

Chapter 1—The Foundations of Chemistry

MULTIPLE CHOICE

1. Which of the following statements is **incorrect**?
 - a. A body in motion possesses kinetic energy because of its motion.
 - b. An object possesses potential energy because of its position or composition.
 - c. Nuclear energy is an important kind of potential energy.
 - d. Chemical reactions and physical changes that release energy to their surroundings are endothermic.
 - e. The Law of Conservation of Matter and Energy states that the combined amount of matter and energy in the universe is fixed.

ANS: D

OBJ: Define the Laws of Conservation of matter and energy. | Define the terms endothermic and exothermic. | Classify energy as potential or kinetic.

TOP: Matter and Energy

2. A braking automobile converts kinetic energy into heat in the brake pads. This is an example of the:
 - a. law of conservation of energy
 - b. law of constant composition
 - c. law of conservation of matter
 - d. law of multiple proportions
 - e. law of gravity

ANS: A

OBJ: Apply the law of conservation of energy.

TOP: Matter and Energy

3. When magnesium is burned in air the mass of the product is heavier than the original mass of the magnesium. However, the product formed still has the same exact mass of magnesium with the remainder of the mass being oxygen. This is an example of:
 - a. law of conservation of energy
 - b. law of definite proportions
 - c. law of conservation of matter
 - d. law of multiple proportions
 - e. law of gravity

ANS: C

OBJ: Apply the law of conservation of energy.

TOP: Matter and Energy

4. Which of the following represents matter that could be described as macroscale?
 - a. a bromine atom
 - b. molecules of water
 - c. bacteria observed under a microscope
 - d. a paperclip
 - e. none of these

ANS: D

OBJ: Classify a description of matter as atomic-, micro-, or macro-scale.

TOP: Chemistry – A Molecular View of Matter

5. Dalton's Atomic Theory included all of the ideas listed below **except**:
- Atoms cannot be created or destroyed.
 - An element is composed of very small particles called protons, neutrons and electrons.
 - All atoms of a given element have identical properties.
 - All atoms of a given element have properties that differ from those of other elements.
 - Compounds are formed when atoms of different elements combine with one another in small whole-number ratios.

ANS: B

OBJ: Identify the tenets of Dalton's atomic theory.

TOP: Chemistry – A Molecular View of Matter

6. Atoms consist of three fundamental particles. What are these particles and their charges?
- proton (+1), neutron (neutral) and electron (−1)
 - proton (−1), neutron (+1) and electron (neutral)
 - proton (+1), neutron (−1) and electron (neutral)
 - proton (neutral), neutron (+1) and electron (−1)
 - proton (−1), neutron (neutral) and electron (+1)

ANS: A

OBJ: Identify the three subatomic particles that make up an atom.

TOP: Chemistry – A Molecular View of Matter

7. One of the following does not describe gases. Which one is it?
- Expands infinitely.
 - Rigid shape.
 - Easily compressed.
 - Relatively low densities.
 - Particles far apart.

ANS: B

OBJ: Classify a gas.

TOP: States of Matter

8. One of the following does not describe solids. Which one is it?
- Particles in definite positions.
 - Definite shape.
 - Easily compressed.
 - Relatively high densities.
 - Particles compact.

ANS: C

OBJ: Classify a solid.

TOP: States of Matter

9. Which response lists characteristics of liquids?
- Volume does not vary much upon heating.
 - Shape is constant.
 - Easily compressed.
 - Fills the container completely.
 - Flows.

- a. I, III, IV, and V
- b. II, III, and V
- c. I
- d. I, II, IV, and IV
- e. I and V

ANS: E

OBJ: Classify a liquid.

TOP: States of Matter

10. All of the following are properties of antimony. Which one is **not** a physical property?
- a. It is a solid at room temperature.
 - b. It has both yellow and gray forms (allotropes) in the solid state.
 - c. It burns in an atmosphere of chlorine.
 - d. It is one of the few substances that expands upon freezing.
 - e. The gray form melts at 631°C.

ANS: C

OBJ: Classify a property as physical or chemical.

TOP: Chemical and Physical Properties

11. The following properties describe zinc. Which one(s) is (are) **chemical** properties?
- I. It is bluish-white metal.
 - II. It corrodes upon prolonged contact with moist air.
 - III. Its density is 7.14 g/cm³.
 - IV. It melts at 419°C.
 - V. It conducts electricity.

- a. IV and V
- b. IV
- c. V
- d. II, IV, and V
- e. II

ANS: E

OBJ: Classify a property as physical or chemical.

TOP: Chemical and Physical Properties

12. All of the following are properties of oxygen. Which one is a **physical** property?
- a. It supports combustion.
 - b. It condenses to a liquid at -219°C and atmospheric pressure.
 - c. It causes iron to rust.
 - d. It reacts with calcium to produce calcium oxide, CaO.
 - e. All of these are physical properties.

ANS: B

OBJ: Classify a property as physical or chemical.

TOP: Chemical and Physical Properties

13. The following statements describe some physical and chemical properties of sucrose (table sugar). Which response includes all that describe **chemical** properties, and none that describe physical properties?
- I. It is a colorless solid.
 - II. It chars or blackens when heated gently.
 - III. Its density is 1.6 g/mL.
 - IV. It ignites and burns with a yellow flame when heated strongly.
 - V. It is usually in the form of small crystals although it can occur as a powder.

- a. I, III, and IV
- b. II and IV
- c. II, IV, and V
- d. I and V
- e. another combination is the answer

ANS: B

OBJ: Classify a property as physical or chemical.

TOP: Chemical and Physical Properties

14. Which of the following is **not** an intensive property of matter?
- a. color
 - b. density
 - c. melting point
 - d. weight
 - e. boiling point

ANS: D

OBJ: Classify a property as intensive or extensive.

TOP: Chemical and Physical Properties

15. Which of the following is an **extensive** property of matter?
- a. weight
 - b. melting point
 - c. specific gravity
 - d. color
 - e. density

ANS: A

OBJ: Classify a property as intensive or extensive.

TOP: Chemical and Physical Properties

16. Identify which of the following properties of methane would be observed only with a change in composition.
- a. The melting point is -182.5°C .
 - b. The density is $6.67 \times 10^{-4} \text{ g/cm}^3$.
 - c. Carbon dioxide forms when it burns.
 - d. The boiling point is -161.5°C .
 - e. It dissolves slightly in water.

ANS: C

OBJ: Classify a property as chemical or physical.

TOP: Chemical and Physical Properties

17. Which response includes all of the following that involve **chemical** changes, and none that involve physical changes?
- I. converting milk to cheese
 - II. converting water to steam
 - III. composting leaves
 - IV. burning of gasoline
 - V. melting wax

- a. II and V
- b. I, III, and IV
- c. I, II, and III
- d. IV and V
- e. III, IV, and V

ANS: B

OBJ: Classify a property as chemical or physical.

TOP: Chemical and Physical Changes

18. Which answer includes all of the following that are **physical** changes and no chemical changes?
- I. the electrolysis of molten sodium chloride to produce metallic sodium and gaseous chlorine
 - II. the solidification of mercury by cooling
 - III. the reaction of hydrochloric acid with calcium carbonate
 - IV. the mixing of water with ethyl alcohol
 - V. cutting an iron bar into small pieces

- a. I and III
- b. II, IV, and V
- c. I and IV
- d. II, III, and V
- e. IV

ANS: B

OBJ: Classify a property as chemical or physical.

