^3$
B) 7.21 $in.^3$
C) 18.3 $in.^3$
D) 118 $in.^3$
E) 762 $in.^3$
Answer: A
Section: 2.6 Volume by Calculation

87) If a bronze solid has a volume of 25.5 cm^3, what is the volume in cubic inches?
A) 1.56 $in.^3$
B) 3.95 $in.^3$
C) 10.0 $in.^3$
D) 64.8 $in.^3$
E) 418 $in.^3$
Answer: A
Section: 2.6 Volume by Calculation

88) If a copper solid has a volume of 8.75 cm^3, what is the volume in cubic inches?
A) 0.534 $in.^3$
B) 1.36 $in.^3$
C) 3.44 $in.^3$
D) 22.2 $in.^3$
E) 143 $in.^3$
Answer: A
Section: 2.6 Volume by Calculation

89) A sample of steel is added to a 100-mL graduated cylinder with 45.0 mL of water. Ifthe resulting water level is 55.5 mL, what is the volume of the steel?
A) 10.5 mL
B) 44.5 mL
C) 55.0 mL
D) 89.5 mL
E) 100.5 mL
Answer: A
Section: 2.7 Volume by Displacement

90) A sample of brass is added to a 100-mL graduated cylinder with 55.5 mL of water. If the resulting water level is 68.0 mL, what is the volume of the brass?
A) 12.5 mL
B) 32.0 mL
C) 44.5 mL
D) 87.5 mL
E) 123.5 mL
Answer: A
Section: 2.7 Volume by Displacement

91) A sample of baking soda is heated and releases carbon dioxide gas into a 1000-mL flask. If the flask initially contains 752 mL of water and 305mL remain after the gas has displaced a portion of the water, what is the volume of the gas?
A) 248 mL
B) 305 mL
C) 447 mL
D) 695 mL
E) 752 mL
Answer: C
Section: 2.7 Volume by Displacement

92) If the density of air is 1.29 g/L, which of the following is a unit factor?
A) 1 g/1 L
B) 1 g/1.29 L
C) 1.29 g/1 L
D) 1.29 g/1.29 L
E) 1.29 L/1 g
Answer: C
Section: 2.8 The Density Concept

93) If the density of alcohol is 0.813 g/mL, which of the following is a unit factor?
A) 1 g/1 mL
B) 1 g/0.813 mL
C) 0.813 g/1 mL
D) 0.813 g/0.813 mL
E) 0.813 mL/1 g
Answer: C
Section: 2.8 The Density Concept

94) If the density of silver is 10.5 g/cm^3, which of the following is a unit factor?
A) 1 g/1 mL
B) 1 g/10.5 mL
C) 10.5 g/1 mL
D) 10.5 g/10.5 mL
E) 10.5 mL/1 g
Answer: C
Section: 2.8 The Density Concept

95) A 10.0 cm^3 volume of alcohol has a mass of 0.00705 kg. What is the density of the alcohol in grams per cubic centimeter?
A) 0.0705 g/cm^3
B) 0.705 g/cm^3
C) 7.05 g/cm^3
D) 10.0 g/cm^3
E) 70.5 g/cm^3
Answer: B
Section: 2.8 The Density Concept

96) A 10.0 mL volume of mercury has a mass of 0.136 kg. What is the density of mercury in grams per milliliter?
A) 1.36 g/mL
B) 7.35 g/mL
C) 13.6 g/mL
D) 73.5 g/mL
E) 136 g/mL
Answer: C
Section: 2.8 The Density Concept

97) A block of aluminum has a mass of 39.589 g and measures 5.10 cm by 2.50 cm by 1.15 cm. What is the density of the rectangular aluminum block?
A) 0.370 g/cm^3
B) 2.70 g/cm^3
C) 3.11 g/cm^3
D) 14.7 g/cm^3
E) 22.3 g/cm^3
Answer: B
Section: 2.8 The Density Concept

98) A block of copper has a mass of 143.584 g and measures 5.05 cm by 2.55 cm by 1.25 cm. What is the density of the rectangular copper block?
A) 0.112 g/cm^3
B) 8.92 g/cm^3
C) 11.1 g/cm^3
D) 28.4 g/cm^3
E) 29.0 g/cm^3
Answer: B
Section: 2.8 The Density Concept

