

*Test Bank for General Organic and
Biological Chemistry 8th Edition by
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Chapter 01

1. Which choice is the best definition of matter?
- a. Anything that has a solid form
 - b. Anything that can be seen
 - c. Anything that takes up space and has mass
 - d. Anything that can undergo chemical reactions

ANSWER: c

2. What is mass?
- a. The amount of matter present in a sample
 - b. The size of a sample
 - c. The amount of space occupied by a sample
 - d. The dimensions of a sample

ANSWER: a

3. What is an example of matter?
- a. Sunlight
 - b. Infrared radiation
 - c. Limestone rock
 - d. Electricity

ANSWER: c

4. What is true of matter?
- a. It can be natural, but not artificial (human-made).
 - b. It can be living or nonliving.
 - c. It can be energy.
 - d. It is visible, not invisible.

ANSWER: b

5. Which of the following is a property of both liquids and solids, but not gases?
- a. Definite shape
 - b. Indefinite shape
 - c. Definite volume
 - d. Indefinite volume

ANSWER: c

6. What is unique to gases?
- a. Definite shape and definite volume
 - b. Definite shape and indefinite volume
 - c. Indefinite shape and definite volume
 - d. Indefinite shape and indefinite volume

ANSWER: d

7. Which of the following is a property of both gases and liquids?
- a. Definite shape

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- b. Indefinite shape
- c. Definite volume
- d. Indefinite volume

ANSWER: b

8. A flexible 2-L bottle of an unknown chemical is subjected to pressure and decreases in volume to 1.75 L. What does this tell you about the chemical?

- a. It is a solid or liquid.
- b. It is a liquid.
- c. It is a liquid or gas.
- d. It is a gas.

ANSWER: d

9. In which of the following pairs of properties are both properties *chemical* properties?

- a. Freezes at 10°C and is nonflammable
- b. Decomposes at 500°C and reacts with bromine
- c. Is a poor conductor of heat and is reddish brown in color
- d. Has a low density and is very hard

ANSWER: b

10. When a substance undergoes a *chemical* change, it is always true that

- a. it liquifies.
- b. it changes from a solid to a gas.
- c. it is converted to a new kind of matter with a different composition.
- d. the temperature of the substance increases.

ANSWER: c

11. The description "two substances present, two phases present" is correct for

- a. heterogeneous mixtures
- b. homogeneous mixtures
- c. elements
- d. compounds

ANSWER: a

12. What is an example of a homogeneous mixture?

- a. Lemonade made by mixing lemonade powder and water
- b. A bar of pure gold that can be melted down to a liquid
- c. Oxygen gas stored in a cylinder
- d. A chocolate chip muffin made by adding chocolate chips to muffin mix

ANSWER: a

13. Which of the following statements is *correct*?

- a. Elements, but not compounds, are pure substances.
- b. Compounds, but not elements, are pure substances.

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- c. Both elements and compounds are pure substances.
- d. Neither elements nor compounds are pure substances.

ANSWER: c

14. An element is a substance that
- a. can be broken down into simpler substances by physical means.
 - b. cannot be broken down into simpler substances by physical means.
 - c. can be broken down into simpler substances by chemical means.
 - d. cannot be broken down into simpler substances by chemical or physical means.

ANSWER: d

15. A pure substance F is found to change upon heating into two new pure substances M and Y. Both M and Y may be decomposed by chemical means. From this, we may conclude that
- a. F is an element, and M and Y are compounds.
 - b. F is a compound, and M and Y are elements.
 - c. F, M, and Y are all elements.
 - d. F, M, and Y are all compounds.

ANSWER: d

16. Which of the following statements concerning the known elements is *correct*?
- a. No new elements have been identified within the last 40 years.
 - b. Most elements occur naturally.
 - c. 108 elements are known at present.
 - d. Scientists have synthesized all possible non-natural elements.

ANSWER: b

17. The most abundant elements in the universe and in the Earth's crust are, respectively,
- a. oxygen and iron.
 - b. hydrogen and helium.
 - c. helium and carbon.
 - d. hydrogen and oxygen.

