***General, Organic and Biological Chemistry, 4e* (Smith)**

**Chapter 1 Matter and Measurement**

1) Which is NOT an example of a pure substance?

A) Sugar

B) Air

C) Aluminum foil

D) Water

E) A block of dry ice

2) Which is an example of a physical change?

A) The rusting of an iron nail

B) The burning of propane in a gas grill

C) Baking cookies

D) Polishing tarnished silver

E) Melting of an ice cube in a glass of soda

3) In which state of matter are the particles close together and highly organized?

A) Solid

B) Liquid

C) Gas

D) All of the choices are correct.

4) Which choice describes the behavior of the particles of a liquid?

A) The particles are close together and highly organized.

B) The particles are close together but disorganized.

C) The particles are far apart and very disorganized.

D) None of the choices are correct.

5) Which state of matter does not have a definite shape or volume?

A) Solid

B) Liquid

C) Gas

D) All of the choices are correct.

6) Which choice describes the behavior of a solid?

A) A solid has a definite volume, and maintains its shape in any container.

B) A solid has a definite volume, but takes on the shape of its container.

C) A solid has no definite shape or volume.

D) None of the above.

7) Which measurement has the fewest number of significant figures?

A) 12.80 m

B) 0.1280 m

C) 0.001280 m

D) 1280 m

E) All of the measurements have the same number of significant figures.

8) Which quantity is an exact number?

A) 3 cars

B) 1,000 m

C) 2 L

D) 453.6 g

9) The number 0.0035880 expressed correctly using scientific notation is \_\_\_\_\_\_\_\_.

A) 0.0035889

B) 3.5880 × 103

C) 3.5880 × 10–3

D) 3.5880 × 10–4

E) 3.588 × 10–3

10) The measurement 78,005,760 expressed correctly using scientific notation is \_\_\_\_\_\_\_\_.

A) 7.8005760 × 107

B) 7.8005760 × 10–7

C) 7.8 × 107

D) 7.800576 × 10–7

E) 7.800576 × 107

11) When 4.870 × 10–3 is correctly converted to its standard form the number becomes \_\_\_\_\_\_\_\_.

A) 4870

B) 4870.

C) 0.00487

D) 0.004870

E) 0.0004870

12) Which number is the largest?

A) 4.38 × 103

B) 4.38 × 102

C) 4.38 × 10–3

D) 4.38 × 10–2

E) 438

13) Which number is the smallest?

A) 4.38 × 103

B) 4.38 × 102

C) 4.38 × 10–3

D) 4.38 × 10–2

E) 438

14) When 0.022189 is correctly rounded to two significant figures the number becomes \_\_\_\_\_\_\_\_.

A) 0.02

B) 0.022

C) 22

D) 0.023

15) When 5.5490 × 108 is correctly rounded to three significant figures the number becomes \_\_\_\_\_\_\_\_.

A) 5.55

B) 5.55 × 108

C) 555

D) 554

E) 5.54 × 108

16) Which number contains four significant figures?

A) 3.978

B) 0.780

C) 0.0085

D) 1700

E) Two or more of the numbers contain four significant figures.

17) Carry out the following calculation and report the answer using the proper number of significant figures: 38.251 + 73.1

A) 111

B) 111.3

C) 111.4

D) 111.35

E) 111.351

18) Carry out the following calculation and report the answer using the proper number of significant figures:

549.101 + 8.12 + 95.0076 – 651.9

A) 3.286

B) 0.3286

C) 0.33

D) 0.3

E) 1268.1

19) Carry out the following calculation and report the answer using the proper number of significant figures:

38.251 × 73.1

A) 2796.1481

B) 2796.15

C) 2796.1

D) 2796

E) 2.80 × 103

20) Carry out the following calculation and report the answer using the proper number of significant figures:



A) 31.0185 ft/s

B) 31.01 ft/s

C) 31.02 ft/s

D) 31.0 ft/s

E) 31 ft/s

21) What is the correct metric relationship between milliliters and microliters?

A) 1 milliliter = 1 microliter

B) 1,000 milliliters = 1 microliter

C) 1 milliliter = 1,000 microliters

D) 1,000,000 milliliters = 1 microliter

E) 1 milliliter = 1,000,000 microliters

22) Which metric relationship is INCORRECT?

A) 1 milligram = 1,000 grams

B) 1 dL = 100 mL

C) 1 km = 1,000 m

D) 100 cg = 1 g

E) 1 liter = 1,000,000 microliters

23) Which is the proper conversion factor for converting a mass expressed in pounds (lb) to the same mass expressed in grams (g)?

A)



B)



C)



D)



24) Which length is the longest?

A) 12 m

B) 12,000 mm

C) 12,000 μm

D) 12,000 cm

E) 0.0012 km

25) A syringe has a volume of 5.0 mL. What is this volume in deciliters?

A) 0.00050 dL

B) 0.0050 dL

C) 0.050 dL

D) 0.50 dL

E) 50. dL

26) What is the mass in kilograms of an individual who weighs 197 lb?

