

Chapter 1

Chemistry and the Atomic/Molecular View of Matter

Multiple Choice Questions

Section 1.1

Difficulty Level: easy

1. Chemistry can be defined as the study of
- a. the physical sciences.
 - b. the chemical symbols.
 - * c. the composition, properties, and transformations of matter.
 - d. theories and laws.
 - e. the phases of matter.

Section 1.2

Difficulty Level: easy

2. A tentative explanation used to explain observed facts or laws is called
- a. the scientific method.
 - b. a scientific law.
 - c. a theory.
 - * d. a hypothesis.
 - e. an empirical fact.

Section 1.2

Difficulty Level: medium

3. A broad generalization based on the results of many experiments is called
- a. the scientific method.
 - * b. a scientific law.
 - c. a theory.
 - d. a hypothesis.
 - e. an empirical fact.

Section 1.2

Difficulty Level: hard

4. Which of the following is false?
- a. Experiments can be used to show that a theory is somewhat limited in scope.
 - b. A hypothesis which has successfully withstood many tests eventually can become a theory.
 - * c. In general, a theory can be proven to be absolutely true.
 - d. In general, a theory cannot be proven to be absolutely true.
 - e. A theory is an explanation of general principles which has withstood repeated testing.

Section 1.3

Difficulty Level: easy

5. An example of an element is

- a. glucose, $\text{C}_6\text{H}_{12}\text{O}_6$.
- b. table salt, NaCl .
- * c. gold, Au .
- d. an oxide of iron, Fe_2O_3 .
- e. limestone, CaCO_3 .

Section 1.3

Difficulty Level: easy

6. An example of a chemical compound is

- a. iron metal, Fe .
- b. brass, a solution of Cu and Zn .
- c. ozone gas, O_3 .
- d. sand.
- * e. table salt, NaCl .

Section 1.3

Difficulty Level: medium

7. The two types of pure substances are

- * a. compounds and elements.
- b. compounds and solutions.
- c. elements and mixtures.
- d. mixtures and solutions.
- e. solutions and elements.

Section 1.3

Difficulty Level: medium

8. Which is an example of a chemical change?

- a. Steam from the boiling water condenses on the ceiling.
- b. The solid metal is heated until it melts.
- c. The gas is cooled until it finally becomes a liquid.
- * d. A piece of paper burns in air with a smoky flame.
- e. The table salt in the warehouse container had very large chunks in it.

Section 1.3

Difficulty Level: medium

9. Which is an example of a physical change?

- a. The milk in the box left on the table becomes sour after a few days.
- b. The bit of scrap metal dissolves when placed in the container of acid.
- * c. The gas is cooled until it finally becomes a liquid.
- d. A piece of paper burns in air with a smoky flame.
- e. Bubbles are seen on the egg shell after some vinegar is poured on it.

Section 1.3

Difficulty Level: medium

10. Which is an example of a chemical change?

- a. The milk in the carton became frozen after the carton was accidentally placed in the freezing compartment.
- b. The bit of scrap metal was crushed by the heavy machine.
- c. The gas was cooled until it eventually became a liquid.
- d. The piece of paper was cut into many thin strips by the shredding machine.
- * e. Bubbles were seen on the egg shell after some vinegar was poured on it.

Section 1.3

Difficulty Level: medium

11. Which is an example of a physical change?

- * a. Steam from the boiling water condenses on the cooler part of the ceiling.
- b. The crude metal ore was first heated then combined with pure oxygen gas to make the oxide of the metal.
- c. The chef made scrambled eggs for their breakfast.
- d. A piece of paper burns in air with a smoky flame.
- e. The table salt in the warehouse was used to make some of the polymeric material.

Section 1.3

Difficulty Level: hard

12. Which is an example of both a physical and a chemical change?

- a. The milk in the carton became frozen after the carton was accidentally placed in the freezing compartment overnight.
- b. The bit of scrap metal was removed to the junkyard after being crushed by the heavy machine.
- c. The gas was collected in a flask and cooled until it eventually became a liquid.
- * d. The old parchment became dry after being placed in the hot oven, but then was charred since it was not removed in the specified time.
- e. Bubbles were seen on the egg shell when the vinegar was poured on it.

Section 1.3

Difficulty Level: hard

13. Which is an example of both a physical and a chemical change?

- a. The milk in the carton became frozen because the carton was accidentally placed in the freezing compartment overnight.
- b. The bit of scrap metal was removed to the junkyard after being crushed by the heavy machine.
- c. The gas was collected in a flask and cooled until it eventually became a liquid.
- d. The old parchment became dry when it was placed in the warm oven for ten minutes.
- * e. Bubbles were seen on the egg shell soon after a sample of the vinegar was poured on it.