99) Osmium is one of the most dense elements (22.5 g/cm^3). What is the mass of 10.0cm^3 of the metal?
A) 0.444 g
B) 2.25 g
C) 22.5 g
D) 225 g
E) 444 g
Answer: D
Section: 2.8 The Density Concept

100) The density of ethyl ether is 0.714 g/mL. What is the mass of 10.0 mL of ether?
A) 0.0714 g
B) 1.40 g
C) 7.14 g
D) 14.0 g
E) 71.4 g
Answer: C
Section: 2.8 The Density Concept

101) Ethyl alcohol has a density less than water (d = 0.789 g/mL). What is the volume of 35.5 g of ethyl alcohol?
A) 2.80 mL
B) 4.50 mL
C) 28.0 mL
D) 45.0 mL
E) 280 mL
Answer: D
Section: 2.8 The Density Concept

102) Platinum is one of the most dense elements (d = 21.5 g/cm^3). What is the volume of a 10.0 g sample of the metal?
A) 0.465 cm^3
B) 2.15 cm^3
C) 21.5 cm^3
D) 215 cm^3
E) 465 cm^3
Answer: A
Section: 2.8 The Density Concept

103) Magnesium is one of the least dense elements (d = 1.74 g/cm^3). What is the volume of a 10.0 g sample of the metal?
A) 5.75 cm^3
B) 10.0 cm^3
C) 17.4 cm^3
D) 57.5 cm^3
E) 174 cm^3
Answer: A
Section: 2.8 The Density Concept

104) A glass cylinder contains four liquid layers: mercury (d = 13.6 g/mL), chloroform (d = 1.49 g/mL), water (d = 1.00 g/mL), and ether (d = 0.708 g/mL). If an ice cube (d=0.92 g/mL) is dropped into the cylinder, where does it come to rest?
A) on top of the ether layer
B) on top of the water layer
C) on top of the chloroform layer
D) on top of the mercury layer
E) on the bottom of the cylinder
Answer: B
Section: 2.8 The Density Concept

105) A glass cylinder contains four liquid layers: mercury (d = 13.6 g/mL), chloroform (d = 1.49 g/mL), water (d = 1.00 g/mL), and ether (d = 0.708 g/mL). If a marble (d=2.7 g/mL). is dropped into the cylinder, where does it come to rest?
A) on top of the ether layer
B) on top of the water layer
C) on top of the chloroform layer
D) on top of the mercury layer
E) on the bottom of the cylinder
Answer: D
Section: 2.8 The Density Concept

106) A glass cylinder contains four liquid layers: mercury (d = 13.6 g/mL), chloroform (d = 1.49 g/mL), water (d = 1.00 g/mL), ether (d = 0.708 g/mL). If a gold nugget (d=19.3 g/mL) is dropped into the cylinder, where does it come to rest?
A) on top of the ether layer
B) on top of the water layer
C) on top of the chloroform layer
D) on top of the mercury layer
E) on the bottom of the cylinder
Answer: E
Section: 2.8 The Density Concept

107) A glass cylinder contains four liquid layers: mercury (d = 13.6 g/mL), chloroform (d = 1.49 g/mL), water (d = 1.00 g/mL), ether (d = 0.708 g/mL). If a rubber stopper (d = 1.2 g/mL) is dropped into the cylinder, where does it come to rest?
A) on top of the ether layer
B) on top of the water layer
C) on top of the chloroform layer
D) on top of the mercury layer
E) on the bottom of the cylinder
Answer: C
Section: 2.8 The Density Concept

108) A glass cylinder contains four liquid layers: mercury (d = 13.6 g/mL), chloroform (d = 1.49 g/mL), water (d = 1.00 g/mL), ether (d = 0.708 g/mL). If a cork stopper (d = 0.50 g/mL) is dropped into the cylinder, where does it come to rest?
A) on top of the ether layer
B) on top of the water layer
C) on top of the chloroform layer
D) on top of the mercury layer
E) on the bottom of the cylinder
Answer: A
Section: 2.8 The Density Concept

