

Chapter 2—The Chemical View of Matter

MULTIPLE CHOICE

1. Which of the following is not one of the common states of matter?
 - a. solid
 - b. plasma
 - c. liquid
 - d. gas

ANS: B

2. Which of the following is one of the classes of pure substances?
 - a. compound
 - b. homogeneous mixture
 - c. solution
 - d. heterogeneous mixture

ANS: A

3. Which is not a mixture?
 - a. pure water
 - b. mayonnaise
 - c. strawberry Kool-Aid® drink
 - d. rock

ANS: A

4. Most samples of matter occur in nature as
 - a. elements.
 - b. compounds.
 - c. homogeneous samples.
 - d. mixtures.

ANS: D

5. Separating a mixture of iron and sulfur can be done
 - a. by filtration.
 - b. dissolving in water.
 - c. with a magnet.
 - d. by burning.

ANS: C

6. Which statement describes a physical property of oxygen?
 - a. Oxygen supports burning of gasoline.
 - b. Oxygen has a density of 0.0014 g/mL.
 - c. Oxygen is required for human metabolism of food.
 - d. Oxygen combines with iron causing the formation of rust.

ANS: B

7. Which is a chemical property?
 - a. boiling point
 - b. state

- c. odor
- d. flammability

ANS: D

8. A process is probably a chemical reaction if
- a. it produces light.
 - b. a solid appears when two solutions are mixed.
 - c. bubbles start to form when two substances are mixed.
 - d. all of these

ANS: D

9. Which of the following is not a chemical change?
- a. burning charcoal
 - b. rusting iron
 - c. melting ice
 - d. baking bread

ANS: C

10. Which term describes energy?
- a. motion
 - b. heat
 - c. light
 - d. all of these

ANS: D

11. Alfred Nobel _____?
- a. discovered dynamite
 - b. proposed the metric system
 - c. developed the STM, scanning tunneling microscope
 - d. discovered kinetic energy

ANS: A

12. Which mixture is heterogeneous?
- a. salt and water
 - b. water and oil
 - c. sweetened hot tea
 - d. Ivory soap bar

ANS: B

13. The element whose name is derived from the Latin *aurum*, meaning shining dawn
- a. gold.
 - b. aluminum.
 - c. silver.
 - d. chromium.

ANS: A

14. Which of the following elements is a metal?

- a. Ca, calcium
- b. Na, sodium
- c. Hg, mercury
- d. all of these

ANS: D

15. Sublimation is a characteristic physical property of

- a. chlorine (Cl₂, liquid).
- b. oxygen (O₂, gas).
- c. bromine (Br₂, liquid).
- d. iodine (I₂, solid).

ANS: D

16. What information is not provided by the formula, C₄H₁₀, for butane?

- a. butane being an organic compound
- b. the molecular formula
- c. the relative number of atoms of each kind
- d. the shape of the molecule

ANS: D

17. Which of the following sets, is a list of the symbols for an element and a compound (in that order)?

- a. Mg, CO
- b. CO, CO₂
- c. CO, Co
- d. H₂O₂, P

ANS: A

18. Which of the following sets, is a list of the symbols that could represent the following substances, respectively?

lead a compound of equal parts hydrogen and oxygen elemental oxygen

- a. PB, H₂O₂, O
- b. Pb, HO, O
- c. Pb, H₂O₂, O₂
- d. PB, HO, O₂

ANS: C

19. In the balanced equation, $2 \text{Al} + 6 \text{HCl} \rightarrow 2 \text{AlCl}_3 + 3 \text{H}_2$, the sum of the coefficients of the reactants is

- a. 5.
- b. 8.
- c. 13.
- d. none of these

ANS: B

20. The equation, $2 \text{C(s)} + \text{O}_2\text{(g)} \rightarrow 2 \text{CO(g)}$, tells us
- the number of atoms of each kind in reactants and products is the same.
 - carbon monoxide (CO) is a product.
 - two atoms of carbon undergo reaction.
 - all of these

ANS: D

21. How does the known number of nonmetals compare to that of metals?
- There are fewer metals.
 - There are an equal number of each.
 - There are fewer nonmetals.
 - This cannot be predicted because not all metals and nonmetals have been discovered.

ANS: C

22. What prefix is the largest?
- mega
 - centi
 - micro
 - kilo

ANS: A

23. A person weighs 165 lbs. Which of the following would calculate their mass in kilograms if $2.2 \text{ lbs} = 1 \text{ kg}$?
- 165×2.2
 - $165 \div 2.2$
 - $2.2 \div 165$
 - $165 + 2.2$

ANS: B

24. The quantity 10^{-9} (one billionth) is designated by the prefix
- pico.
 - nano.
 - centi.
 - mega.

ANS: B

25. Which of the following would convert 15 L of gasoline to gallons? ($1.06 \text{ qt} = 1 \text{ L}$; $4 \text{ qts} = 1 \text{ gal}$)
- $(15) (1.06/1) (1/4)$
 - $(15) (1/1.06) (4/1)$
 - $(15) (1.06/1) (4/1)$
 - $(15) (1/1.06) (1/4)$

ANS: A

26. An example of a homogeneous mixture is
- oil in water.
 - a salt water solution.
 - a suspension.
 - a pure substance.