Section 1.4

Difficulty Level: easy

14. The relative number of atoms of each element in a particular compound

- a. is always 1:1.
- b. is the same as the density ratio.
- c. is the same as the weight ratio.
- * d. is definite and constant.
- e. cannot be determined experimentally.

Section 1.4

Difficulty Level: medium

15. Which of the following postulates from Dalton's atomic theory are now considered incorrect?

- I. All the atoms of a given element are identical.
 - II. Matter consists of very small particles known as atoms.
 - III. Atoms are indestructible and also indivisible.
-
- a. III only.
 - b. II only.
 - c. I only.
 - d. I and II
 - * e. I and III

Section 1.4

Difficulty Level: medium

16. Which of the following statements is/are consistent with Dalton's atomic theory?

- I. The atoms in a given sample of an element do not share any common properties.
 - II. Matter consists of particles called atoms.
 - III. In chemical reactions, atoms merely rearrange, but do not disintegrate.
- a. III only.
 - b. II only.
 - c. I only.
 - * d. II and III
 - e. I and III

Section 1.4

Difficulty Level: medium

17. Which of the following statements is/are NOT consistent with Dalton's atomic theory?

- I. The atoms in a given sample of an element do not share any common properties.
 - II. Matter consists of tiny particles called molecular substances.
 - III. In chemical reactions, atoms merely rearrange, but do not disintegrate.
- a. III only.
 - b. II only.
 - c. I only.
 - d. II and III
 - * e. I and II

Section 1.4

Difficulty Level: medium

18. Which of the following postulates from Dalton's atomic theory is incorrectly stated?

- a. The atoms in a given sample of an element are identical.
- b. Matter consists of tiny particles called atoms.
- c. In chemical reactions, atoms merely rearrange, but do not disintegrate.
- * d. In a given chemical compound, the atoms can be present in various numerical ratios.
- e. In a given chemical compound, the atoms are always present in the same fixed numerical ratio.

Section 1.4

Difficulty Level: medium

19. Which of the following is consistent with the postulates from Dalton's atomic theory?

- a. The atoms in a given sample of an element are not necessarily identical.
- b. Matter consists of tiny particles called ions.
- c. In chemical reactions, atoms not only rearrange, but also disintegrate in smaller subatomic particles.
- d. In a given chemical compound, the atoms can be present in various numerical ratios.
- * e. In a given chemical compound, the atoms are always present in the same fixed numerical ratio.

Section 1.4

Difficulty Level: medium

20. Which one of the statements below is true?

- a. When two atoms combine to form a chemical compound, they do so in many different proportions by mass.
- b. When two different compounds combine to form an element, they do so in definite proportions by mass.
- * c. When two different elements combine to form a chemical compound, they do so in definite proportions by mass.
- d. When two molecules combine in a chemical reaction, a number of different elements can be generated depending on the masses used.
- e. When two different elements combine to form a mixture, they do so in definite proportions by weight.

Section 1.4

Difficulty Level: medium

21. Which one of the statements below is false?

- a. In chemical reactions, atoms are rearranged.
- b. In a given compound, the atoms are always present in the same fixed numerical ratio.
- c. Matter is made up of tiny particles called atoms.
- d. In a sealed reaction flask, the total mass after the reaction is over, is the same as before the reaction started.
- * e. When hydrogen and oxygen react to form water, the mass of oxygen is equal to the mass of hydrogen.

Section 1.4

Difficulty Level: hard

22. Which of the following examples is consistent with the postulates from Dalton's atomic theory?
- a. The atoms in a sample of chlorine are similar to the atoms in a sample of elemental sulfur.
 - b. Matter consists of extremely tiny particles which are either positively or negatively charged.
 - * c. When water is formed from oxygen and hydrogen molecules, the atoms in water are grouped differently compared to those in hydrogen and oxygen.
 - d. When a sample of water is analyzed, it is discovered that the hydrogen and the oxygen atoms are combined in only two different ratios by mass.
 - e. There are eight different types of sulfur atoms in any naturally occurring sample of elemental sulfur.