TOP: Chemical and Physical Changes

19. Which of these physical changes would require the liberation of energy?
- a. condensation of steam to form liquid water
 - b. melting of ice
 - c. boiling of water
 - d. all of these
 - e. none of these

ANS: A

OBJ: Identify physical changes as endothermic or exothermic.

TOP: Chemical and Physical Changes

20. Which of the following changes in water represents a chemical change?
- a. Melting of ice.
 - b. Boiling water.
 - c. Sublimation of solid ice directly to gaseous water.
 - d. Electrolyzing water to produce hydrogen and oxygen.
 - e. Heating water from 25°C to 60°C.

ANS: D

OBJ: Classify changes as chemical or physical.

TOP: Chemical and Physical Changes

21. Which answer lists all the substances below that are **compounds** and not any elements or mixtures?

- I. ethanol
- II. neon
- III. bromine
- IV. water
- V. crude oil

- a. I, II, and III
- b. I, IV, and V
- c. IV and V
- d. II, III, and V
- e. I and IV

ANS: E

OBJ: Classify a substance as an element, compound, or mixture.

TOP: Mixtures, Substances, Compounds, and Elements

22. Which of the following is not a mixture?

- a. air
- b. steel
- c. soda
- d. gasoline
- e. nitrogen

ANS: E

OBJ: Distinguish between examples of pure substances and mixtures.

TOP: Mixtures, Substances, Compounds, and Elements

23. Crude oil can be separated into gasoline, diesel, heating oil, etc. by differences in boiling points. The form of matter which would best describe crude oil is:

- a. homogeneous mixture
- b. heterogeneous mixture
- c. compound
- d. mineral
- e. element

ANS: A

OBJ: Classify matter.

TOP: Mixtures, Substances, Compounds, and Elements

24. Which statement is **false**?

- a. A compound is a substance that can be decomposed by chemical means into simpler substances.
- b. All samples of a particular pure substance have the same composition and properties.
- c. An example of a homogeneous mixture is one prepared by mixing two liquids, ethyl alcohol (grain alcohol) and water.
- d. An example of a heterogeneous mixture is one prepared by dissolving the solid, sodium chloride (table salt), in the liquid, water.
- e. Different mixtures of the same two substances can have different compositions.

ANS: D

OBJ: Define elements, compounds, or mixtures. | Classify matter.

TOP: Mixtures, Substances, Compounds, and Elements

25. Which of the following is a compound?

- a. cola
- b. air
- c. mercury
- d. gasoline
- e. calcium fluoride

ANS: E

OBJ: Identify elements, compounds, and mixtures.

TOP: Mixtures, Substances, Compounds, and Elements

26. Which mixture is incorrectly labeled?

- a. homogeneous / sugar dissolved in water
- b. homogeneous / sand stirred into water
- c. heterogeneous / orange juice with pulp
- d. heterogeneous / chocolate chip cookie
- e. heterogeneous / concrete sidewalk

ANS: B

OBJ: Classify a mixture as homogeneous or heterogeneous.

TOP: Mixtures, Substances, Compounds, and Elements

27. A sample of matter that can be decomposed into three different elements

- a. must be a solution.
- b. must be a compound.
- c. must be a heterogeneous mixture.
- d. must be a homogeneous mixture.
- e. could be any of these answers.

ANS: E

OBJ: Classify matter.

TOP: Mixtures, Substances, Compounds, and Elements

28. A form of matter is isolated and tested. No physical procedures can produce simpler forms of matter but heating the sample produces mercury and oxygen. The sample of matter must be:

- a. element
- b. compound
- c. solution
- d. mixture
- e. molecule

ANS: B

OBJ: Classify matter.

TOP: Mixtures, Substances, Compounds, and Elements

29. What is the symbol for the element potassium?

- a. K
- b. P
- c. Pt
- d. W
- e. Po

ANS: A

OBJ: Identify the symbol representing an element.

TOP: Mixtures, Substances, Compounds, and Elements

30. The element whose symbol is Ca is

- a. carbon.
- b. cadmium.
- c. calcium.
- d. californium.
- e. none of these.

ANS: C

OBJ: Identify an element name given the symbol.

TOP: Mixtures, Substances, Compounds, and Elements

31. What is the symbol for the element magnesium?

- a. Mg
- b. Fe
- c. Mn
- d. Mo
- e. Hg

ANS: A

OBJ: Identify the symbol representing an element.

TOP: Mixtures, Substances, Compounds, and Elements

32. Which element / symbol pair is incorrect?

- a. Fe / iron
- b. Ca / calcium
- c. Ag / gold
- d. Pb / lead
- e. O / oxygen

ANS: C

OBJ: Identify the incorrect symbol/element name combination.

TOP: Mixtures, Substances, Compounds, and Elements

33. Identify which of the following statements about elements and their abundance is false?

- a. Each element has its own unique symbol.
- b. Oxygen and silicon are very common.
- c. More than 99% of the Earth's mass is made up of only 10 of the naturally occurring elements.
- d. Most elements occur in nature as free elements, not in compounds.
- e. Gold is very uncommon.

ANS: D

OBJ: Know the qualitative abundance of the elements, the form of their occurrence in nature, and the terminology of the periodic table.

TOP: Mixtures, Substances, Compounds, and Elements

34. What is the symbol for the element strontium?

- a. Si
- b. S
- c. Sr
- d. Se
- e. Sm

ANS: C

OBJ: Identify the symbol representing an element.

TOP: Mixtures, Substances, Compounds, and Elements

35. The element whose symbol is Br is

- a. boron.
- b. barium.
- c. bromine.
- d. berkelium.
- e. beryllium.

ANS: C

OBJ: Identify the element name given the symbol.

TOP: Mixtures, Substances, Compounds, and Elements

36. The element whose symbol is Sn is

- a. silver.
- b. sulfur.
- c. tin.
- d. samarium.
- e. strontium.

ANS: C

OBJ: Identify the element name given the symbol.

TOP: Mixtures, Substances, Compounds, and Elements

37. Which symbol / name combination is **incorrect**?

- a. Mn / manganese
- b. Zn / zinc
- c. Sn / tin
- d. Sr / strontium
- e. Pd / lead

ANS: E

OBJ: Identify the incorrect symbol/element name combination.

TOP: Mixtures, Substances, Compounds, and Elements

38. Which name / symbol combination is **incorrect**?

- a. aluminum / Al
- b. cadmium / Ca
- c. cobalt / Co
- d. magnesium / Mg
- e. chromium / Cr

ANS: B

OBJ: Identify the incorrect symbol/element name combination.

TOP: Mixtures, Substances, Compounds, and Elements

39. Water is always 11.1% hydrogen and 88.9 % oxygen by mass. This is a statement of the
- Law of Conservation of Matter.
 - Law of Definite Proportions.
 - Law of Multiple Proportions.
 - Law of Conservation of Matter and Energy.
 - none of these.

ANS: B

OBJ: Identify the Law represented by percent mass of a pure compound.

TOP: Mixtures, Substances, Compounds, and Elements

40. Below is a list of physical properties and the fundamental unit used in the SI system to measure each. Which unit is **not** the correct **fundamental** unit for the property?

