# *General Chemistry 11th edition Ebbing Test Bank*

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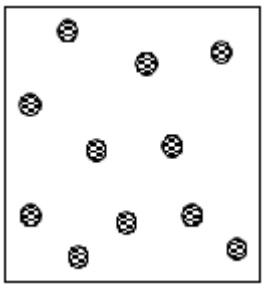
# Chapter 02 - Atoms, Molecules, and Ions

1. Which of the following is/are postulates of Dalton's atomic theory?
    1. Atoms combine in fixed ratios of whole numbers.
    2. Atoms of each element have different properties.
    3. Elements occur as solids, liquids, or gases.

    a. 1 only
    b. 2 only
    c. 3 only
    d. 1 and 2
    e. 1, 2, and 3

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.24 - List the postulates of atomic theory.
*TOPICS:* early atomic theory
atomic theory of matter

2. Which of the following statements best describes the particulate representation depicted by the picture?



    a. The figure is a representation of a gas made up of a single element.
    b. The figure is a representation of a molecular solid.
    c. The figure is a representation of a liquid mixture of two elements.
    d. The figure is a representation of a liquid mixture of two compounds.
    e. The figure is a representation of a gas of a compound.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.1
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.25 - Define element, compound, and chemical reaction in the context of these postulates.
*TOPICS:* early atomic theory
atomic theory of matter

3. Which of the following is <u>not</u> a correct name–symbol combination?

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a. gallium, Ga
b. iron, Fe
c. nitrogen, N
d. argon, Ar
e. sodium, He

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter

4. The symbol for tin is
a. T.
b. Tn.
c. Si.
d. Ti.
e. Sn.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

5. What is the symbol for the element phosphorus?
a. Po
b. P
c. Pt
d. K
e. Pr

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1

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*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

6. Which one of the following lists gives the correct symbols for the elements phosphorus, potassium, silver, chlorine, and sulfur?

a. P, Po, Ag, Cl, S
b. K, Ag, Po, Cl, S
c. P, K, Ag, Cl, S
d. Ph, K, Ag, S, Cl
e. Ph, Po, Ag, Cl, S

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

7. Which of the following lists gives the atomic symbols for potassium, magnesium, beryllium, and sodium?

a. Po, Mn, Br, Na
b. P, Mn, Be, Se
c. K, Mg, Be, Na
d. Pt, Mg, Be, Sc
e. K, Mn, Br, Na

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

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8. The names of the elements whose symbols are Si, P, Mn, and S are, respectively,
   a. silicon, phosphorus, manganese, and sulfur.
   b. silicon, potassium, magnesium, and sulfur.
   c. silver, phosphorus, magnesium, and sodium.
   d. silver, potassium, manganese, and sodium.
   e. silicon, potassium, manganese, and sulfur.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

9. Which of the following is the atomic symbol for the element cobalt?
   a. CO
   b. Co
   c. C
   d. co
   e. All of the above

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.26 - Recognize the atomic symbols of the elements.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

10. A series of silicon–hydrogen compounds with the general formula $Si_nH_{2n+2}$ can be represented by the known compounds $SiH_4$, $Si_2H_6$, and $Si_3H_8$. This best illustrates the law of
   a. multiple proportions.
   b. conservation of charge.
   c. definite composition.
   d. conservation of mass.
   e. conservation of atoms.

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*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.27 - Explain the significance of the law of multiple proportions.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* Dalton's atomic theory
*OTHER:* general chemistry

11. According to the law of multiple proportions:
    a. the total mass is the same after a chemical change as before the change.
    b. it is not possible for the same two elements to form more than one compound.
    c. the ratio of the masses of the elements in a compound is always the same.
    d. if the same two elements form two different compounds, they do so in the same ratio.
    e. none of these

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.27 - Explain the significance of the law of multiple proportions.
*TOPICS:* general concepts
matter
*KEYWORDS:* compound
*OTHER:* general chemistry

12. Which of the following pairs of compounds can be used to illustrate the law of multiple proportions?
    a. $H_2O$ and HCl
    b. NO and $NO_2$
    c. $NH_4$ and $NH_4Cl$
    d. $ZnO_2$ and $ZnCl_2$
    e. $CH_4$ and $CO_2$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.1
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.27 - Explain the significance of the law of multiple proportions.