Section 1.5

Difficulty Level: easy

23. Which of the following is used to represent elemental bromine?
- a. Be
 - b. B
 - c. 2Br
 - * d. Br₂
 - e. Br

Section 1.5

Difficulty Level: medium

24. Which combination is used to represent molecular hydrogen, and atomic hydrogen, respectively?
- * a. H₂, H
 - b. He, H⁻
 - c. H, H
 - d. 2H, H⁺
 - e. Hy, H

Section 1.5

Difficulty Level: medium

25. Which element exists as a diatomic molecule in the free state?
- a. magnesium
 - b. managanese
 - c. silicon
 - d. arsenic

- * e. chlorine

Section 1.5

Difficulty Level: medium

26. Which element exists as a diatomic molecule in the free state?

- a. C
- * b. N
- c. Ga
- d. Ge
- e. P

Section 1.5

Difficulty Level: medium

27. Which element exists as a diatomic molecule in the free state?

- a. helium
- * b. fluorine
- c. neon
- d. argon
- e. xenon

Section 1.5

Difficulty Level: medium

28. Which compound is correctly represented as a hydrate?

- a. $\text{C}_2\text{H}_5\text{OH}_2^+$
- * b. $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
- c. $\text{FeH}_2(\text{CO})_4$
- d. $\text{O}_2\text{S}(\text{OH})_2$
- e. $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}$

Section 1.5

Difficulty Level: medium

29. Which compound is correctly represented as a hydrate?

- * a. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- b. $\text{HC}_2\text{H}_3\text{O}_2$
- c. $\text{O}_2\text{S}(\text{OH})_2$
- d. $\text{H}_2\text{S}_2\text{O}_7$
- e. $\text{C}_6(\text{H}_2\text{O})_6$

Section 1.6

Difficulty Level: medium

30. The number of atoms in one formula unit of the substance, $\text{CO}(\text{NH}_2)_2$, is

- a. 4
- b. 5
- c. 6
- d. 7
- * e. 8

Section 1.6

Difficulty Level: medium

31. The number of atoms in one formula unit of $\text{C}_2\text{H}_4(\text{COOH})_2$ is

- a. 10
- b. 11
- c. 12
- * d. 14
- e. 16

Section 1.6

Difficulty Level: medium

32. The number of atoms in one formula unit of the substance $\text{Cs}_2\text{SO}_4 \cdot 5\text{H}_2\text{O}$ is

- a. 4
- b. 17
- * c. 22
- d. 25
- e. 33

Section 1.6

Difficulty Level: medium

33. The number of atoms in one formula unit of the substance $(\text{NH}_4)_3\text{Co}(\text{CN})_6$ is

- a. 21
- b. 26
- * c. 28
- d. 31
- e. 33

Section 1.6

Difficulty Level: medium

34. How many atoms are there in one formula unit of $(\text{NH}_4)_4\text{Fe}(\text{CN})_6$?

- a. 15
- b. 25
- c. 28
- * d. 33
- e. 35

Section 1.6

Difficulty Level: medium

35. How many atoms are there in one formula unit of $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$?

- a. 9
- b. 14
- * c. 27
- d. 28
- e. 33

Section 1.6

Difficulty Level: medium

36. How many atoms of each element are in the formula, $\text{H}_2\text{S}_2\text{O}_7$?

- * a. 2H, 2S, 7O
- b. 1H, 2S, 4O
- c. 2H, 1S, 1O
- d. 2H, 4S, 4O
- e. 1H, 1S, 1O

Section 1.6

Difficulty Level: medium

37. How many atoms of each element are in the formula, $\text{Ni}(\text{ClO}_4)_2$?

- a. 2Ni, 1Cl, 4O
- * b. 1Ni, 2 Cl, 8O
- c. 2Ni, 1 Cl, 1O
- d. 2Ni, 4 Cl, 4O
- e. 1Ni, 1 Cl, 8O

Section 1.6

Difficulty Level: medium

38. How many hydrogen atoms appear on the right side of the equation, $4\text{NH}_3 + 3\text{O}_2 \rightarrow 2\text{N}_2 + 6\text{H}_2\text{O}$?
- a. 2
 - b. 4
 - c. 6
 - d. 10
 - * e. 12

Section 1.6

Difficulty Level: hard

39. How many atoms are in one molecule of $\text{Mo}_2(\text{O}_2\text{CC}(\text{CH}_3)_3)_4$?
- a. 17
 - b. 30
 - c. 60
 - * d. 66
 - e. 64