_____ physical property / unit

- length / meter
- time / second
- mass / gram
- temperature / kelvin
- electric current / ampere

ANS: C

OBJ: Identify the incorrect physical property/ fundamental SI unit combination.

TOP: Measurements in Chemistry

41. Which of the following is not an SI system unit of measurement?
- seconds
 - joules
 - kelvins
 - meters
 - pounds

ANS: E

OBJ: Recognize SI and non-SI units of measurement.

TOP: Measurements in Chemistry

42. Below is a list of common prefixes used in the SI and metric systems. Included with each is an abbreviation and meaning. Which set contains an **error**?
- mega- M 10^6
 - deci- d 10^{-1}
 - centi- c 10^{-2}
 - micro- m 10^{-6}
 - kilo- k 10^3

ANS: D

OBJ: Recognize common measurement prefixes, and their abbreviation and meaning.

TOP: Measurements in Chemistry

43. Below is a list of common prefixes used in the SI and metric systems. Included with each is an abbreviation and meaning. Which set contains an **error**?
- mega- M 10^{-6}
 - deci- d 10^{-1}
 - nano- n 10^{-9}
 - milli- m 10^{-3}
 - kilo- k 10^3

ANS: A

OBJ: Recognize common measurement prefixes, and their abbreviation and meaning.

TOP: Measurements in Chemistry

44. Which of the following is equivalent to 10 cm?

- a. 1 m
- b. 0.1 dm
- c. 100 mm
- d. 1000 μm
- e. 1 mm

ANS: C

OBJ: Express a measurement in different units.

TOP: Measurements in Chemistry

45. One of the following is a reasonable approximation of the **diameter** of a quarter (U.S. coin). Which one?

- a. 24 Mm
- b. 0.24 m
- c. 24 mm
- d. 24 cm
- e. 0.0024 km

ANS: C

OBJ: Approximate a measurement and express it in a variety of common units.

TOP: Units of Measurement

46. The mass of an average adult male would be closest to?

- a. 82 kg
- b. 100 lbs
- c. 28 kg
- d. 280 lbs
- e. 8200 g

ANS: A

OBJ: Approximate a measurement and express it in a variety of common units.

TOP: Units of Measurement

47. A bug travels at a speed of 1 cm/s. The notation cm/s could also be written as:

- a. $\text{cm} \bullet \text{s}$
- b. $\text{cm}^{-1} \bullet \text{s}^{-1}$
- c. $\text{cm}^{-1} \bullet \text{s}$
- d. $\text{cm} \bullet \text{s}^{-1}$
- e. none of these.

ANS: D

OBJ: Know the different ways to express units found in the denominator of a measurement.

TOP: Units of Measurement

48. Which of the following numbers has 4 significant figures?

- a. 0.04309
- b. 0.0430
- c. 0.0431
- d. 0.43980
- e. 0.043090

ANS: A

OBJ: Identify the measurement with the stated number of significant figures.

TOP: Use of Numbers

49. The sum $2.834 + 5.71520 + 2.12 + 178.1 + 250.2619$ expressed to the proper number of significant figures is:

- a. 439
- b. 439.0

- c. 439.03
- d. 439.031
- e. 439.0311

ANS: B

OBJ: Express a measurement derived from a calculation with the correct precision by applying the significant figure rules for calculations.

TOP: Use of Numbers

50. Perform the indicated mathematical operations and express the answer in scientific notation rounded off to the proper number of significant figures:

$$(8.001 \times 10^2) \times (2.88 \times 10^3 \div 2.4 \times 10^{-3}) =$$

- a. 9.6×10^2
- b. 9.60×10^8
- c. 9.601×10^8
- d. 9.6×10^8
- e. 9.6×10^{-2}

ANS: D

OBJ: Express a value in scientific notation. | Express a measurement derived from a calculation with the correct precision by applying the significant figure rules for calculations.

TOP: Use of Numbers

51. The answer to the following calculation, rounded to the proper number of significant digits, is:

$$23.413 \text{ g} \div (2.15 \text{ cm} \times 1.1 \text{ cm} \times 3.73 \text{ cm})$$

- a. 2.654 g/cm^3
- b. 2.65 g/cm^3
- c. 2.7 g/cm^3
- d. 3.0 g/cm^3
- e. 2.66 g/cm^3

ANS: C

OBJ: Express a measurement derived from a calculation with the correct precision by applying the significant figure rules for calculations.

TOP: Use of Numbers

52. How many millimeters are there in 25 feet?

- a. $7.6 \times 10^2 \text{ mm}$
- b. $2.6 \times 10^3 \text{ mm}$
- c. $1.0 \times 10^2 \text{ mm}$
- d. $7.6 \times 10^3 \text{ mm}$
- e. $1.2 \times 10^3 \text{ mm}$

ANS: D

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

53. What is the height in centimeters of a person who is 5 feet 10 inches tall?
- a. 1.8×10^4 cm
 - b. 3.6×10^{-2} cm
 - c. 27 cm
 - d. 1.5×10^2 cm
 - e. 1.8×10^2 cm

ANS: E

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

54. If 5.76×10^{13} neon atoms (spherical) were laid in a line, each touching the next, the line would measure 2.54 miles. What is the diameter of a neon atom in Å?
- a. 0.92 Å
 - b. 0.71 Å
 - c. 1.86 Å
 - d. 1.44 Å
 - e. 1.74 Å

ANS: B

OBJ: Calculate a value using the data provided. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

55. Convert 25.2 kilometers to inches.
- a. 99.2 in
 - b. 6.40×10^6 in
 - c. 9.92×10^5 in
 - d. 9.92×10^{-1} in
 - e. 6.40×10^3 in

ANS: C

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

56. Convert 175 milliliters to gallons.
- a. 0.0462 gal
 - b. 0.0414 gal
 - c. 0.740 gal
 - d. 0.164 gal
 - e. 0.660 gal

ANS: A

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

57. Express 39.34 square yards in square centimeters.

- a. 0.6417 cm^2
- b. 17280 cm^2
- c. $1.835 \times 10^6 \text{ cm}^2$
- d. $3.289 \times 10^5 \text{ cm}^2$
- e. $7.632 \times 10^6 \text{ cm}^2$

ANS: D

OBJ: Express an area in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

58. What is the area in square millimeters of a rectangle that is 8.632 cm long and 26.41 mm wide?

- a. 2280 mm^2
- b. 3.060 mm^2
- c. 22.80 mm^2
- d. 0.3060 mm^2
- e. 30.60 mm^2

ANS: A

OBJ: Determine the area of an object. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

59. What is the area (in mm^2) of a rectangular surface that is 0.640 inch wide and 1.14 inches long?

- a. 471 mm^2
- b. 328 mm^2
- c. 84.2 mm^2
- d. 242 mm^2
- e. 680 mm^2

ANS: A

OBJ: Determine the area of an object. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

60. What is 16.7 cubic feet expressed in cubic centimeters?

- a. $1.55 \times 10^4 \text{ cm}^3$
- b. 510 cm^3
- c. 0.159 cm^3
- d. $1.76 \times 10^3 \text{ cm}^3$
- e. $4.73 \times 10^5 \text{ cm}^3$

ANS: E

OBJ: Determine the volume of an object. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

