Study Guide Answers

Matter

p 31

3. b, c, d
4. a) mercury
   b) melting point and density
   c) all are colorless

p 35

9. a) substance
   b) mixture
   c) mixture
   d) substance

p 40

14. Compounds can be separated by chemical means into elements. Elements cannot be separated into simpler substances by chemical techniques.
15. a) Cu b) O c) P
    d) Ag f) He
16. a) tin b) calcium
    c) sulfur d) cadmium
    e) phosphorus f) chlorine
17. a) mix. b) mix. c) comp.
    d) mix.
18. Carbon, hydrogen, oxygen and nitrogen; Hydrogen is present in the greater proportion by number of atoms

p 43

19 b) In any physical change or chemical reaction, mass is neither created nor destroyed; it is conserved. The mass of the products equals the mass of the reactants in a chemical reaction.

20. a) chemical
    b) physical
    c) physical
21. 18g
22. a) color, odor, reaction upon heating, boiling point
    b) color, melting point, reactions with other substances, hardness, brittleness, strength
    c) boiling point, freezing point, density
    d) density, melting, point, magnetism

Measurement

p 53

1. a) Qualitative measurements are expressed in descriptive, nonnumerical form. Quantitative measurements are expressed in a definite form, usually numerical.
   b) It is written as the product of a coefficient greater than or equal to one and less than ten and 10 raised to a power.
2. a) qualitative
   b) quantitative
   c) quantitative
   d) qualitative
3. a) 9.14×10^{1} meters
   b) 1.54×10^{-10} meters
   c) 6.378×10^{6} meters
   d) 1.496×10^{11} meters
4. a) 8×10^{4}
   b) 3.0×10^{-6}
   c) 2.8×10^{3}
   d) 7.6×10^{-2}

p 56 fig. 3.6

1. a) 0.6 m b) 0.61 m, c) 0.607 Yes; the greater the number of divisions on the meter stick the more precision with which it can be read and the greater then number of significant figures in the measurement.

p 62

14. a) unlimited b) 2
    c) unlimited d) 5
    e) 3 f) 3
15. a) 6.6×10^{-7}
    b) 4.0×10^{-7}
    c) 10^{7}
    d) 8.65×10^{-1}
    e) 1.9×10^{14}
    f) 1.1×10^{5}
16. error 1.6 degrees C; present error 1.3%

p 67

17. a) amount of substance, mol

23. 43.2 g

p 47-49

24. solid, metallic luster, gray color, high melting point, malleable,

25. a) solid b) liquid c) gas
d) solid e) liquid f) liquid

27. a vapor, the term "vapor" is used to refer to the gaseous state of a substance which normally exists as a liquid or solid at room temperature.

28. water, gasoline, acetone (fingernail polish remover),aromatic salves such as those used in vaporizers, butter.

30. a) heterogeneous
b) heterogeneous
c) homogeneous
d) homogeneous
e) homogeneous

31. one; A solution is a system with uniform composition and properties. Solutions are homogeneous mixtures, consisting of a single phase

32. a) element b) mixture
c) mixture d) element
e) mixture f) mixture

33. a) nitrogen, hydrogen, chlorine
b) potassium, manganese, oxygen
c) carbon, hydrogen, oxygen
d) calcium, iodine

34.color change; energy absorbed or released; gas produced; odor change

35. a) physical b) chemical
c) chemical d) physical

36. The iron combines with oxygen in the air, and oxygen has mass

37. As the wax burns, the chemical composition of the wax changes, producing the products water, and carbon dioxide, which are released into the surrounding air.

40. a) color b) 6
c) sodium chloride
d) sulfur

42. a) physical b) physical
c) physical d) physical

b) density, kg/m^3
c) time, s
d) pressure, Pa
e) length, m
f) mass, kg

18. Mass is a measure of the amount of matter in an object. Weight is a measure of the force of gravity on an object

19 a) m, 10^{-3} b) n, 10^{-9}
c) d, 10^{-1} d) c, 10^{-2}

20. Your weight would decrease; your mass would remain constant

21. 8.8 x 10^2 cm^3

22. a and d, f, e, c, 2b.

p.72

25. Mass is divided by volume

26. 1.7 x 10^{-2} g/L

27. checking urine to diagnose patients, measuring acid concentration in a car battery, checking antifreeze solution.

28. 0.802 g/cm^3 ; it would sink

29. highest: a gold; lowest b gasoline

p 75

32. ^oC = K -273

33. 463 K

34. 443 K

35. -186^oC

p 78-81

36. a) qualitative b) quantitative
c) qualitative d) quantitative

37. a) precision b) accuracy
c) precision d) precision
e) accuracy f) accuracy

39. Lissa: inaccurate and imprecise
Lamont: accurate and precise
Leigh Anne: inaccurate but precise

42. a) 98.5 L
b) 0.000763 cg
c) 57.0 m d)12.2^oC
e) 0.00750 x 10^4 mm
f) 1760 mL

43. a) 9.85 x 10^{-1} L
b)7.63 x 10^{-4} cg
c) 5.70 x 10^1 m
d)1.22 x 10^1 ^oC
e) 7.50 x 10^1 mm

e) chemical

44. a) 1, product
b) 3, compound

47. a) yes, because the graph is a straight line, the proportion of iron to oxygen is a constant, which is true for a compound
b) No, plotting these values on the graph would not give a point on the line indicating that the mass ratio of iron to oxygen is different from the other four samples.

48. a) oxygen and calcium
b) silicon, aluminum, and iron
c) Different; the 2nd most abundant element in Earth's crust, silicon, is not present in the human body, and the second most abundant element in the human body, carbon, is not among the most abundant element of the Earth's crust. If the elements are different then the compounds must also be different.

51. a) physical b) chemical
c) chemical d) physical

53. a) mixture; compound
b) mixture; elements
c) substance; element
d) substance; compound

f) 1.76×10^3 mL

44. a) 43 g b) 7.3 cm^2
c) 225.8 L d) 92.0 kg
e) 32.4 m^3 f) 104 m^3

48. 4%

57. a) 0.01 g b) 0.000001 g
c) 1000g d) 0.001 g

59. a) 1 b) 4 c) 2 d) 3

61. No; the density of the metal bar is 12 g/cm^3, but the density of gold is 19 g/cm^3.

65. germanium

66. improper, calibration or improper use of the measuring device

67. e, d, c, f, a, b

68. sig. figs in the answer of an addition problem depend on the measurement with the least number of decimal places.

70. a) cg b) L c) kcal
d) cs e) mL f) $1dm^3$

71. The digit to the right of the last significant figure is dropped if it is less than five

74. The egg is floating at the juncture of 2 liquids of different densities

75. a) 2 b) 1

84. Answers will vary. Lakes would freeze from the bottom up; aquatic life would be killed; possible climate changes.

91. Measurements of mass and volume are needed. Students should propose determining mass with a displacement of water. The order of the operations matters. Suppose the volume is measured first. Unless the stone were thoroughly dried, it would appear more massive and thus more dense.