109) What are the freezing point and boiling point of water on the Fahrenheit scale?
A) -32 °F and 212 °F
B) 0 °F and 100 °F
C) 0 °F and 212 °F
D) 32 °F and 100 °F
E) 32 °F and 212 °F
Answer: E
Section: 2.9 Temperature

110) What are the freezing point and boiling point of water on the Celsius scale?
A) 0 °C and 100 °C
B) 0 °C and 212 °C
C) 32 °C and 100 °C
D) 32 °C and 212 °C
E) 273 °C and 373 °C
Answer: A
Section: 2.9 Temperature

111) What are the freezing point and boiling point of water on the Kelvin scale?
A) 0 K and 100 K
B) 0 K and 273 K
C) 100 K and 273 K
D) 100 K and 373 K
E) 273 K and 373 K
Answer: E
Section: 2.9 Temperature

112) Table salt melts at 801 °C. What is the melting point on the Fahrenheit scale?
A) 427 °F
B) 1384 °F
C) 1410 °F
D) 1470 °F
E) 1490 °F
Answer: D
Section: 2.9 Temperature

113) An antifreeze solution freezes at -100 °C. What is the freezing point on the Fahrenheit scale?
A) -212 °F
B) -148 °F
C) -88 °F
D) -82 °F
E) -73 °F
Answer: B
Section: 2.9 Temperature

114) Aluminum melts at 1220 °F. What is the melting point on the Celsius scale?
A) 646 °C
B) 660 °C
C) 696 °C
D) 2138 °C
E) 2164 °C
Answer: B
Section: 2.9 Temperature

115) Rubbing alcohol freezes at -129 °F. What is the freezing point on the Celsius scale?
A) -290 °C
B) -200 °C
C) -103 °C
D) -89.4 °C
E) -54 °C
Answer: D
Section: 2.9 Temperature

116) Liquid hydrogen boils at -252 °C. What is the boiling point on the Kelvin scale?
A) -525 K
B) -252 K
C) -21 K
D) 21 K
E) 525 K
Answer: D
Section: 2.9 Temperature

117) Liquid argon boils at -186 °C. What is the boiling point on the Kelvin scale?
A) -459 K
B) -186 K
C) -87 K
D) 87 K
E) 459 K
Answer: D
Section: 2.9 Temperature

118) A rare metal alloy is a superconductor at -225 °C. What is the temperature on the Kelvin scale?
A) -498 K
B) -225 K
C) -48 K
D) 48 K
E) 498 K
Answer: D
Section: 2.9 Temperature

119) Liquid helium boils at 4 K. What is the boiling point on the Celsius scale?
A) -277 °C
B) -269 °C
C) 4 °C
D) 269 °C
E) 277 °C
Answer: B
Section: 2.9 Temperature

120) Liquid krypton boils at 121 K. What is the boiling point on the Celsius scale?
A) -394 °C
B) -152 °C
C) 121 °C
D) 152 °C
E) 394 °C
Answer: B
Section: 2.9 Temperature

121) A rare metal alloy is a superconductor at 55 K. What is the temperature on the Celsius scale?
A) -328 °C
B) -218 °C
C) -55 °C
D) 218 °C
E) 328 °C
Answer: B
Section: 2.9 Temperature

122) Which of the following can express the *total* amount of heat energy in a sealed, insulated chamber?
A) 20.0 °C
B) 68.0 °F
C) 293.0 K
D) 20.0 kcal
E) all of the above
Answer: D
Section: 2.10 The Heat Concept

123) Which of the following can express the *average* amount of heat energy in a sealed, insulated chamber?
A) 20.0 °C
B) 68.0 cal
C) 293.0 kcal
D) 20.0 J
E) all of the above
Answer: A
Section: 2.10 The Heat Concept

124) When 100.0 g of gasoline undergoes combustion, 9560 kJ of energy are released. Express the heat released in kilocalories. (Given: 4.184 J = 1 cal)
A) 2.28×10^3 kcal
B) 2.28×10^6 kcal
C) 2.28×10^9 kcal
D) 4.00×10^4 kcal
E) 4.00×10^7 kcal
Answer: A
Section: 2.10 The Heat Concept

125) Which of the following are base units and symbols in the English system?
A) inch (in.), ounce (oz), pint (pt)
B) foot (ft), pound (lb), quart (qt)
C) yard (yd), pound (lb), gallon (gal)
D) mile (mi), ton (ton), gallon (gal)
E) The English system does not have base units.
Answer: E
Section: General Exercises