61. Express 21.5 cubic centimeters in quarts.

- a. $2.03 \times 10^{-2} \text{ qt}$
- b. $2.26 \times 10^4 \text{ qt}$
- c. $9.24 \times 10^2 \text{ qt}$
- d. $2.27 \times 10^{-2} \text{ qt}$
- e. $2.02 \times 10^4 \text{ qt}$

ANS: D

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

62. Assuming a magnesium atom is spherical, calculate its volume in nm^3 . The **diameter** of a magnesium atom is $3.20 \text{ \AA}$. The volume of a sphere is $V = (4/3) \pi r^3$. $1 \text{ \AA} = 1 \times 10^{-10} \text{ m}$ and $1 \text{ nm} = 1 \times 10^{-9} \text{ m}$ (Both of these relationships are exact). $\pi = 3.14$.
- $5.57 \times 10^3 \text{ nm}^3$
 - $2.34 \times 10^{-22} \text{ nm}^3$
 - $5.57 \times 10^{-24} \text{ nm}^3$
 - $1.71 \times 10^{-2} \text{ nm}^3$
 - $5.57 \times 10^{-3} \text{ nm}^3$

ANS: D

OBJ: Determine the volume of an object. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

63. Assuming that a lithium atom is spherical, calculate its volume in cm^3 . The volume of a sphere is given by $V = (4/3) \pi r^3$. The radius of a lithium atom is $1.52 \text{ \AA}$. $1 \text{ \AA} = 10^{-8} \text{ cm}$ and $\pi = 3.14$.
- $4.78 \times 10^{-8} \text{ cm}^3$
 - $1.47 \times 10^{-23} \text{ cm}^3$
 - $6.14 \times 10^{-22} \text{ cm}^3$
 - $3.06 \times 10^{-17} \text{ cm}^3$
 - $4.68 \times 10^{-24} \text{ cm}^3$

ANS: B

OBJ: Determine the volume of an object. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

64. How many kilograms of lead are there in 749 pounds of lead?
- 95.1 kg
 - 340 kg
 - 760 kg
 - 28.0 kg
 - 1650 kg

ANS: B

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

65. What is the mass, in grams, of a 16.0 lb bowling ball?
- 7300 g
 - 0.0352 g
 - 7260 g
 - 6520 g
 - 8000 g

ANS: C

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

66. It requires $2.26 \times 10^3 \text{ J}$ to boil 1 g H_2O . How many kJ are required to boil 1.00 lb H_2O ?
- 1030 kJ
 - 4.98 kJ
 - 4980 kJ
 - 201 kJ
 - 2260 kJ

ANS: A

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

67. If an airplane's speed is 550 mi/h, what is its speed in m/s?
- a. 40 m/s
 - b. 328 m/s
 - c. 246 m/s
 - d. 528 m/s
 - e. 885 m/s

ANS: C

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

68. The mileage rating of a new high efficiency automobile is 52.0 miles per gallon. This could also be expressed as ____ kilometers per liter.
- a. 28.2
 - b. 31.6
 - c. 22.0
 - d. 72.6
 - e. 83.6

ANS: C

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

69. The 1970 standard established by the U.S. government for carbon monoxide emission for automobiles limited exhaust to 23.0 grams of CO per vehicle-mile. Assume that in a given metropolitan area there are 82,700 automobiles, driven an average of 13.5 miles per 24-hour period. How many tons/day of CO could legally be discharged into the area's atmosphere?
- a. 270 tons/day
 - b. 0.155 tons/day
 - c. 28.3 tons/day
 - d. 0.0535 tons/day
 - e. 39.0 tons/day

ANS: C

OBJ: Calculate a value using the data provided. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

70. At 25°C, one milliliter of mercury has a mass of 13.6 grams. How many liters of mercury are required to have a mass of 500 kg of mercury?
- a. 500 L
 - b. 25.2 L
 - c. 42.1 L
 - d. 13.6 L
 - e. 36.8 L

ANS: E

OBJ: Calculate a value using the data provided. | Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

71. Caffeine, a stimulant in coffee and some cola drinks, is 49.47% carbon, 5.19% H, 28.8% N, 16.48% O. What is the mass of carbon contained in 37.1 g of caffeine?
- 18.4 g
 - 36.8 g
 - 6.11 g
 - 1840 g
 - 24.3 g

ANS: A

OBJ: Determine the mass of a component in a substance using percent mass.

TOP: Percentage

72. Dark dental 22 carat gold is an alloy consisting of 92% Au, 4.9% Ag, and 3.1% Cu. If a patient leaves the dentist's office with 3.25 g of dark dental gold in her mouth, what mass of each element does she have in her mouth? (Note: round off may result in total mass not quite equaling 3.25 g.)
- 2.8 g Au 0.25 g Ag 0.15 g Cu
 - 2.9 g Au 0.10 g Ag 0.16 g Cu
 - 2.3 g Au 0.75 g Ag 0.20 g Cu
 - 3.0 g Au 0.16 g Ag 0.10 g Cu
 - 2.9 g Au 0.25 g Ag 0.10 g Cu

ANS: D

OBJ: Determine the mass of a component in a substance using percent mass.

TOP: Percentage

73. A 125 g sample of calcium carbonate contains 50.1 g calcium, 15.0 g carbon, and 59.9 g oxygen. Which of the following statements about calcium carbonate is **incorrect**?
- Calcium carbonate is 40.1 % calcium by mass.
 - Calcium carbonate is 47.9 % oxygen by mass.
 - Calcium carbonate is 15.0 % carbon by mass.
 - Calcium carbonate has a smaller % by mass of carbon than of calcium.
 - Calcium carbonate follows the Law of Definite Proportions.

ANS: C

OBJ: Determine the percent by mass of a component from its composition. | Identify the Law represented by percent mass of a pure compound.

TOP: Percentage

74. A cube of metal is 1.42 centimeters on an edge. Its mass is 16.3 grams. What is its density?
- 4.68 g/cm³
 - 4.30 g/cm³
 - 5.69 g/cm³
 - 6.14 g/cm³
 - 4.86 g/cm³

ANS: C

OBJ: Calculate density from mass and volume.

TOP: Density and Specific Gravity

75. A metal cube having a mass of 112 grams is dropped into a graduated cylinder containing 30.00 mL of water. This causes the water level to rise to 39.50 mL. What is the density of the cube?
- 2.86 g/mL
 - 11.8 g/mL
 - 10.8 g/mL
 - 3.74 g/mL
 - 10.6 g/mL

ANS: B

OBJ: Calculate total volume from liquid displacement data. | Calculate density from mass and volume.

TOP: Density and Specific Gravity

76. What is the specific gravity of nickel if 2.35 cm³ of nickel has the same mass as 20.9 mL of water at room temperature?
- 0.112
 - 2.14
 - 8.89
 - 19.7
 - 49.2

ANS: C

OBJ: Calculate the specific gravity of a substance.

TOP: Density and Specific Gravity

77. The density of mercury is 13.6 g/cm³. What is the mass of 6.50 cm³ of mercury?
- 0.478 g
 - 88.4 g
 - 18.9 g
 - 2.38 g
 - 1.10×10^2 g

ANS: B

OBJ: Convert volume to mass using density.

