***General, Organic, and Biological Chemistry, 1e* (Owens)**

**Chapter 1 Introduction to Chemistry**

1.1 Multiple-Choice Questions

1) Helium is a(n)

A) compound.

B) heterogeneous mixture.

C) element.

D) homogeneous mixture.

E) electron.

Answer: C

Objective: 1.2

Global Outcomes: G2

2) Air is a(n)

A) compound.

B) heterogeneous mixture.

C) element.

D) homogeneous mixture.

E) None of the above.

Answer: D

Objective: 1.2

Global Outcomes: G2

3) Coins in a piggy bank is a(n)

A) compound.

B) heterogeneous mixture.

C) element.

D) homogeneous mixture.

E) None of the above.

Answer: B

Objective: 1.2

Global Outcomes: G2

4) The primary substances of which all other things are composed are

A) molecules.

B) compounds.

C) elements.

D) electrons.

E) protons.

Answer: C

Objective: 1.2

Global Outcomes: G2

5) Which of the following is a property of a solid?

A) It takes the shape of the container.

B) It fills the volume of the container.

C) The particles move at a rapid rate.

D) The interactions between its particles are very weak.

E) The particles have fixed positions and are very close together.

Answer: E

Objective: 1.2

Global Outcomes: G2

6) Which of the following is a physical property of both liquids and gases?

A) has a definite shape

B) has a definite volume

C) has strong interactions between its particles

D) has randomly arranged particles

E) has large spaces between molecules

Answer: D

Objective: 1.2

Global Outcomes: G2

7) Which one of the following properties describes a liquid?

A) has a definite shape

B) particles are close together and move randomly

C) particles move very rapidly

D) fills the entire volume of the container

E) There is essentially no interaction between the particles.

Answer: B

Objective: 1.2

Global Outcomes: G2

8) In a gas, the distance between the particles is

A) very close relative to the size of the particles.

B) close relative to the size of the particles.

C) fixed relative to the size of the particles.

D) small relative to the size of the particles.

E) very large relative to the size of the particles.

Answer: E

Objective: 1.2

Global Outcomes: G2

9) Which of the following is an example of a physical change?

A) grinding coffee beans

B) baking a cake

C) converting water to hydrogen and oxygen

D) digesting a cheeseburger

E) burning coal

Answer: A

Objective: 1.2

Global Outcomes: G2

10) Which of the following would NOT be a physical change?

A) freezing water to make ice cubes

B) tearing a piece of aluminum foil

C) boiling water for soup

D) burning gasoline in a lawnmower

E) melting gold to make jewelry

Answer: D

Objective: 1.2

Global Outcomes: G2

11) Which of the following is a chemical change?

A) cutting a rope

B) bending a steel rod

C) making a snowman

D) burning sugar

E) melting gold

Answer: D

Objective: 1.2

Global Outcomes: G2

12) Au is the symbol for

A) gold.

B) silver.

C) argon.

D) aluminum.

E) sodium.

Answer: A

Objective: 1.3

Global Outcomes: G2

***Select the correct symbol for the element.***

13) Aluminum

A) Al

B) Am

C) Au

D) Sn

E) Ag

Answer: A

Objective: 1.3

Global Outcomes: G2

14) Iron

A) Ir

B) Fs

C) Fe

D) In

E) FE

Answer: C

Objective: 1.3

Global Outcomes: G2

15) Sodium

A) So

B) Na

C) No

D) Sm

E) Au

Answer: B

Objective: 1.3

Global Outcomes: G2

16) Potassium

A) P

B) Po

C) Pt

D) K

E) Ko

Answer: D

Objective: 1.3

Global Outcomes: G2

17) Silver

A) S

B) Si

C) Ag

D) Au

E) AG

Answer: C

Objective: 1.3

Global Outcomes: G2

18) Ca is the symbol for

A) calcium.

B) carbon.

C) cobalt.

D) copper.

E) cadmium.