126) Which of the following are base units and symbols in the International system?
A) centimeter (cm), gram (g), second (s)
B) meter (m), gram (g), second (s)
C) meter (m), kilogram (kg), second (s)
D) kilometer (km), kilogram (kg), second (s)
E) The International system does not have base units.
Answer: C
Section: General Exercises

127) In performing a multistep multiplication or division calculation, when should you round off the answer in the calculator display?
A) after each step in the calculation
B) after the first unit factor
C) after the second unit factor
D) after the final calculation
E) none of the above
Answer: D
Section: General Exercises

128) Which of the following is equivalent to the volume of a 1-cm cube?
A) 1 L
B) 1 cL
C) 1 dL
D) 1 kL
E) 1 mL
Answer: E
Section: General Exercises

129) Which of the following is equivalent to the volume of a 10-cm cube?
A) 1 L
B) 1 cL
C) 1 dL
D) 1 kL
E) 1 mL
Answer: A
Section: General Exercises

130) Which of the following is equivalent to the volume of a 1.00-L flask?
A) 1.00 cm^3
B) 10.0 cm^3
C) 100 cm^3
D) 946 cm^3
E) 1000 cm^3
Answer: E
Section: General Exercises

131) The density of water at 3.98 °C is 1.00 g/mL. What is the density in g/cm^3?
A) 1.00 g/cm^3
B) 2.54 g/cm^3
C) 3.98 g/cm^3
D) 16.4 g/cm^3
E) 62.4 g/cm^3
Answer: A
Section: General Exercises

132) How many significant digits are justified by the unit factor 1 m/100 cm?
A) 1
B) 2
C) 3
D) infinite
E) impossible to determine
Answer: D
Section: General Exercises

133) How many significant digits are justified by the unit factor 1 lb/454 g?
A) 1
B) 2
C) 3
D) infinite
E) impossible to determine
Answer: C
Section: General Exercises

134) If a diamond weighs 1.33 carats, what is the mass in grams? (Given: 1 ct = 200 mg)
A) 0.133 g
B) 0.150 g
C) 0.200 g
D) 0.266 g
E) 6.65 g
Answer: D
Section: General Exercises

135) How many minutes are required for sunlight to travel from the Sun to Earth? (Assume the Sun is 93,000,000 miles from Earth and sunlight travels at 1.86×10^5 miles per second.)
A) 0.0020 minute
B) 2.0 minutes
C) 8.3 minutes
D) 500 minutes
E) 830 minutes
Answer: C
Section: General Exercises

136) How many minutes are required for sunlight to travel from the Sun to Mars? (Assume the Sun is 2.28×10^8 kilometers from Mars and sunlight travels at 2.99×10^5 kilometers per second.)
A) 0.00131 minutes
B) 0.0787 minutes
C) 12.7 minutes
D) 763 minutes
E) 45,800 minutes
Answer: C
Section: General Exercises

137) A hybrid vehicle has a mileage rating of 22 km/L. What is the gas mileage in miles per gallon? (Given: 1 mi = 1.61 km, and 1 gal = 3.78 L)
A) 3.6 mi/gal
B) 9.4 mi/gal
C) 35 mi/gal
D) 52 mi/gal
E) 130 mi/gal
Answer: D
Section: General Exercises

138) An Indy 500 car can travel 111 m/s. What is the speed of the car in miles per hour? (Given: 1 mi = 1.61 km, and 1 h = 3600 s)
A) 111 mi/h
B) 178 mi/h
C) 248 mi/h
D) 400 mi/h
E) 643 mi/h
Answer: C
Section: General Exercises

139) Why does a sterling silver spoon weigh more than a stainless steel spoon of the same size?
A) sterling silver is less valuable than stainless steel
B) sterling silver is more valuable than stainless steel
C) sterling silver is less dense than stainless steel
D) sterling silver is more dense than stainless steel
E) none of the above
Answer: D
Section: General Exercises