TOP: Density and Specific Gravity

78. A gold ring has a mass of 15.37 g. If this ring is pure gold (density = 16.1g/mL), what would the volume of the ring be?
- 15.37 mL
 - 1.04 mL
 - 0.955 mL
 - 16.1 mL
 - 8.05 mL

ANS: C

OBJ: Convert mass to volume using density.

TOP: Density and Specific Gravity

79. The density of octane is 0.702 g/cm³. What is the mass of 65.0 mL of octane?
- 110 g
 - 92.6 g
 - 22.5 g
 - 45.6 g
 - 1.08×10^{-2} g

ANS: D

OBJ: Convert volume to mass using density. | Express a measurement in different units.

TOP: Density and Specific Gravity

80. The specific gravity of ethyl chloride, an external painkiller, is 1.37 at 10°C. What is the mass of 47.4 mL of the liquid?
- 64.9 g
 - 0.346 g
 - 34.6 g
 - 52.5 g
 - 56.6 g

ANS: A

OBJ: Convert volume to mass using specific gravity.

TOP: Density and Specific Gravity

81. What is the volume of a 2.50-gram block of metal whose density is 6.72 grams per cubic centimeter?
- 16.8 cm³
 - 2.69 cm³
 - 0.0595 cm³
 - 0.372 cm³
 - 1.60 cm³

ANS: D

OBJ: Convert mass to volume using density.

TOP: Density and Specific Gravity

82. What volume is occupied by 14.3 g of mercury? Density = 13.6 g/mL.
- 37.2 mL
 - 0.236 mL
 - 193 mL
 - 1.05 mL
 - 4.82 mL

ANS: D

OBJ: Convert mass to volume using density.

TOP: Density and Specific Gravity

83. What is the volume of a 58.5 gram sample of a liquid with a specific gravity of 1.24?
- 47.2 mL
 - 63.2 mL
 - 72.8 mL
 - 20.2 mL
 - 35.2 mL

ANS: A

OBJ: Convert mass to volume using specific gravity.

TOP: Density and Specific Gravity

84. A saltwater aquarium should have a specific gravity of approximately 1.07. What is the density of seawater?
- 1.07 g/mL
 - 10.7 g/mL
 - 1.00 g/mL
 - 0.935 g/mL
 - 0.00107 g/mL

ANS: A

OBJ: Determine the density of a solution from its specific gravity.

TOP: Density and Specific Gravity

85. Bromine, a brick red liquid, has a specific gravity of 3.12. What is the mass of 25.6 mL of bromine?
- 8.21 g
 - 39.9 g
 - 82.1 g
 - 79.9 g
 - 7.99 g

ANS: D

OBJ: Convert volume to mass using specific gravity.

TOP: Density and Specific Gravity

86. Which of the following statements about density is incorrect?
- The densities of gases are usually expressed in units of g/L.
 - The intensive property density can be calculated from the two extensive properties: mass and volume.
 - The densities of liquids are usually expressed in units of g/mL (or g/cm³).
 - If oil and water are placed in a container, they form two layers with oil as the top layer because it has the greater density.
 - Densities of gases change greatly with changes in temperature and pressure.

ANS: D

OBJ: Understand the effect of temperature on density. | Know the units of density. | Understand the effect of pressure on density. | Understand how density effects layering of immiscible substance.

TOP: Density and Specific Gravity

87. The freezing point of argon is -189°C . What is its freezing point on the absolute temperature scale?
- 84 K
 - 136 K
 - 461 K
 - 112 K
 - 72 K

ANS: A

OBJ: Convert degrees Celsius to kelvins.

TOP: Heat and Temperature

88. Liquid propane boils at 231K. What is its boiling point in $^{\circ}\text{C}$?
- 42 $^{\circ}\text{C}$
 - 315 $^{\circ}\text{C}$
 - 42 $^{\circ}\text{C}$
 - 504 $^{\circ}\text{C}$
 - 231 $^{\circ}\text{C}$

ANS: C

OBJ: Convert kelvins to degrees Celsius.

TOP: Heat and Temperature

89. Methane, CH_4 , boils at -162°C . What is the boiling point of methane in $^\circ\text{F}$?
- a. -58°F
 - b. -108°F
 - c. -260°F
 - d. -323°F
 - e. -464°F

ANS: C

OBJ: Convert degrees Celsius to degrees Fahrenheit.

TOP: Heat and Temperature

90. Tungsten melts at 3422°C which is why it is used as the filament in incandescent lights. What is its melting temperature in $^\circ\text{F}$?
- a. 1933°F
 - b. 1901°F
 - c. 619°F
 - d. 6150°F
 - e. 6192°F

ANS: E

OBJ: Convert degrees Celsius to degrees Fahrenheit.

TOP: Heat and Temperature

91. If normal body temperature is 98.6°F , what is normal body temperature in $^\circ\text{C}$?
- a. 45.0°C
 - b. 37.0°C
 - c. 20.0°C
 - d. 52.6°C
 - e. 25.6°C

ANS: B

OBJ: Convert degrees Fahrenheit to degrees Celsius.

TOP: Heat and Temperature

92. The freezing point of the noble gas, argon, is -308°F . What is this temperature in kelvins?
- a. 120 K
 - b. 462 K
 - c. -249 K
 - d. 84 K
 - e. 462 K

ANS: D

OBJ: Convert degrees Fahrenheit to degrees Celsius. | Convert degrees Celsius to kelvins.

TOP: Heat and Temperature

93. Heptane melts at 182 K, and it boils at 371K. Which statement below is **incorrect**?
- Heptane will be a liquid at room temperature.
 - The melting point of heptane is -132°F .
 - The melting point of heptane is lower than the melting point of water.
 - Heptane would be a solid in a 200 K room.
 - Heptane would be a solid at 100 K.

ANS: D

OBJ: Understand melting point. | Understand boiling point. | Convert kelvins to degrees Celsius. | Convert degrees Celsius to degrees Fahrenheit.

TOP: Heat and Temperature

94. Gallium, a metal, has a freezing point near room temperature so it can be melted by holding it in your hands. If gallium's melting point is 302.8 K, what is that temperature in $^{\circ}\text{C}$?
- 0.0°C
 - 575.8°C
 - 302.8°C
 - 39.8°C
 - 29.8°C

ANS: E

OBJ: Convert kelvins to degrees Celsius.

TOP: Heat and Temperature

95. What is the boiling point of liquid nitrogen, 77 K, on the Fahrenheit scale?
- -321°F
 - 171°F
 - -168°F
 - 14.0°F
 - -144°F

ANS: A

OBJ: Convert kelvins to degrees Celsius. | Convert degrees Celsius to degrees Fahrenheit.

TOP: Heat and Temperature

96. Which of the following are sets of equivalent temperatures?
- | | | | |
|------|-----------------------|----------------------|-------|
| I. | 77°F | 25°C | 278 K |
| II. | 86°F | 30°C | 303 K |
| III. | 194°F | 90°C | 363 K |
| IV. | 68°F | 22°C | 251 K |
- I and II
 - II and III
 - I and III
 - II and IV
 - III and IV

ANS: B

OBJ: Convert between three temperature units: degrees Fahrenheit, degrees Celsius, and kelvins.