ANSWER: d

18. Which chemical symbol represents sodium?
- a. S
 - b. Si
 - c. Na
 - d. N

ANSWER: c

19. Which chemical symbol represents silver?
- a. Au
 - b. Si
 - c. Ag

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d. S

ANSWER: c

20. What element is represented by the symbol Fe?

- a. Tin
- b. Lead
- c. Silver
- d. Iron

ANSWER: d

21. Which one of the following statements about atoms is *incorrect*?

- a. An atom is the smallest "piece" of an element that can exist and still have the properties of the element.
- b. Free isolated atoms are rarely encountered in nature.
- c. Atoms may be decomposed using chemical change.
- d. Only one kind of atom may be present in a homoatomic molecule.

ANSWER: c

22. Which one of the following statements about heteroatomic molecules is *correct*?

- a. Two atoms in a heteroatomic molecule may be the same.
- b. Upon chemical subdivision, heteroatomic molecules always yield two or more kinds of atoms.
- c. Heteroatomic molecules maintain the properties of their constituent elements.
- d. Molecules of certain elements are heteroatomic.

ANSWER: b

23. Which of the following pairings of chemical formulas and "molecular descriptions" is *incorrect*?

- a. LiCN and "triatomic"
- b. KCl and "heteroatomic"
- c. N₂ and "homoatomic"
- d. SiO₂ and "diatomic"

ANSWER: d

24. In which of the following pairs of chemical formulas do both formulas represent compounds?

- a. O₂ and O₃
- b. CO₂ and O₂
- c. HCN and N₂
- d. N₂O₄ and NO₂

ANSWER: d

25. Which of the following is a correct description of a sample of ice cubes in water?

- a. One phase present, one substance present
- b. One phase present, two substances present
- c. Two phases present, one substance present

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- d. Two phases present, two substances present

ANSWER: c

26. Consider the chemical formulas CoI_2 and COI_2 . It is true that they

- a. contain identical kinds of atoms.
- b. represent the same compound.
- c. contain different kinds and numbers of atoms.
- d. can be described by none of the above.

ANSWER: c

27. In which of the following pairs of chemical formulas do the two members of the pair contain the same number of elements as well as the same number of atoms?

- a. Cs and CS
- b. CoBr_2 and COBr_2
- c. CoCl_2 and CoCl_3
- d. NH_4Br and NiSO_4

ANSWER: d

28. The total number of atoms present in one formula unit of $\text{Co}_2(\text{SO}_4)_3$ is

- a. 14
- b. 15
- c. 16
- d. 17

ANSWER: d

29. Which of the following changes is a *chemical* change?

- a. Melting of ice
- b. Pulverizing of hard sugar cubes
- c. Rusting of iron
- d. Boiling water

ANSWER: c

30. The description “two substances present, two phases present” is *correct* for which combination, assuming that they are mixed together?

- a. Ice and water
- b. Oil and water
- c. Milk and water
- d. Sugar dissolved in water

ANSWER: b

31. Which of the following statements concerning mixtures is *correct*?

- a. The composition of a homogeneous mixture cannot vary.
- b. A homogeneous mixture can have components present in two physical states.

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- c. It is impossible for a mixture containing only one phase to be heterogeneous.
- d. A heterogeneous mixture can only be separated by chemical means.

ANSWER: c

32. Which of the following statements concerning pure substances is *correct*?

- a. Elements, but not compounds, are pure substances.
- b. A pure substance can never be separated into simpler pure substances using chemical means.
- c. Pure substances cannot have a variable composition.
- d. Pure substances can be separated into simpler pure substances by physical means.

ANSWER: c

33. Which of the following statements about compounds and mixtures is *correct*?

- a. Both mixtures and compounds must contain two or more kinds of atoms.
- b. Mixtures must always contain at least one compound.
- c. Both mixtures and compounds can have a variable composition.
- d. Compounds must always contain at least one mixture.

ANSWER: a

34. Which of the following statements concerning elemental abundances in Earth's crust is *correct*?

- a. One element accounts for over one-half of all atoms present.
- b. Silicon and aluminum are the two most abundant elements in terms of atom percent.
- c. Elemental abundances in Earth's crust closely parallel elemental abundances in the universe as a whole.
- d. The most abundant element in Earth's crust is silicon.

ANSWER: a

35. In which of the following sequences of elements do all members of the sequence have chemical symbols starting with the same letter?