Section 1.6

Difficulty Level: hard

40. How many atoms of each element appear on each side of the arrow in the following chemical equation? $2\text{Fe}(\text{NO}_3)_3 + 3\text{Na}_2\text{CO}_3 \rightarrow \text{Fe}_2(\text{CO}_3)_3 + 6\text{NaNO}_3$
- a. 2Fe, 6N, 18O, 6Na, 3C
 - b. 2Fe, 6N, 27O, 6Na, 9C
 - * c. 2Fe, 6N, 27O, 6Na, 3C
 - d. 2Fe, 6N, 27O, 9Na, 3C
 - e. 2Fe, 6N, 21O, 18Na, 3C

Section 1.6

Difficulty Level: hard

41. How many atoms of each element appear on each side of the arrow in the following chemical equation? $3\text{Cl}_3\text{BNH}_2\text{CH}_3 + 6(\text{CH}_3)_3\text{N} \rightarrow 6(\text{CH}_3)_3\text{NHCl} + \text{B}_3\text{N}_3\text{Cl}_3(\text{CH}_3)_3$
- a. 9Cl, 3B, 9N, 54H, 6C
 - * b. 9Cl, 3B, 9N, 69H, 21C
 - c. 3Cl, 3B, 9N, 15H, 21C
 - d. 9Cl, 1B, 9N, 54H, 9C
 - e. 3Cl, 3B, 9N, 69H, 18C

Fill-in-the-Blank Questions

Section 1.1

Difficulty Level: easy

42. Chemistry is particularly about the way substances undergo changes in _____.

Answer: chemical reactions

Section 1.2

Difficulty Level: easy

43. A statement that describes something seen, heard, or smelled, is called an _____.

Answer: observation

Section 1.2

Difficulty Level: medium

44. A statement based on a series of observations is a _____.

Answer: conclusion

Section 1.2

Difficulty Level: medium

45. A broad generalization based on the results from many experiments is called a _____.

Answer: scientific law

Section 1.3

Difficulty Level: easy

46. All the objects around us are examples of what are called _____.

Answer: matter

Section 1.3

Difficulty Level: easy

47. Substances that cannot be decomposed into simpler substances by chemical reactions are examples of _____.

Answer: elements

Section 1.3

Difficulty Level: easy

48. An abbreviation used to represent the name of an element is a _____.

Answer: chemical symbol

Section 1.4

Difficulty Level: easy

49. Atoms are made of tiny particles called _____ .

Answer: atoms

Section 1.4

Difficulty Level: easy

50. There is no detectable gain or loss in mass in chemical reactions. This is the_____.

Answer: Law of Conservation of Mass

Section 1.4

Difficulty Level: easy

51. In a chemical compound, the elements are always combined in the same proportions by _____ .

Answer: mass

Section 1.4

Difficulty Level: hard

52. A compound is made of nitrogen and hydrogen in a ratio of 5.65 grams nitrogen to 1.22 grams of hydrogen. There are _____ grams of nitrogen in a sample of this compound containing 4.00 grams of hydrogen._____.

Answer: 18.5

Section 1.4

Difficulty Level: hard

53. A compound is made of nitrogen and hydrogen in a ratio of 22.6 grams nitrogen to 4.88 grams of hydrogen. There are _____ grams of hydrogen in a sample of the compound containing 12.6 grams of nitrogen._____

Answer: 2.72

Section 1.4

Difficulty Level: hard

54. A compound of phosphorus and chlorine contains 3.00 grams of phosphorus and 10.3 grams of chlorine. There are _____ grams of phosphorus in a sample of the compound containing 17.2 grams of chlorine._____ .

Answer: 5.01

Section 1.4

Difficulty Level: hard

55. A compound of phosphorus and chlorine contains 3.00 grams of phosphorus and 10.3 grams of chlorine. There are _____ total grams of the compound in a sample which contains 4.00 grams of chlorine. _____.

Answer: 5.17

Section 1.5

Difficulty Level: medium

56. Two atoms of nitrogen combine with one atom of oxygen to form one compound, whereas two atoms of nitrogen combine with five atoms of oxygen to form another compound. The ratio of the masses of oxygen in the two compounds must be _____.

Answer: 1/5

Section 1.5

Difficulty Level: medium

57. What formula is used to represent molecular chlorine? _____

Answer: Cl_2

Section 1.5

Difficulty Level: medium

58. To show how atoms are connected in certain compounds, the chemical symbols are used to represent the atoms, and dashes are used to indicate the chemical bonds. The resulting formula is therefore referred to as _____.