TOP: Heat and Temperature

97. How many kilojoules are equivalent to 565 calories?

- a. 130 kJ
- b. 930 kJ
- c. 0.135 kJ
- d. 2.36 kJ
- e. 2360 kJ

ANS: D

OBJ: Convert calories to kJ.

TOP: Heat Transfer and the Measurement of Heat

98. How much heat is released as the temperature of 25.2 grams of iron is decreased from 72.1 °C to 9.8 °C? The specific heat of iron is 0.444 J/g °C.

- a. 113 J
- b. 566.1 J
- c. 1.11 kJ
- d. 0.697 kJ
- e. 957 J

ANS: D

OBJ: Calculate the change in temperature of a substance. | Calculate the heat released based on the temperature change of a substance.

TOP: Heat Transfer and the Measurement of Heat

99. The specific heat of aluminum is 0.900 J/g °C. How many joules of heat are absorbed by 15.0 g of Al if it is heated from 20.0 °C to 60.0 °C?

- a. 540 J
- b. 270 J
- c. 812 J
- d. 2.40 J
- e. 1.17×10^4 J

ANS: A

OBJ: Calculate the change in temperature of a substance. | Calculate the heat released or gained based on the temperature change of a substance.

TOP: Heat Transfer and the Measurement of Heat

100. An endothermic reaction

- a. evolves heat.
- b. is also called exothermic.
- c. would have its heat transferred measured in Joules.
- d. is not possible.
- e. would be described by all of these.

ANS: C

OBJ: Know the units of energy. | Define the terms endothermic and exothermic.

TOP: Heat Transfer and the Measurement of Heat

101. An exothermic reaction

- a. absorbs heat.
- b. is also called kinetic.
- c. is not possible.
- d. would have its heat transferred measured in Joules.
- e. would be described by all of these.

ANS: D

OBJ: Know the units of energy. | Define the terms endothermic and exothermic.

TOP: Heat Transfer and the Measurement of Heat

102. If 10.0 g of copper cools from 35.0°C to 28.8°C and loses 23.6 joules of heat, what is the specific heat of copper?
- a. 0.076 J/g•°C
 - b. 3.8×10^2 J/g•°C
 - c. 0.38 J/g•°C
 - d. 0.62 J/g•°C
 - e. 76 J/g•°C

ANS: C

OBJ: Calculate the change in temperature of a substance. | Calculate the specific heat of a substance based on the change in heat content and the temperature change of the substance.

TOP: Heat Transfer and the Measurement of Heat

103. What is the specific heat of a 5.75 g piece of metal if the addition of 175 joules of heat causes a 22.3°C temperature increase?
- a. 1.36 J/g•°C
 - b. 4.18 J/g•°C
 - c. 1.11 J/g•°C
 - d. 0.73 J/g•°C
 - e. 1.54 J/g•°C

ANS: A

OBJ: Calculate the specific heat of a substance based on the change in heat content and the temperature change of the substance.

TOP: Heat Transfer and the Measurement of Heat

104. A 10.0 kg piece of metal at 50.0°C is placed in 1000. g of water at 10.0°C in an insulated container. The metal and water come to the same temperature at 30.6°C. What is the specific heat of metal? The specific heat of water is 4.18 J/g•°C.
- a. 0.0686 J/g•°C
 - b. 0.444 J/g•°C
 - c. 0.721 J/g•°C
 - d. 0.124 J/g•°C
 - e. 0.0216 J/g•°C

ANS: B

DIF: Harder Question

OBJ: Calculate the specific heat of a substance based on the temperature equilibration of two substances. | Express a measurement in different units. | Calculate the change in temperature of a substance.

TOP: Heat Transfer and the Measurement of Heat

105. The same amount of heat is added to a 25-g sample of each of the following metals. If each of the metals was initially at 20.0°C, which metal will reach the highest temperature?

Metal	Specific Heat
a. beryllium	1.82 J/g•°C
b. calcium	0.653 J/g•°C
c. copper	0.385 J/g•°C
d. gold	0.129 J/g•°C
e. nickel	0.444 J/g•°C

ANS: D

OBJ: Identify the substance with the greatest change in temperature. | Understand the relationship between the specific heat of a substance and the change in temperature of a substance.

TOP: Heat Transfer and the Measurement of Heat

106. If 100. grams of liquid water at 100.0°C and 200. grams of water at 20.0°C are mixed in an insulated container, what will be the final temperature of the water? The specific heat of water is 4.18 J/g•°C.
- 41.9°C
 - 44.2°C
 - 46.7°C
 - 48.3°C
 - 45.1°C

ANS: C

DIF: Harder Question

OBJ: Calculate the equilibrium temperature of a mixture.

TOP: Heat Transfer and the Measurement of Heat

107. How many grams of water at 25°C must be mixed in an insulated container with 250. grams of water at 93°C if the final temperature of the combined water is to be 75°C?
- 45 g
 - 376 g
 - 120 g
 - 90 g
 - 140 g

ANS: D

OBJ: Calculate the mass of one substance required to cool another substance to a specified temperature.

TOP: Heat Transfer and the Measurement of Heat

108. If a 10.0 g ball of iron at 160.0°C is dropped into 50.0 g of water at 20.0°C in an insulated container, what will be the final temperature of the water? The specific heat of iron is 0.444 J/g•°C and that of water is 4.18 J/g•°C.
- 23°C
 - 38°C
 - 48°C
 - 82°C
 - 110°C

ANS: A

DIF: Harder Question

OBJ: Calculate the equilibrium temperature of a mixture.

TOP: Heat Transfer and the Measurement of Heat

109. One of the following does not describe gases. Which one is it?
- fills any container completely
 - slight expansion on heating
 - easily compressed
 - relatively low densities
 - particles far apart

ANS: B

OBJ: Classify a gas or solid.

TOP: States of Matter

110. Which of the following is **not** an intensive property of matter?
- malleability
 - boiling point
 - thermal conductivity
 - weight
 - color

ANS: D

OBJ: Classify a property as intensive or extensive.

TOP: Chemical and Physical Properties

111. Which of these physical changes would require the addition of energy?
- boiling a liquid
 - condensing a gas
 - freezing a liquid
 - all of these
 - none of these

ANS: A

OBJ: Identify the endothermic or exothermic physical change.

TOP: Chemical and Physical Changes

112. Which of following represents a physical change?
- the decomposition of cinnabar (HgS) to mercury metal upon heating
 - the electrolysis of water to produce hydrogen and oxygen
 - the tarnishing of the surface of copper in the presence of oxygen
 - the dissolution of sugar in water
 - the rusting of iron

ANS: D

OBJ: Classify changes as chemical or physical.

TOP: Chemical and Physical Changes

113. Which of the following is not a mixture?
- sea shells
 - cow manure
 - ice cream
 - gasoline
 - diamond

ANS: E

OBJ: Distinguish between examples of pure substances and mixtures.

TOP: Mixtures, Substances, Compounds, and Elements

114. Which of the following is a compound?

- a. soda
- b. air
- c. copper ore
- d. skim milk
- e. table salt

ANS: E

DIF: Hard

OBJ: Distinguish between examples of pure substances and mixtures.

TOP: Mixtures, Substances, Compounds, and Elements

115. What is the symbol for the element tin?

- a. Sn
- b. Ti
- c. S
- d. Zn
- e. K

ANS: A

OBJ: Identify the symbol representing an element.

