

*Introduction to Chemistry, 4e (Russo)*

**Chapter 1 What Is Chemistry?**

1.1 Multiple-Choice Questions

1) What is the name given to the element with the symbol "P"?

- A) Polonium
- B) Protactinium
- C) Phosphorus
- D) Palladium

Answer: C

Topic: Section 1.2

2) What is the name of the element whose symbol is "Co"?

- A) Carbon
- B) Chromium
- C) Coal
- D) Cobalt

Answer: D

Topic: Section 1.2

3) What is the name given to the element with the symbol "K"?

- A) Kallium
- B) Potassium
- C) Phosphorus
- D) Krypton

Answer: B

Topic: Section 1.2

4) What is the name given to the element with the symbol "As"?

- A) silver
- B) argon
- C) antimony
- D) arsenic
- E) astatine

Answer: D

Topic: Section 1.2

5) By what chemical symbol do we know the element chromium?

- A) Cr
- B) Co
- C) C
- D) Cs

Answer: A

Topic: Section 1.2

6) What chemical symbol has been given to the element sodium?

- A) S
- B) K
- C) Na
- D) Sr

Answer: C

Topic: Section 1.2

7) By what chemical symbol do we know the element magnesium?

- A) Mn
- B) Ma
- C) M
- D) Mg

Answer: D

Topic: Section 1.2

8) Which of the following is a pure, elemental substance?

- A)  $\text{Br}_2(l)$
- B)  $\text{SO}_2(g)$
- C)  $\text{H}_2\text{O}(l)$
- D) air

Answer: A

Topic: Section 1.2

9) Which of the following is a compound?

- A)  $\text{F}_2(g)$
- B)  $\text{O}_2(g)$
- C)  $\text{Na}(s)$
- D)  $\text{H}_2\text{O}_2(l)$

Answer: D

Topic: Section 1.2

10) Which element pair is **incorrect**?

- A) Au - gold
- B) Pb - iron
- C) Ag - silver
- D) Hg - mercury
- E) Mg - magnesium

Answer: B

Topic: Section 1.2

11) Which of the following represents a chemical change?

- A) sugar dissolving into hot coffee
- B) ice melting to form liquid water
- C) water boiling to form steam
- D) steel turning to rust in salt air

Answer: D

Topic: Section 1.4

12) Which of the following represents a chemical change?

- A) sublimation of dry ice
- B) molding melted silver
- C) frying an egg
- D) breaking a piece of glass

Answer: C

Topic: Section 1.4

13) Which of the following represents a physical change only?

- A) steel turning to rust in salt air
- B) liquid water freezing into ice cubes
- C) milk turning "sour"
- D) wood burning to form ashes

Answer: B

Topic: Section 1.4

14) Which of the following represents a physical change only?

- A) barbecuing a steak
- B) adding electricity to water to produce hydrogen and oxygen gas
- C) chopping a piece of wood
- D) burning a propane camping stove

Answer: C

Topic: Section 1.4

15) A dilute sugar solution is an example of a(n) \_\_\_\_\_.

- A) homogeneous mixture
- B) heterogeneous mixture
- C) compound
- D) element

Answer: A

Topic: Section 1.3

16) Which of the following is an example of a homogenous mixture?

- A) sand
- B) copper
- C) air
- D) sugar

Answer: C

Topic: Section 1.2

17) Which of the following is an example of a heterogeneous mixture?

- A) seawater
- B) steel
- C) milk
- D) chicken noodle soup

Answer: D

Topic: Section 1.2

18) What is another name for a homogeneous mixture?

- A) pure substance
- B) compound
- C) solution
- D) element

Answer: C

Topic: Section 1.2

19) Which of the following represents a chemical property of a specific metal?

- A) It has magnetic properties.
- B) It melts at 800 °C.
- C) Its density is higher than that of water.
- D) When in contact with air it corrodes.

Answer: D

Topic: Section 1.4

20) Which of the following may **not** be classified as matter?

- A) tooth filling
- B) sand
- C) heat
- D) seawater

Answer: C

Topic: Section 1.2

21) Which of the following represents a physical property?

- A) Sodium metal is extremely reactive with chlorine gas.
- B) Mercury is a shiny liquid at room temperature.
- C) The tendency of aluminum to "oxidize"
- D) The flammability of butane fuel.
- E) The unreactive nature of argon gas

Answer: B

Topic: Section 1.3

22) The "disappearance" of mothballs is an example of \_\_\_\_\_.