Answer: a structural formula

Section 1.5

Difficulty Level: hard

59. Write the formula for the compound that has the atoms and, or groups in the order given: 3 Fe, and two groups made up of 1 As and 4 O. _____

Answer: $\text{Fe}_2(\text{AsO}_4)_2$

Section 1.5

Difficulty Level: hard

60. Write the formula for the compound that has the atoms and, or groups in the order given: 1 K, 1 Al, two groups of 1 S and 4 O, and twelve groups made up of 2 H and 1 O.

Answer: $\text{KAl}(\text{SO}_4)_2 \cdot 12 \text{H}_2\text{O}$

Section 1.6

Difficulty Level: medium

61. How many hydrogen atoms are present in the formula, $(\text{NH}_4)_3\text{PO}_4$? _____

Answer: 12

Section 1.6

Difficulty Level: medium

62. How many hydrogen atoms appear on the reactant side of the equation, $4\text{NH}_3 + 3\text{O}_2 \rightarrow 2\text{N}_2 + 6\text{H}_2\text{O}$? _____

Answer: 12

Section 1.6

Difficulty Level: hard

63. How many of each type of atoms are needed on the left to balance the equation? ____
 $3\text{H}_2\text{SO}_4 + ?? \rightarrow \text{Al}_2(\text{SO}_4)_3 + 6\text{H}_2\text{O}$

Answer: 2Al, 6H, 6O

Section 1.6

Difficulty Level: hard

64. How many additional hydrogen atoms and oxygen atoms are required on the right side to balance the given equation? $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O} + 2\text{NH}_4\text{NO}_3 \rightarrow 2\text{NH}_3 + \text{H}_2\text{O} + \text{Ba}(\text{NO}_3)_2$

Answer: 18H, 9O

True and False Questions

Section 1.1

Difficulty Level: medium

65. Through an understanding of chemical reactions at a fundamental level, it is now possible to create new materials that do not occur naturally on earth. ____

Answer: True

Section 1.2

Difficulty Level: medium

66. The following equation, $\text{Pressure} = \text{Constant}/\text{Volume}$, is an example of a theory. ____

Answer: False

Section 1.2

Difficulty Level: medium

67. Theoretical models are used to help in explaining laws. _____

Answer: True

Section 1.2

Difficulty Level: medium

68. The observations made during an experiment are known as conclusions. _____

Answer: False

Section 1.3

Difficulty Level: easy

69. A sample of a pure compound contains two or more phases. ____

Answer: False

Section 1.3

Difficulty Level: easy

70. Mass indicates how much matter is in a given object. ____

Answer: True

Section 1.3

Difficulty Level: easy

71. A compound is an example of a mixture which can have variable composition. _____

Answer: False

Section 1.3

Difficulty Level: easy

72. A homogeneous mixture consists of only one chemical substance. ____

Answer: False

Section 1.3

Difficulty Level: easy

73. A mixture always contains more than one chemical substance. ____

Answer: True

Section 1.3

Difficulty Level: medium

74. The mass of a water molecule is the same on the moon as it is on the earth. ____

Answer: True

Section 1.3.

Difficulty Level: medium

75. A heterogeneous mixture can exist as only a single phase. ____

Answer: False

Section 1.4

Difficulty Level: easy

76. Atoms are made of tiny particles called molecules. ____

Answer: False

Section 1.4

Difficulty Level: easy

77. In any given chemical compound, elements can be combined in various amounts by mass. ____

Answer: False

Section 1.4

Difficulty Level: medium

78. When a piece of paper burns in a closed container, the combined masses of the products is less than the mass of the original piece of paper. ____

Answer: False

Section 1.4

Difficulty Level: medium

79. Atoms must undergo disintegration followed by rearrangement, in order for chemical reactions to occur. ____

Answer: False

Section 1.5

Difficulty Level: easy

80. The formula, N_2 , is used to represent elemental nitrogen. _____

Answer: True

Section 1.5

Difficulty Level: easy

81. When interpreting the formula, $\text{CO}(\text{NH}_2)_2$, it should be noted that the group of atoms within the parentheses, occurs twice. _____

Answer: True

Section 1.5

Difficulty Level: medium

82. An important characteristic of a compound's formula is it specifies the atomic composition of the compound. _____

Answer: True

Section 1.6

Difficulty Level: easy

83. When iron and sulfur combine chemically, the properties of the resulting compound are similar to that of each of the elements.