TOP: Mixtures, Substances, Compounds, and Elements

116. The element whose symbol is K is

- a. potassium.
- b. krypton.
- c. cobalt.
- d. calcium.
- e. none of these.

ANS: A

OBJ: Identify the symbol representing an element.

TOP: Mixtures, Substances, Compounds, and Elements

117. Below is a list of physical properties and the fundamental unit used in the SI system to measure each. Which unit is **not** the correct **fundamental** unit for the property?

_____ physical property / unit

- a. amount of substance / mole
- b. luminous intensity / candela
- c. time / meter
- d. temperature / kelvin
- e. electric current / ampere

ANS: C

OBJ: Identify the incorrect physical property/ fundamental SI unit combination.

TOP: Measurements in Chemistry

118. What is the height in centimeters of a person who is 4 ft 10 in tall? (2.54 cm = 1 in; 1 ft = 12 in)

- a. 1.5×10^4 cm
- b. 2.9×10^{-2} cm
- c. 22 cm
- d. 1.2×10^2 cm
- e. 1.5×10^2 cm

ANS: E

OBJ: Express a measurement in different units.

TOP: The Unit Factor Method (Dimensional Analysis)

119. Which of the following would you classify as nano-scale?

- a. An amoeba (one-celled animal)
- b. Coffee grounds
- c. A water molecule
- d. A cell membrane
- e. Gold ore

ANS: C

OBJ: Approximate the size-scale of matter.

TOP: Chemistry – A Molecular View of Matter

120. Which of the following substances is an element?

- a. F_2
- b. C_2H_5OH
- c. Sodium chloride
- d. Water
- e. Brass

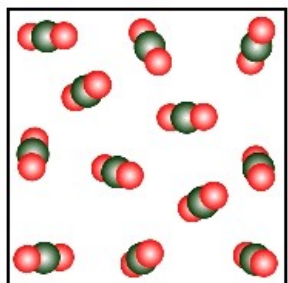
ANS: A

OBJ: Identify the element.

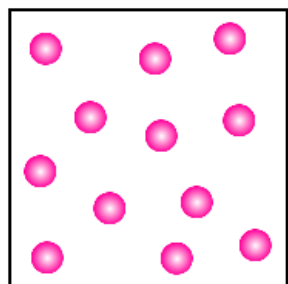
TOP: Mixtures, Substances, Compounds, and Elements

121. Which of the following represents a mixture of two elements?

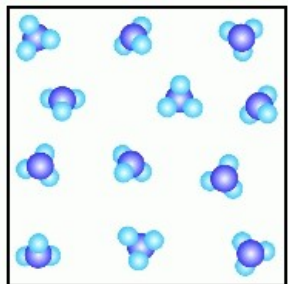
a.

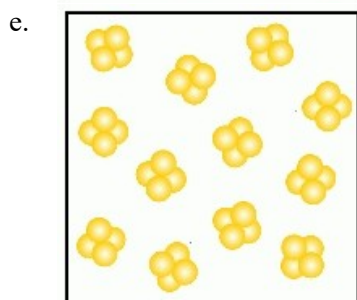
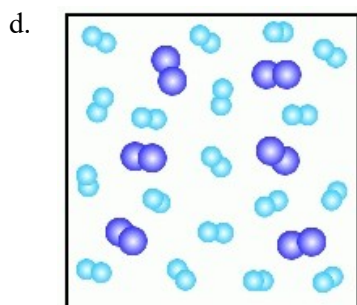


b.



c.



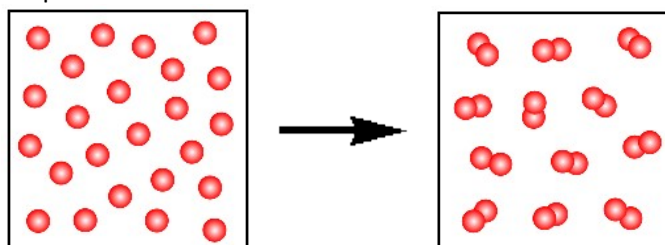


ANS: D

OBJ: Identify the mixture of two elements.

TOP: Mixtures, Substances, Compounds, and Elements

122. What kind of change is depicted below?



a. Chemical change

b. Physical change

c. Both chemical and physical change

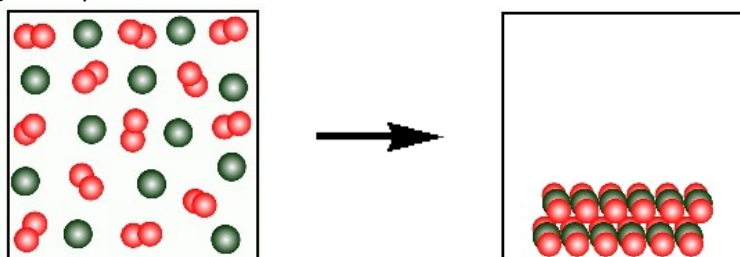
d. No change

ANS: A

OBJ: Classify changes as chemical or physical.

TOP: Chemical and Physical Changes

123. What kind of change is depicted below?



a. chemical change

b. physical change

c. both chemical and physical

d. no change

ANS: C

OBJ: Classify changes as chemical or physical.

TOP: Chemical and Physical Changes

124. How many significant figures are there in the number 0.097
a. 1 b. 2 c. 3 d. 4 e. 5

ANS: B

OBJ: Identify the number of significant figures in a measurement.

TOP: Use of Numbers

125. How many significant figures are there in the number 75100
a. 1 b. 2 c. 3 d. 4 e. 5

ANS: C

OBJ: Identify the number of significant figures in a measurement.

TOP: Use of Numbers

126. How many significant figures are there in the number 1.0720
a. 1 b. 2 c. 3 d. 4 e. 5

ANS: E

OBJ: Identify the number of significant figures in a measurement.

TOP: Use of Numbers

127. How many significant figures are there in the number 0.0306960?
a. 4 b. 5 c. 6 d. 7 e. 8

ANS: C

OBJ: Identify the number of significant figures in a measurement.

TOP: Use of Numbers

128. What is the best answer to report for $(515 \times 0.0025) + 24.57$?
a. 25.858 b. 25.86 c. 25.8575 d. 26 e. 25.9

ANS: E

OBJ: Report the answer in a mixed operation to the correct number of significant figures.

TOP: Use of Numbers

129. When 87.7 is added to 73.841, the result should be reported with _____ significant figures. And when 87.7 is divided by 73.841 the result should be reported with _____ significant figures.
a. 3, 3 b. 3, 5 c. 4, 3 d. 4, 4 e. 3, 4

ANS: C

OBJ: Determine the number of significant figures for the given operations.

TOP: Use of Numbers

130. When 45.24 is subtracted from 40.1, the result should have _____ sig figs. When 45.24 is multiplied by 40.1, the result should have _____ sig figs.
a. 2, 5 b. 3, 3 c. 2, 3 d. 4, 4 e. 3, 2

ANS: C

OBJ: Determine the number of significant figures for the given operations.

TOP: Use of Numbers

131. When 51.8 and 67.5 are multiplied, the product has ____ significant figures, and when 51.8 and 67.5 are added, the sum has ____ significant figures.
- a. 5, 3 b. 3, 4 c. 3, 5 d. 4, 3 e. 3, 3

ANS: B

OBJ: Determine the number of significant figures for the given operations.