Answer: A

Objective: 1.3

Global Outcomes: G2

19) What elements are in hydroxyapatite, Ca5(PO4)3OH, a major compound in human bones and teeth?

A) carbon, potassium, oxygen, hydrogen

B) calcium, phosphorus, oxygen, hydrogen

C) carbon, phosphorus, oxygen, helium

D) calcium, phosphorus, oxygen, helium

E) carbon, potassium, oxygen, helium

Answer: B

Objective: 1.3

Global Outcomes: G2

20) Which of the following is a characteristic of the modern periodic table?

A) A group is a horizontal row on the periodic table.

B) A period is a column on the periodic table.

C) The elements in each group have similar chemical properties.

D) The B groups contain the representative elements.

E) The A groups contain the transition elements.

Answer: C

Objective: 1.4

Global Outcomes: G2

21) Which of the following properties is NOT a characteristic of the Group 1A (1) elements (alkali metals)?

A) They are shiny.

B) They are good conductors of heat.

C) They react vigorously with water.

D) Most of them are liquids at room temperature.

E) They are good conductors of electricity.

Answer: D

Objective: 1.4

Global Outcomes: G2

22) The Group 8A (18) elements

A) are unreactive and are rarely found in combination with other elements.

B) are good conductors of electricity.

C) melt at high temperatures.

D) are liquids at room temperature.

E) react vigorously with water.

Answer: A

Objective: 1.4

Global Outcomes: G2

23) Which of the following elements is a metal?

A) nitrogen

B) fluorine

C) argon

D) strontium

E) phosphorus

Answer: D

Objective: 1.4

Global Outcomes: G2

24) Which of the following is a characteristic of nonmetals?

A) shiny

B) malleable

C) good conductors of heat

D) low melting points

E) good conductors of electricity

Answer: D

Objective: 1.4

Global Outcomes: G2

25) Which of the following elements is a nonmetal?

A) nitrogen

B) sodium

C) iron

D) silver

E) calcium

Answer: A

Objective: 1.4

Global Outcomes: G2

26) Which of the following elements is a noble gas?

A) oxygen

B) chlorine

C) bromine

D) argon

E) nitrogen

Answer: D

Objective: 1.4

Global Outcomes: G2

27) Which element would have physical and chemical properties similar to chlorine?

A) Ar

B) Br

C) S

D) O

E) P

Answer: B

Objective: 1.4

Global Outcomes: G2

28) What is the symbol of the element in Group 4A (14) and Period 2?

A) Be

B) Mg

C) Ca

D) C

E) Si

Answer: D

Objective: 1.4

Global Outcomes: G2

29) Identify the noble gas in the following list.

A) helium

B) nitrogen

C) oxygen

D) gold

E) chlorine

Answer: A

Objective: 1.4

Global Outcomes: G2

30) The element in this list with chemical properties similar to magnesium is

A) sodium.

B) boron.

C) carbon.

D) strontium.

E) chlorine.

Answer: D

Objective: 1.4

Global Outcomes: G2

31) The elements lithium, sodium, and potassium

A) are isotopes of each other.

B) are in the same period of elements.

C) have the same number of neutrons.

D) are in the same group.

E) have the same mass number.

Answer: D

Objective: 1.4

Global Outcomes: G2

32) The elements sodium, magnesium, and silicon

A) are isotopes of each other.

B) are in the same period of elements.

C) have the same number of neutrons.

D) are in the same group.

E) have the same mass number.