Answer: False

Section 1.6

Difficulty Level: medium

84. Four molecules of the only product formed in the incomplete equation below are needed to ensure that the equation is balanced. $\text{P}_4\text{O}_{10} + 6\text{H}_2\text{O} \rightarrow ??$ ____

Answer: True

On the Cutting Edge 1.1

Difficulty Level: medium

85. At the nanoscale level, the structures under investigation usually have dimensions of tens to hundreds of atoms. _____

Answer: True

On the Cutting Edge 1.1

Difficulty Level: medium

86. Molecular self assembly occurs when two atoms can spontaneously arrange themselves into creating a diatomic molecular structure. _____

Answer: False

On the Cutting Edge 1.1

Difficulty Level: medium

87. The atomic force microscope which is used with electrically nonconducting samples, makes it possible to obtain an image of individual atoms._____

Answer: True

Critical Thinking Questions

Section 1.4

Difficulty Level: medium

88. Based on the law of Conservation of Mass, 1.2 g of elemental carbon (C) react with molecular oxygen (O_2) to produce 4.4 g of carbon dioxide gas (CO_2) as the only product. What mass of oxygen reacts?

- a. 16 g
- b. 1.0 g
- c. 4.4 g
- d. 22 g
- * e. 3.2 g

Section 1.4

Difficulty Level: medium

89. Based on the law of Conservation of Mass, 1.8 g of elemental carbon (C) react with 4.8 g of molecular oxygen (O_2) to produce carbon dioxide gas (CO_2) as the only product. What mass of carbon dioxide is formed?

- a. 18 g
- b. 1.9 g
- * c. 6.6 g
- d. 12 g
- e. 1.2 g

Section 1.4

Difficulty Level: hard

90. Based on the law of Conservation of Mass, 65.4 g of zinc metal react with exactly 32.1 g of sulfur to produce zinc sulfide (ZnS) as the only product. What mass of zinc sulfide can be formed from 10.0 g zinc metal?

- a. 28 g
- b. 19 g
- c. 5.6 g
- * d. 14.9 g
- e. 8.4 g

Section 1.5

Difficulty Level: medium

91. A compound is known to contain one C atom for each water molecule (H_2O). If the compound has six carbon atoms, what is the general formula representing the compound?

Answer: $\text{C}_6(\text{H}_{12}\text{O}_6)$

Section 1.5

Difficulty Level: hard

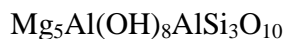
92. How many silicon and oxygen atoms are in the formula, $\text{Ca}_3\text{Mg}_5(\text{Si}_4\text{O}_{11})_2(\text{OH})_2$?

- a. 3 Si, 5 O
- * b. 8 Si, 24 O
- c. 4 Si, 11 O
- d. 2 Si, 2 O
- e. 5 Si, 3 O

Section 1.5

Difficulty Level: hard

93. What is the total number of atoms represented by the following formula?

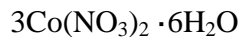


- * a. 36
- b. 28
- c. 8
- d. 24
- e. 42

Section 1.5

Difficulty Level: hard

94. What is the total number of atoms represented by the following?

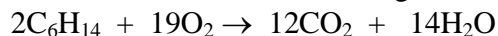


- a. 35
- b. 28
- c. 8
- d. 24
- * e. 42

Section 1.6

Difficulty Level: medium

95. What is the total number of atoms reacting in the chemical reaction below?

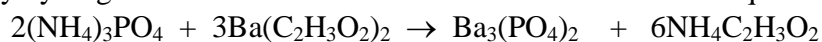


- a. 35
- b. 82
- c. 41
- * d. 78
- e. 21

Section 1.6

Difficulty Level: hard

96. How many hydrogen atoms are on the reactant side of the chemical equation below?

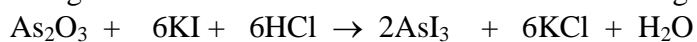


- a. 35
- b. 28
- c. 8
- d. 24
- * e. 42

Section 1.6

Difficulty Level: hard

97. What single coefficient is needed to balance the following chemical equation?



- a. 2
- * b. 3
- c. 4
- d. 5
- e. 6

Section 1.6

Difficulty Level: hard

98. Write the formula of the single product in the reaction below, if its coefficient is 5.



- a. $\text{P}_6\text{O}_6\text{S}_5$
- * b. $\text{P}_4\text{O}_6\text{S}_4$
- c. $\text{P}_4\text{O}_{16}\text{S}_6$
- d. $\text{P}_8\text{O}_3\text{S}_8$
- e. $\text{P}_{12}\text{O}_3\text{S}_{10}$