TOP: Use of Numbers

132. Which is higher: 144°F or 63.6°C? { °F = 9/5(°C) + 32 }
- a. 144°F c. The temperatures are equivalent
- b. 63.6°C

ANS: B

OBJ: Compare two temperatures in different units.

TOP: Heat and Temperature

- 133. As part of the calibration of a new laboratory balance, a 0.200-g mass is weighed with the following results:**

	Trial Mass
1	0.216-g
2	0.196-g
3	0.187-g

Choose the statement that best describes the calibration data.

- The balance is both accurate and precise.
- The balance is accurate but imprecise.
- The balance is precise but inaccurate.
- The balance is both inaccurate and imprecise.

ANS: B

OBJ: Interpret the accuracy and precision of a set of data.

TOP: Accuracy and Precision

134. The liquid 1,2-ethanedithiol is insoluble in water. If a 75.5 g sample of 1,2-ethanedithiol has a volume of 61.2 mL, what is its density, and would it float or sink if poured into a beaker containing water?
- a. 1.20g/mL and it would sink in water c. 0.811 g/mL and it would sink in water
b. 1.20 g/mL and it would float on water d. 0.811 g/mL and it would float on water

ANS: A

OBJ: Calculate the density and determine if the substance floats or sinks.

TOP: Density

135. An empty Erlenmeyer flask weighs 241.3g. When filled with water (density = 0.997g/mL), the flask and its contents weigh 489.1g. What volume of water does the flask hold?
- a. 246.3 mL b. 247.1 mL c. 247.8 mL d. 248.5 mL e. 240.6 mL

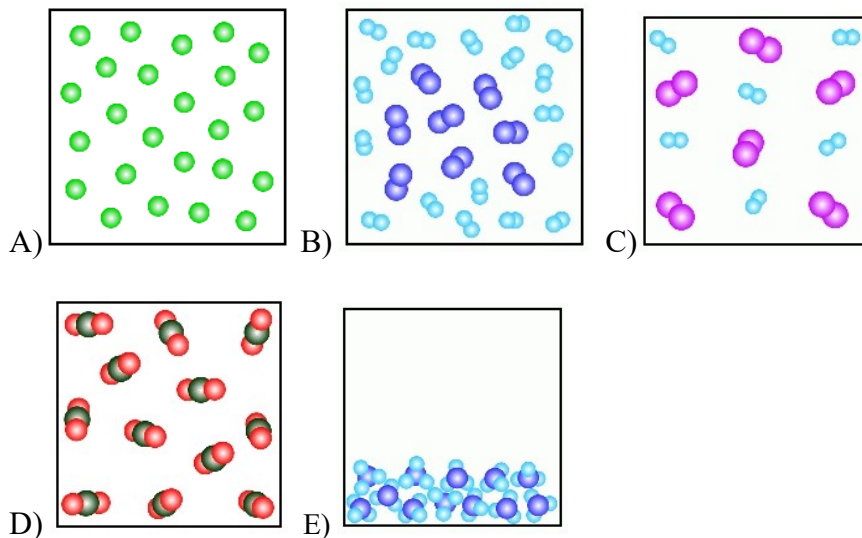
ANS: D

OBJ: Calculate a volume given density and mass.

TOP: Density

SHORT ANSWER

Instructions: Use the pictures below to answer the following questions:



1. Which of the figures above depicts a heterogeneous mixture?

ANS: B

OBJ: Identify the heterogeneous mixture.

TOP: Mixtures, Substances, Compounds, and Elements

2. Which of the figures above depicts a liquid compound?

ANS: E

OBJ: Identify the liquid compound.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

3. Which of the figures above depicts a gaseous compound?

ANS: D

OBJ: Identify the gaseous compound.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

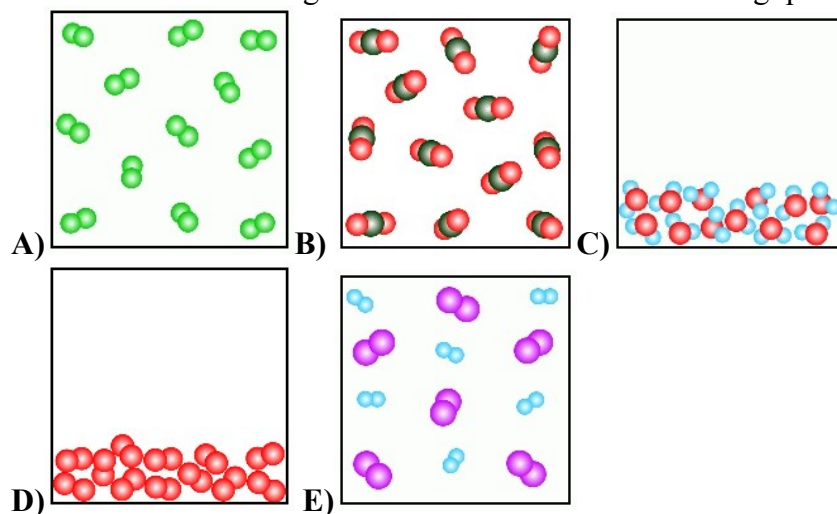
4. Which of the figures above depicts a homogeneous mixture?

ANS: C

OBJ: Identify the homogeneous mixture.

TOP: Mixtures, Substances, Compounds, and Elements

Instructions: Use the figures below to answer the following questions:



5. Which of the figures above represents a gaseous compound?

ANS: B

OBJ: Identify the gaseous compound.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

6. Which of the figures above represents a liquid element?

ANS: D

OBJ: Identify the liquid element.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

7. Which of the figures above represents a homogeneous mixture?

ANS: E

OBJ: Identify the homogeneous mixture.

TOP: Mixtures, Substances, Compounds, and Elements

8. Which of the figures above represents a gaseous element?

ANS: A

OBJ: Identify the gaseous element.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

9. Which of the figures above represents a liquid compound?

ANS: C

OBJ: Identify the liquid compound.

TOP: States of Matter | Mixtures, Substances, Compounds, and Elements

CONCEPTUAL

1. What are some experiments that might be performed to determine the identity of an unknown metal from the moon?
OBJ: Propose an experiment to determine the density of a substance.
TOP: Density
2. Why is having a universal system of units for the entire planet a good idea? Why does the United States still use other units?
OBJ: Explain the value of a universal system of units.
TOP: Units of Measurement | Measurements in Chemistry
3. If there are only about 88 naturally occurring type of atoms, why is there such a tremendous variety of matter in the universe?
OBJ: Explain why matter is not limited to the 88 naturally occurring elements.
TOP: Mixtures, Substances, Compounds, and Elements
4. A 50-lb rock is removed from the bottom of a pool and placed in a canoe on the surface of the pool. Does the water level in the pool increase or decrease?
OBJ: Explain the effect of density with respect to liquid displacement.
TOP: Density
5. What are some pure elements that we encounter every day? What are some pure compounds?
OBJ: Classify a common substance as an element or a compound.
TOP: Mixtures, Substances, Compounds, and Elements
6. If Einstein's equation $E = mc^2$ is correct what happens when energy is released from a nuclear reaction?
OBJ: Propose the fate of matter in a nuclear reaction.
TOP: Nuclear reactions. | Matter and Energy