- a. Sulfur, silicon, sodium
- b. Gold, silver, aluminum
- c. Potassium, phosphorus, lead
- d. Silver, silicon, tin

ANSWER: b

36. In which of the following pairs of chemical formulas do both members of the pair have the same number of atoms per molecule?

- a. NaSCN and H₂CO₃
- b. CoCl₂ and COCl₂
- c. O₂N₂ and NH₃
- d. CaCO₃ and Al₂(SO₄)₃

ANSWER: c

37. In which of the following sequences of chemical formulas do all members of the sequence fit the description "heteroatomic and triatomic"?

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- a. HCN, H₂O and O₃
- b. CO₂, NO₂ and N₂O
- c. S₂O, SO₂, and SO₃
- d. CO₂, CO, and O₂

ANSWER: b

Use the following to answer the questions below:

In each of the following multiple-choice questions, characterize EACH of the three given statements as being TRUE or FALSE and then indicate the collective true-false status of the statements using the choices.

- (a) All three statements are true.
- (b) Two of the three statements are true.
- (c) Only one of the statements is true.
- (d) None of the statements is true.

38. Statements:

- (1) No more than two visibly distinct phases may be present in a homogeneous mixture.
 - (2) Elements are chemically rather than physically combined in a compound.
 - (3) A common characteristic for both solids and liquids is a definite volume.
- a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: b

39. Statements:

- (1) The determination of a physical property of a substance causes no change in the identity of the substance.
 - (2) Matter is anything that has mass, occupies space, and can be seen by the naked eye.
 - (3) The two most abundant elements in the Earth's crust are oxygen and carbon.
- a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: c

40. Statements:

- (1) A basis for distinguishing between an element and a compound is whether the substance can be decomposed into other substances using chemical means.
 - (2) Compounds, but not elements, can be broken down by physical means.
 - (3) The elements silver, gold, and aluminum all have chemical symbols that start with the letter A.
- a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: b

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41. Statements:

- (1) The first letter in a chemical symbol is always the same as the first letter in the element's name.
- (2) Two elements account for over 70% of the atoms in the Earth's crust.
- (3) The limit of chemical subdivision for a compound is a molecule.
 - a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: b

42. Statements:

- (1) The classification "triatomic molecule" denotes molecules in which three different elements are present.
- (2) Common physical properties for a substance include color, melting point, boiling point, flammability, and hardness.
- (3) The chemical formulas HN_3 and NH_3 represent two ways of denoting the same compound.
 - a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: d

43. Statements:

- (1) A molecule is a group of two or more atoms that functions as a unit because the atoms are bound together by chemical forces.
- (2) The crushing of ice to make ice chips is a physical procedure that involves a chemical change.
- (3) Samples of pure substances can be found naturally.
 - a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: b

44. Statements:

- (1) When the formula for a compound contains parentheses, it is an indication that the compound is unstable and subject to decomposition.
- (2) The fact that an unknown substance reacts with chlorine is an insufficient basis for classifying the unknown as a compound.
- (3) All chemical symbols use a two-letter notation to represent the name of an element.
 - a. All three statements are true.
 - b. Two of the three statements are true.
 - c. Only one of the statements is true.
 - d. None of the statements is true.

ANSWER: c

45. Statements:

- (1) Temperature and pressure are the only major factors that determine the state of matter (solid, liquid, gas) observed for a particular substance.

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(2) The components of a mixture maintain their identity if the mixture is heterogeneous but lose their identity if the mixture is homogeneous.

(3) No more than six atoms may be present in a heteroatomic molecule.

- a. All three statements are true.
- b. Two of the three statements are true.
- c. Only one of the statements is true.
- d. None of the statements is true.

ANSWER: d

46. Statements:

(1) A compound must always contain two or more types of atoms.

(2) The description "one substance present, two phases present, all molecules are homoatomic" is consistent with a sample that is an element.

(3) The number of known elements is less than 100.

- a. All three statements are true.
- b. Two of the three statements are true.
- c. Only one of the statements is true.
- d. None of the statements is true.

ANSWER: b

47. For the elements calcium, iron, and beryllium, choose the appropriate characterization of the set's chemical symbols from the response list.

- a. All symbols have one letter.
- b. All symbols have two letters.
- c. All symbols start with the same letter.
- d. All symbols start with a letter other than the first letter of the element's English name.