A) 197 kg

B) 8.95 kg

C) 89.5 kg

D) 90 kg

E) 433 kg

27) If a balloon has a volume of 21.6 cups, what is the volume of this balloon expressed in L?

A) 86.4 L

B) 81.51 L

C) 5.72 L

D) 5.094 L

E) 5.09 L

28) Which volume is equivalent to 225 mL?

A) 2.25 × 105 μL

B) 2.25 × 102 μL

C) 2.25 L

D) 2.25 × 10–5 μL

E) 0.225 μL

29) If a package of nuts weighs 41.3 oz, what is the mass of the package expressed in milligrams?

A) 1.17 mg

B) 1.17 × 103 mg

C) 1.17 × 106 mg

D) 117 mg

E) 3.00 × 105 mg

30) If a tree is 89.5 cm tall, what is the tree's height expressed in yards?

A) 0.979 yd

B) 6.31 yd

C) 18.9 yd

D) 35.2 yd

E) 227 yd

31) If honey has a density of 1.36 g/mL, what is the mass of 1.25 qt, reported in kilograms?

A) 1.60 kg

B) 1.6 × 103 kg

C) 0.974 kg

D) 974 kg

E) 1.80 kg

32) If a piece of rock has a volume of 0.73 L and a mass of 1524 g, what is the density of the rock in g/mL?

A) 2.1 × 103 g/mL

B) 0.48 g/mL

C) 4.8 × 10–4 g/mL

D) 2.1 g/mL

E) 2.088 g/mL

33) A hiker with hypothermia has a body temperature of 82 °F. What is his body temperature in °C?

A) 14 °C

B) 28 °C

C) 31 °C

D) 50 °C

34) On an autumn day in Washington, DC, the outdoor temperature was 21 °C. What was this outdoor temperature in °F?

A) 44 °F

B) 57 °F

C) 69 °F

D) 70 °F

35) An oven is set for a temperature of 298 °F. What is the oven temperature in K?

A) 166 K

B) 421 K

C) 148 K

D) 571 K

E) 439 K

36) Which of the following temperatures is the hottest?

A) 100 °C

B) 100 °F

C) 100 K

D) All would feel equally warm.

37) The recommended dietary allowance for calcium for teenage children is 1,300 mg per day. If a typical 8.0-fl oz glass of reduced-fat milk contains 298 mg of calcium, how many fluid ounces of milk does a teenager need to drink to get the entire recommended amount of calcium from this milk?

A) 4.4 fl oz

B) 1.8 fl oz

C) 3.5 fl oz

D) 35 fl oz

E) 32 fl oz

38) What is the density of a sample of rubbing alcohol if it has a specific gravity of 0.789?

A) 1.27 g/mL

B) 0.789 g/mL

C) 1.00 g/mL

D) 0.895 g/mL

39) Which of the following conversions is correct and expresses the answer using the proper number of significant figures?

A)



B)



C)



D)



40) What is the mass in grams of 85.32 mL of blood plasma with a density of 1.03 g/mL?

A) 85.32 g

B) 82.83 g

C) 82.8 g

D) 87.88 g

E) 87.9 g

41) If a 185-lb patient is prescribed 145 mg of the cholesterol lowering drug Tricor daily, what dosage is the patient receiving in mg/kg of his body weight?

A) 0.784 mg/kg

B) 1.28 mg/kg

C) 0.356 mg/kg

D) 1.72 mg/kg

E) 0.580 mg/kg

42) The estimated average daily requirement of folic acid for pregnant females is 520 micrograms. Which accurately expresses this value?

A) 520 mg

B) 520 Mg

C) 520 mG

D) 520 μg

43) For a person between the ages of 10 and 29, the normal range of blood triglycerides is 53 × 104 mg/dL. What is the correct interpretation of the units in this measurement?

A) milligrams times deciliter

B) micrograms per deciliter

C) megagrams per deciliter

D) milligrams per deciliter

44) A patient's urine sample has a density of 1.02 g/mL. If 1250 mL of urine was excreted by the patient in one day, what mass of urine was eliminated?

A) 1.28 kg

B) 1225 g

C) 1275 g

D) 128 g

45) The density of human urine is normally between 1.003 and 1.030 g/mL, and is often used as a diagnostic tool. If a 25.00 mL sample of urine from a patient has a mass of 26.875 g, how does the density of the urine sample compare to the normal range?

A) The density of the sample is lower than the normal range

B) The density of the sample is greater than the normal range

C) The density of the sample is within the normal range

D) There is insufficient information to make a comparison

46) Which volume has the most uncertainty associated with the measurement?

A) 10 mL

B) 10.0 mL

C) 10.00 mL

D) All have the same degree of uncertainty.

47) Air has a density of 0.001226 g/mL. What volume of air would have a mass of 1.0 lb?