Answer: B

Objective: 1.4

Global Outcomes: G2

1.2 Matching Questions

***Identify each of the following transformations as a chemical or physical change.***

A) chemical

B) physical

1) water evaporating

Objective: 1.2

Global Outcomes: G2

2) a button falling off of a shirt

Objective: 1.2

Global Outcomes: G2

3) silver tarnishing

Objective: 1.2

Global Outcomes: G2

4) cutting the grass

Objective: 1.2

Global Outcomes: G2

5) a nail rusting

Objective: 1.2

Global Outcomes: G2

Answers: 1) B 2) B 3) A 4) B 5) A

***Identify each of the following transformations as a chemical or physical change***

A) chemical

B) physical

6) baking a cake

Objective: 1.2

Global Outcomes: G2

7) placing photographs in a scrapbook

Objective: 1.2

Global Outcomes: G2

8) formation of green leaves on a plant

Objective: 1.2

Global Outcomes: G2

9) burning leaves

Objective: 1.2

Global Outcomes: G2

10) melting ice

Objective: 1.2

Global Outcomes: G2

Answers: 6) A 7) B 8) A 9) A 10) B

***Do the following represent elements in a group, a period, or neither?***

A) period

B) group

C) neither

11) Li, C, F

Objective: 1.4

Global Outcomes: G2

12) F, S, P

Objective: 1.4

Global Outcomes: G2

13) O, S, Se

Objective: 1.4

Global Outcomes: G2

14) He, H, I

Objective: 1.4

Global Outcomes: G2

Answers: 11) A 12) C 13) B 14) C

***Match the correct symbols with the names of elements.***

A) Ca

B) C

C) Cl

D) Cu

E) Co

15) calcium

Objective: 1.3

Global Outcomes: G2

16) copper

Objective: 1.3

Global Outcomes: G2

17) carbon

Objective: 1.3

Global Outcomes: G2

18) chlorine

Objective: 1.3

Global Outcomes: G2

19) cobalt

Objective: 1.3

Global Outcomes: G2

Answers: 15) A 16) D 17) B 18) C 19) E

***Classify the following elements.***

A) halogen

B) noble gas

C) metalloid

D) transition element

E) alkali metal

F) alkaline earth metal

20) sodium

Objective: 1.4

Global Outcomes: G2

21) argon

Objective: 1.4

Global Outcomes: G2

22) bromine

Objective: 1.4

Global Outcomes: G2

23) copper

Objective: 1.4

Global Outcomes: G2

24) magnesium

Objective: 1.4

Global Outcomes: G2

25) phosphorus

Objective: 1.4

Global Outcomes: G2

Answers: 20) E 21) B 22) A 23) D 24) F 25) C

***Classify the following elements as metals, nonmetals or metalloids.***

A) metal

B) metalloid

C) nonmetal

26) chlorine

Objective: 1.4

Global Outcomes: G2

27) cobalt

Objective: 1.4

Global Outcomes: G2

28) sulfur

Objective: 1.4

Global Outcomes: G2

29) silicon

Objective: 1.4

Global Outcomes: G2

30) nickel

Objective: 1.4

Global Outcomes: G2

Answers: 26) C 27) A 28) C 29) B 30) A

1.3 True/False Questions

1) Gold is an element.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

2) Black coffee is a homogeneous mixture.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

3) A solid has a definite shape and volume.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

4) Molecules of a gas are very close together.

Answer: FALSE

Objective: 1.2

Global Outcomes: G2

5) Water vapor is a gas.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

6) The first step in the scientific method is to draw a conclusion.

Answer: FALSE

Objective: 1.1

Global Outcomes: G1

7) Doing experiments to test your hypothesis is part of the scientific method.

Answer: TRUE

Objective: 1.1

Global Outcomes: G1

8) The symbol for potassium is P.

Answer: FALSE

Objective: 1.3

Global Outcomes: G2

9) The symbol for gold is Au.

Answer: TRUE

Objective: 1.3

Global Outcomes: G2

10) Sulfur is a nonmetal.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

11) Chromium is a metal.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

12) Radon is a metal.

Answer: FALSE

Objective: 1.2

Global Outcomes: G2

13) Mercury is a metal.

Answer: TRUE

Objective: 1.2

Global Outcomes: G2

14) Iodine is a metal.

Answer: FALSE

Objective: 1.2

Global Outcomes: G2