ANSWER: b

48. For the elements silver, sodium, and potassium, choose the appropriate characterization of the set's chemical symbols from the response list.

- a. All symbols have one letter.
- b. All symbols have two letters.
- c. All symbols start with the same letter.
- d. All symbols start with a letter other than the first letter of the element's English name.

ANSWER: d

49. For the elements iodine, fluorine, and nitrogen, choose the appropriate characterization of the set's chemical symbols from the response list.

- a. All symbols have one letter.
- b. All symbols have two letters.
- c. All symbols start with the same letter.
- d. All symbols start with a letter other than the first letter of the element's English name.

ANSWER: a

50. For the elements gold, lead, and bromine, choose the appropriate characterization of the set's chemical symbols from

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the response list.

- a. All symbols have one letter.
- b. All symbols have two letters.
- c. All symbols start with the same letter.
- d. All symbols start with a letter other than the first letter of the element's English name.

ANSWER: b

51. For the elements silicon, sulfur, and tin, choose the appropriate characterization of the set's chemical symbols from the response list.

- a. All symbols have one letter.
- b. All symbols have two letters.
- c. All symbols start with the same letter.
- d. All symbols start with a letter other than the first letter of the element's English name.

ANSWER: c

52. Give the classification of matter when two substances exist with three phases present.

- a. Heterogeneous mixture
- b. Homogeneous mixture
- c. Compound
- d. Element

ANSWER: a

53. Give the classification of matter when two substances exist with two phases present.

- a. Heterogeneous mixture
- b. Homogeneous mixture
- c. Compound
- d. Element

ANSWER: a

54. Give the classification of matter when two substances exist with one phase present.

- a. Heterogeneous mixture
- b. Homogeneous mixture
- c. Compound
- d. Element

ANSWER: b

55. Give the classification of matter when only one type of heteroatomic molecules is present.

- a. Heterogeneous mixture
- b. Homogeneous mixture
- c. Compound
- d. Element

ANSWER: c

56. A substance is silvery-gray in color. Choose the appropriate classification from the response list below.

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- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: a

57. A substance decomposes upon heating. Choose the appropriate classification from the response list below.

- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: c

58. A substance is composed of diatomic molecules. Choose the appropriate classification from the response list below.

- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: a

59. A substance reacts vigorously with chlorine. Choose the appropriate classification from the response list below.

- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: a

60. A substance has a variable composition. Choose the appropriate classification from the response list below.

- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: d

61. A substance has a freezing point of -20°C . This is an example of a

- a. physical property.
- b. chemical property.
- c. physical change.
- d. chemical change.

ANSWER: a

62. A substance is melted. Choose the appropriate classification from the response list below.

- a. Could be an element or a compound
- b. Could be an element but not a compound

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- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: a

63. A substance has a high density. Choose the appropriate classification from the response list below

- a. Could be an element or a compound
- b. Could be an element but not a compound
- c. Could be a compound but not an element
- d. Can neither be an element nor a compound

ANSWER: a

64. Substance A spontaneously decomposes into substances B and C under the right conditions. Based on this information, substance A

- a. could be an element or a compound.
- b. could be an element but not a compound.
- c. could be a compound but not an element.
- d. can neither be an element nor a compound.

ANSWER: c

65. A substance is reacted with chlorine gas. The substance

- a. could be an element or a compound.
- b. could be an element but not a compound.
- c. could be a compound but not an element.
- d. can neither be an element nor a compound.

ANSWER: a

66. Which of the following substances is both homoatomic and tetraatomic?

- a. HCN
- b. H_2O_2
- c. P_4
- d. H_2CO_3

ANSWER: c

67. Which of the following substances is both heteroatomic and triatomic?

- a. HCN
- b. H_2O_2
- c. P_4
- d. H_2CO_3

ANSWER: a

68. Which of the following substances contains the same number of elements as atoms?

- a. HCN

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- b. H_2O_2
- c. P_4
- d. H_2CO_3

ANSWER: a

69. Which of the following substances contains fewer atoms of one kind than other kinds?

- a. HCN
- b. H_2O_2
- c. P_4
- d. H_2CO_3

ANSWER: d

70. Which of the following substances contains the largest total number of atoms??

- a. HCN
- b. H_2O_2
- c. P_4
- d. H_2CO_3

ANSWER: d