A) 2.7 mL

B) 815.6 mL

C) 37 mL

D) 3.7 × 102 L

48) A beaker contains 145.675 mL of a saline solution. If 24.2 mL of the saline solution are removed from the beaker, what volume of solution remains?

A) 121.475 mL

B) 121.4 mL

C) 121.5 mL

D) 121 mL

49) PVC plastic, which is used in pipes, is an example of a synthetic material.

50) Nitrogen gas (N2) would properly be classified as a compound.

51) Changes in state such as melting and boiling are physical changes.

52) A compound cannot be broken down into simpler substances.

53) The water molecules in this image are best described as being in the liquid state.



54) The base unit for mass in the metric system is kilograms (kg).

55) The base unit for volume in the metric system is liter (L).

56) An inexact number results from a measurement or observation and contains some uncertainty.

57) A zero counts as a significant figure when it occurs at the end of a number that contains a decimal point.

58) 8 mL is larger than 8 dL.

59) Specific gravity is a quantity that compares the density of a substance with the density of water.

60) The specific gravity of a substance has units of g/mL.

61) When the liquid carbon tetrachloride (density = 1.59 g/mL) is added to water, the top layer will be the water layer.

62) When a piece of magnesium (density = 1.738 g/mL) is placed in a container of liquid carbon tetrachloride (density = 1.59 g/mL), the piece of magnesium will float on top of the carbon tetrachloride.

63) In reading a number with a decimal point from left to right, all digits starting with the first nonzero number are significant figures.

64) The number 900,027,300 has four significant figures.

65) The number 900,027,300 has nine significant figures.

66) The two conversion factors for the equality 1 in = 2.54 cm are properly shown below.



67) Dissolving sugar in water involves a chemical change.

68) One-thousand (1,000) ms is the same length of time as one (1) μs.

69) Assuming the numbers are measured values, when multiplying 762.85 by 15 the answer should be reported with two significant figures.

70) When subtracting 15 from 762.85 the answer should be reported with two significant figures.

71) In scientific notation, a number is written as *y* × 10*x*, where *x* can be any positive or negative number or fraction.

72) If the density of a substance is greater than 1 g/mL, the mass of a sample of this substance will be greater than the volume of the sample.

73) Dividing a number by 105 is the same as multiplying a number by 10–5.

74) The measurement 10.3 cm has more significant figures than the measurement 10.3 m.

75) The density of olive oil is greater at 200 °C than at 25 °C.

76) One Kelvin is the same size as one degree Celsius.

77) The temperature 60 °C is higher than 60 °F.

78) The temperature –60 °C is higher than –60 °F.

79) The temperature 60 °C is higher than 60 K.

80) Elements and compounds are both classified as pure substances.

81) The terms used in conversion factors must always be exact numbers.

82) The number 87,927,000 is larger than the number 9.7 × 106.

83) The number 0.0007270 is larger than the number 5.7 × 10–3.

84) A mixture can be separated into its components by physical changes.

85) For a number written in scientific notation, a negative exponent indicates the value of the number is less than 1.

86) The meaning of the metric prefix *milli-* is 1000.

87) A \_\_\_\_\_\_\_\_ change converts one material to another.

88) The measurement 0.030500 m has \_\_\_\_\_\_\_\_ significant figures.

A) 2

B) 3

C) 4

D) 5

E) 6

F) 7

89) The measurement 4008 L has \_\_\_\_\_\_\_\_ significant figures.

90) The measurement 32.0 m has \_\_\_\_\_\_\_\_ significant figures.

91) The measurement 0.0002 g has \_\_\_\_\_\_\_\_ significant figures.

92) The measurement 9.0 x 103 km has \_\_\_\_\_\_\_\_ significant figures.

93) When the measurement 340,942 s is rounded to two significant figures, the value is properly reported as \_\_\_\_\_\_\_\_.

A) 34

B) 340

C) 340,000

D) 340,000.

E) 3.4 x 105

F) 34 x 104

94) To use conversion factors to solve a problem, set up the problem with any unwanted unit in the numerator of one term and the \_\_\_\_\_\_\_\_ of another term, so that unwanted units cancel.

95) If you have equal masses of two different substances (A and B), and the density of A is twice the density of B, then the volume of A is \_\_\_\_\_\_\_\_ the volume of B.

A) One-quarter

B) One-half

C) The same as

D) Two times

E) Four times

96) Every measurement is composed of a number and a \_\_\_\_\_\_\_\_.

97) A small banana contains 323 mg of the nutrient potassium. You would need to eat approximately \_\_\_\_\_\_\_\_ small bananas in one day to obtain the recommended daily intake of 3.5 g of potassium.

98) The measurement 5342 nm is the same length as \_\_\_\_\_\_\_\_ cm, written in scientific notation.

A) 5.342 x 1010

B) 5.342 x 107

C) 5.342 x 105

D) 5.342 x 10-4

E) 5.342 x 10-8

99) When crude oil leaks into the ocean from an oil tanker, the crude oil floats because it is \_\_\_\_\_\_\_\_ dense than water.