- A) melting
- B) evaporation
- C) condensation
- D) sublimation

Answer: D

Topic: Section 1.3

23) The term used to describe the conversion from a gaseous state to a liquid state is \_\_\_\_\_.

- A) melting
- B) evaporation
- C) condensation
- D) sublimation

Answer: C

Topic: Section 1.3

24) The term used to describe the conversion from a solid state to a gaseous state is \_\_\_\_\_.

- A) melting
- B) evaporation
- C) condensation
- D) sublimation

Answer: D

Topic: Section 1.3

25) What is the correct statement about an atom?

- A) It is always pure.
- B) It is the smallest particle of an element.
- C) It is the smallest particle of a molecule.
- D) It can be isolated.

Answer: B

Topic: Section 1.2

26) Which of the following is **not** a chemical property of carbon dioxide?

- A) It is a critical component in photosynthesis.
- B) It is used in fire extinguishers because it does not support combustion.
- C) It is used to pump up bicycle tires.
- D) It is soluble in blood.

Answer: C

Topic: Section 1.4

27) The only way one can change an element to another is via \_\_\_\_\_.

- A) a chemical reaction
- B) a physical reaction
- C) a nuclear reaction
- D) applying heat

Answer: C

Topic: Section 1.2

28) Which term best completes this definition?

*An attempt to explain why a law exists is a(n) \_\_\_\_\_.*

- A) experiment
- B) law
- C) theory
- D) model

Answer: C

Topic: Section 1.5

29) Which of the following can be classified as matter?

- A) ice
- B) sugar
- C) graphite
- D) All of the above are matter.

Answer: D

Topic: Section 1.2

30) Which of the following is a pure substance?

- A) blood
- B) block of aluminum
- C) air
- D) orange juice

Answer: B

Topic: Section 1.2

31) Which of the following **cannot** be classified as matter?

- A) air
- B) temperature
- C) fog
- D) oxygen molecule

Answer: B

Topic: Section 1.2

## 1.2 True/False Questions

1) The earth, taken together as a unit, may be considered one very large piece of heterogeneous matter.

Answer: TRUE

Topic: Section 1.2

2) The smallest possible piece of gold which still retains all the properties of gold is a cube shape containing eight gold atoms.

Answer: FALSE

Topic: Section 1.2

3) Water is heterogeneous matter because it is made from twice as much hydrogen as oxygen ( $H_2O$ ).

Answer: FALSE

Topic: Section 1.2

4) Iced tea, with sugar completely dissolved in it, is an example of homogeneous matter.

Answer: TRUE

Topic: Section 1.2

5) When milk goes "sour," only a physical change has occurred.

Answer: FALSE

Topic: Section 1.4

6) An atom is the smallest possible single piece of an element that still retains all the properties of that element.

Answer: TRUE

Topic: Section 1.2

7) The chemical compounds  $CO$  and  $CO_2$  have exactly the same properties, because both are made from carbon and oxygen.

Answer: FALSE

Topic: Section 1.4

- 8) It is scientifically proper to construct a theory without then doing any experiments to test it.  
Answer: FALSE  
Topic: Section 1.5
- 9) A theory summarizes facts in general statements.  
Answer: FALSE  
Topic: Section 1.5
- 10) A physical picture used to illustrate a theory is a model.  
Answer: TRUE  
Topic: Section 1.5
- 11) Air is a homogeneous mixture of nitrogen, oxygen and hydrogen.  
Answer: FALSE  
Topic: Section 1.2
- 12) Evaporated ethanol can be isolated by cooling, without changing its disinfectant properties.  
Answer: TRUE  
Topic: Section 1.3
- 13) Tap water is a homogeneous mixture, while freshly distilled water is a compound.  
Answer: TRUE  
Topic: Section 1.3
- 14) Cooking vegetables with steam is a chemical process.  
Answer: TRUE  
Topic: Section 1.2
- 15) If 1 gram of ice needs a certain amount of heat to melt, the same amount of energy must be removed to convert it back to ice at its melting point.  
Answer: TRUE  
Topic: Section 1.3

### 1.3 Matching Questions

*Match the event with the name of the process from the list below.*

- A) sublimation
- B) evaporation
- C) freezing
- D) condensation
- E) melting

1) The pond ices in winter.

Topic: Section 1.3

2) Mothballs disappear when placed between clothes.