140) The density of carbon tetrachloride is 1.60 g/cm^3. What is the density of the liquid expressed in SI units (kg/m^3)?
A) 0.160 kg/m^3
B) 1.60 kg/m^3
C) 16.0 kg/m^3
D) 1.60 x 10^3 kg/m^3
E) 1.60 x 10^6 kg/m^3
Answer: D
Section: General Exercises

141) Calculate the volume of Earth assuming it is spherical and has a radius (r) of 6370 km. The volume of a sphere equals $4\pi r^3/3$, and $\pi = 3.14$.
A) 2.58 x 10^{11} km^3
B) 3.45 x 10^{11} km^3
C) 6.37 x 10^{11} km^3
D) 1.03 x 10^{12} km^3
E) 1.08 x 10^{12} km^3
Answer: E
Section: General Exercises

142) Calculate a length of copper wire having a diameter of 0.200 cm and a mass of 15.620 g. The density of copper is 8.92 g/cm^3. The volume of wire equals $\pi d^2 L/4$, and $\pi = 3.14$, d = diameter, and L = length)
A) 1.80×10^{-4} cm
B) 4.00×10^{-4} cm
C) 5.50×10^{-2} cm
D) 1.75 cm
E) 55.8 cm
Answer: E
Section: General Exercises

143) What is the difference between a cup of coffee and a drop of coffee at 95 °C?
A) Temperature is greater in the cup of coffee.
B) Heat is greater in the cup of coffee.
C) Temperature is greater in the drop of coffee.
D) Heat is greater in the drop of coffee.
E) Temperature and heat are the same for a cup and drop of coffee.
Answer: B
Section: General Exercises

Critical Thinking - The International System of Units (SI)

1) Which of the following is an official quantity in SI?
A) length
B) mass
C) time
D) all of the above
E) none of the above
Answer: D

2) Which of the following is an official quantity in SI?
A) density
B) energy
C) volume
D) all of the above
E) none of the above
Answer: E

3) Which of the following is an official quantity in SI?
A) amount of substance
B) electric current
C) light intensity
D) all of the above
E) none of the above
Answer: D

4) Which of the following is a base unit in SI?
A) centimeter
B) kilogram
C) liter
D) all of the above
E) none of the above
Answer: B

5) Which of the following is a base unit in SI?
A) degree Fahrenheit
B) degree Celsius
C) Kelvin
D) all of the above
E) none of the above
Answer: C

6) Which of the following is a base unit in SI?
A) ampere
B) candela
C) mole
D) all of the above
E) none of the above
Answer: D

Chemistry Connection - The Olympics

1) Which running competition in the Olympic Summer Games is approximately equal to 440 yards?
A) 100 meters
B) 200 meters
C) 400 meters
D) 1000 meters
E) 2000 meters
Answer: C

2) Which swimming competition in the Olympic Summer Games is approximately equal to 100 yards?
A) 100 meters
B) 200 meters
C) 500 meters
D) 50 kilometers
E) 100 kilometers
Answer: A

3) Which skiing competition in the Olympic Winter Games is approximately equal to 10 kilometers?
A) 5000 yards
B) 10,000 yards
C) 10 miles
D) 15 miles
E) 20 miles
Answer: B

4) Which of the following is a running event in the Olympic Summer Games?
A) 100 inches
B) 100 feet
C) 100 yards
D) 100 meters
E) 100 miles
Answer: D

5) Which of the following is a swimming event in the Olympic Summer Games?
A) 50 yards
B) 100 yards
C) 200 yards
D) 400 yards
E) 400 meters
Answer: E

6) Which of the following is a skiing event in the Olympic Winter Games?
A) 50 kilometers
B) 50 miles
C) 5000 feet
D) 500 yards
E) 1000 yards
Answer: A

Critical Thinking - World Trade Center

1) Which of the following is the largest "footprint"?
A) 150 square feet
B) 150 feet square
C) 150 square inches
D) 150 inches square
E) Answers A and B are the same.
Answer: B

2) Which of the following is the smallest "footprint"?
A) 150 square feet
B) 150 feet square
C) 150 square yards
D) 150 yards square
E) Answers A and B are the same.
Answer: A

3) What is the proposed height of the World Trade Center Freedom Tower?
A) 1776 feet
B) 1776 yards
C) 1776 meters
D) 1776 decimeters
E) none of the above
Answer: A