ANS: B

27. Which of the following is not a pure substance?
- pure gold
 - clean air
 - refined sugar
 - distilled water

ANS: B

28. Which state of matter is composed of charged particles which are dramatically affected by electric and magnetic fields?
- solids
 - liquids
 - gases
 - plasmas

ANS: D

29. How many categories of pure substances exist?
- 2
 - 3
 - thousands
 - about 100

ANS: A

30. A pure substance which can be decomposed into two or more pure substances is a(n)
- element.
 - compound.
 - mixture.
 - colloid.

ANS: B

31. For which of the following is it necessary that there be a definite composition which cannot vary?
- mixture
 - solution
 - compound
 - colloid

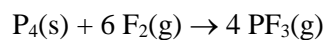
ANS: C

32. How many phosphorus atoms are in the formula H_3PO_4 ?

- a. 4
- b. 3
- c. 7
- d. 1

ANS: D

33. How many chemical formulas are in this chemical equation?



- a. 2
- b. 3
- c. 4
- d. 11

ANS: B

34. Which of the following is an SI unit of ?

- a. pound
- b. kilogram
- c. quart
- d. calorie

ANS: B

35. Potential energy is defined as

- a. heat energy.
- b. energy associated with motion.
- c. stored energy.
- d. the ability to do work.

ANS: C

36. Which of the following is a physical change?

- a. souring of milk
- b. ripening of fruit
- c. frying an egg
- d. melting

ANS: D

37. The simplest form of matter is a(n)

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

ANS: A

38. Which of the following is a compound?

- a. mercury
- b. blood
- c. sugar
- d. air

ANS: C

39. How would you separate a mixture of salt, sand, and water?

- a. by filtration, followed by evaporation
- b. freezing, followed by melting
- c. separating with tweezers, followed by evaporation
- d. by filtration, followed by burning

ANS: A

40. Which of the following is a physical property?

- a. freezing point
- b. color
- c. odor
- d. all of the above

ANS: D

41. Which of the following is an example of a chemical change?

- a. boiling water
- b. iodine sublimating
- c. barbecuing a steak
- d. breaking a piece of glass

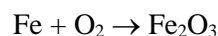
ANS: C

42. Identify the nonmetal among those listed below.

- a. Fe
- b. Na
- c. S
- d. Ag

ANS: C

43. What is the coefficient in front of iron when the following equation is balanced?



- a. 1
- b. 2
- c. 4
- d. 6

ANS: C

44. How many millimeters are in 100 cm?

- a. 10
- b. 1000
- c. 100
- d. 1

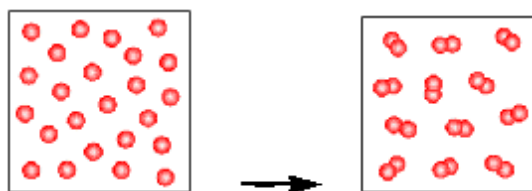
ANS: B

45. Which of the following has the highest kinetic energy?

- a. boulder on the top of hill
- b. water behind a dam
- c. a ball falling from a 3 story building
- d. a piece of wood

ANS: C

46. What kind of change is depicted in the following image?



- a. chemical change
- b. physical change
- c. both a chemical change and a physical change
- d. There is no change shown in the image.

ANS: A

TRUE/FALSE

1. A pure substance which can be decomposed into two or more pure substances is called a mixture.

ANS: F

2. 10 mg is larger than 100 ng.

ANS: T

3. Glucose has the chemical formula $C_6H_{12}O_6$. In one molecule of glucose there are 24 atoms.

ANS: T

4. The density of copper is 8.96 g/mL and that of gold is 19.3 g/mL. The ratio of the mass of a 10 mL block of copper to a 10 mL block of gold is 0.464.

ANS: T

5. The most common unit of volume used in chemistry is the millimeter.

ANS: F

6. In order to convert a measurement for the element mercury from mass to volume, one would multiply the starting measurement by the following factor.

$$\frac{13.6 \text{ g}}{1 \text{ mL}}$$

ANS: F

COMPLETION

1. The chemical symbol for copper is_____.

ANS: Cu

2. Mg is the chemical symbol for _____.

ANS: magnesium

3. There are _____mg in exactly 10. g.

ANS:

10,000

10000

10^4

4. The SI multiple of 10^{-3} is indicated in a unit with the common prefix _____.

ANS: milli

5. 1 Mm = _____m

ANS:

10^6

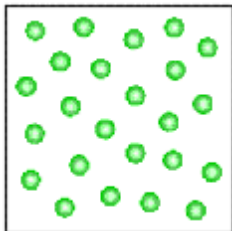
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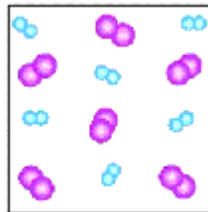
MATCHING

Use the pictures below to answer the following questions.

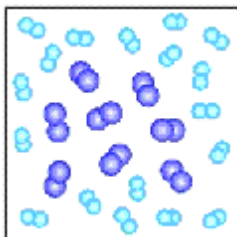
a.



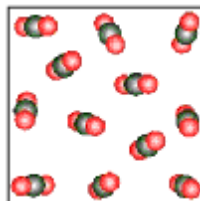
c.



b.



d.



1. Which figure above depicts a homogeneous mixture?
2. Which figure above depicts a heterogeneous mixture?
3. Which figure above depicts a compound?
4. Which figure above depicts an element?

1. ANS: C
2. ANS: B
3. ANS: D
4. ANS: A