Topic: Section 1.3

3) An ice cube disappears when left in a freezer for a year

Topic: Section 1.3

4) Water droplets form on the mirror of the medicine cabinet while taking a shower.

Topic: Section 1.3

5) While heating water in a tea kettle, part of it disappears.

Topic: Section 1.3

6) Ice cream liquefies on a hot day.

Topic: Section 1.3

7) The block of dry ice in an ice cream parlor starts smoking once the store attendant opens the ice cream freezer.

Topic: Section 1.3

8) Margarine is transformed into a liquid while frying an egg.

Topic: Section 1.3

9) Liquid nitrogen is transformed into a colorless gas.

Topic: Section 1.3

10) Water is collected in the gas tank of a car in a humid day.

Topic: Section 1.3

Answers: 1) C 2) A 3) A 4) D 5) B 6) E 7) A 8) E 9) B 10) D



*Match the substances with its classification from the list below.*

- A) compound
- B) element
- C) homogeneous mixture
- D) heterogeneous mixture

11) Lemonade (without pulp)

Topic: Section 1.2

12) Fully rusted nail

Topic: Section 1.2

13) Distilled water

Topic: Section 1.2

14) Table salt

Topic: Section 1.2

15) Intravenous liquid

Topic: Section 1.2

16) Diamond

Topic: Section 1.2

17) Chlorine gas

Topic: Section 1.2

18) Air in a smog-free environment

Topic: Section 1.2

19) Oil-vinegar salad dressing

Topic: Section 1.2

20) Breakfast cereal

Topic: Section 1.2

21) Oxidized wine

Topic: Section 1.2

22) 24-karat golden bracelet

Topic: Section 1.2

23) 14-karat golden bracelet

Topic: Section 1.2

24) Gasoline

Topic: Section 1.2

25) Sand  
Topic: Section 1.2

26) Brass  
Topic: Section 1.2

27) Steel  
Topic: Section 1.2

28) Vitamin C tablet  
Topic: Section 1.2

29) Contents of a helium balloon  
Topic: Section 1.2

30) Golden nugget  
Topic: Section 1.2

31) Graphite  
Topic: Section 1.2

Answers: 11) C 12) A 13) A 14) A 15) C 16) B 17) B 18) C 19) D 20) D  
21) C 22) B 23) C 24) C 25) A 26) C 27) C 28) A 29) B 30) B 31) B

Match the event with the type of process involved from the list below.

A) physical process

B) chemical process

32) Mixing salt and water

Topic: Section 1.4

33) Iron rusting

Topic: Section 1.4

34) Paper burning

Topic: Section 1.4

35) Mixing ammonia and bleach

Topic: Section 1.4

36) Mothballs subliming

Topic: Section 1.4

37) Cooking of an egg

Topic: Section 1.4

38) Molding iron

Topic: Section 1.4

39) Diluting orange juice

Topic: Section 1.4

40) Digesting a sandwich

Topic: Section 1.4

41) Separating iron filings from sand with a magnet

Topic: Section 1.4

42) Using gasoline to drive a car

Topic: Section 1.4

43) Filtering a liquid to remove suspended material

Topic: Section 1.4

44) Molded cheese

Topic: Section 1.4

Answers: 32) A 33) B 34) B 35) B 36) A 37) B 38) A 39) A 40) B 41) A 42) B 43) A 44) B

*Match the element with the symbol from the list below.*

- A) Pu
- B) Po
- C) P
- D) K
- E) Pt
- F) Pd
- G) Pa

45) Potassium  
Topic: Section 1.2

46) Polonium  
Topic: Section 1.2

47) Phosphorus  
Topic: Section 1.2

48) Plutonium  
Topic: Section 1.2

49) Platinum  
Topic: Section 1.2

50) Palladium  
Topic: Section 1.2

51) Protactinium  
Topic: Section 1.2

Answers: 45) D 46) B 47) C 48) A 49) E 50) F 51) G

*Match the element with the symbol from the list below.*

- A) N
- B) No
- C) Ne
- D) Nd
- E) Ni

52) Nitrogen  
Topic: Section 1.2

53) Neodymium  
Topic: Section 1.2

54) Nobelium  
Topic: Section 1.2

55) Neon  
Topic: Section 1.2

56) Nickel  
Topic: Section 1.2

Answers: 52) A 53) D 54) B 55) C 56) E