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*TOPICS:* general concepts
matter
*KEYWORDS:* compound
*OTHER:* general chemistry

13. Cathode rays are
    a. anions.
    b. protons.
    c. cations.
    d. positrons.
    e. electrons.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.28 - Describe Thomson's experiment in which he discovered the electron.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* discovery of electron | structure of the atom
*OTHER:* general chemistry

14. A subatomic particle is
    a. a piece of an atom.
    b. only found in the nucleus of an atom.
    c. always positively charged.
    d. larger than the nucleus of an atom.
    e. always negatively charged.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.1
2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.29 - Describe Rutherford's nuclear model and the makeup of the nucleus.
*TOPICS:* early atomic theory
atomic theory of matter

15. Experiments were carried out in which a beam of cathode rays was first bent by a magnetic field and then bent back by an electrostatic field until the beam hit the screen exactly where it had been hitting before the

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fields were applied. This experiment permitted the direct measurement of

a. the ratio of mass to charge of an electron.
b. the charge on the nucleus of an atom.
c. the charge on the electron.
d. the mass of the atom.
e. the mass of the electron.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.28 - Describe Thomson's experiment in which he discovered the electron.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* discovery of electron | structure of the atom
*OTHER:* general chemistry

16. Who discovered the electron?

a. Bohr
b. de Broglie
c. Rutherford
d. Heisenberg
e. Thomson

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.28 - Describe Thomson's experiment in which he discovered the electron.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* discovery of electron | structure of the atom
*OTHER:* general chemistry

17. Which of the following conclusions regarding Rutherford’s gold foil experiment is not consistent with the observations?

a. The nucleus occupies only a small portion of the space of an atom.
b. Most alpha particles travel straight through the gold foil.
c. The nucleus occupies a large amount of the atom space.
d. The nucleus, like the alpha particles used to bombard the gold foil, is positively charged.

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e. Wide angle deflections result from a collision of an alpha particle and a gold atom nucleus.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.30 - Describe Rutherford's experiment that led to the nuclear model of the atom.
*TOPICS:* atomic theory of matter
early atomic theory

18. Who discovered the nucleus of an atom?
a. Thomson
b. de Broglie
c. Rutherford
d. Bohr
e. Heisenberg

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.30 - Describe Rutherford's experiment that led to the nuclear model of the atom.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* nuclear model of atom | structure of the atom
*OTHER:* general chemistry

19. If the Thomson model of the atom had been correct, Rutherford would have observed
a. alpha particles bouncing off the foil.
b. alpha particles going through the foil with little or no deflection.
c. alpha particles greatly deflected by the metal foil.
d. positive particles formed in the foil.
e. None of the above observations is consistent with the Thomson model of the atom.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.30 - Describe Rutherford's experiment that led to the nuclear

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model of the atom.

*TOPICS:* early atomic theory
atomic theory of matter

*KEYWORDS:* nuclear model of atom | structure of the atom

*OTHER:* general chemistry

20. The nucleus of a $^{191}$Ir nuclide contains
    a. 191 neutrons and 268 electrons.
    b. 77 protons and 191 neutrons.
    c. 191 protons and 114 electrons.
    d. 191 protons, 77 neutrons, and 191 electrons.
    e. 77 protons and 114 neutrons.

*ANSWER:* e

*POINTS:* 1

*DIFFICULTY:* easy

*REFERENCES:* 2.3

*HAS VARIABLES:* True

*LEARNING OBJECTIVES:* GENE.EBBI.13.31 - Define atomic number, mass number, and nuclide.

*TOPICS:* early atomic theory
atomic theory of matter

*KEYWORDS:* atomic symbol

*OTHER:* general chemistry

21. If two different nuclides have the same atomic number, it must mean that
    a. they have the same atomic mass.
    b. they have the same mass number.
    c. they have the same number of protons.
    d. they have the same number of electrons.
    e. they have the same number of neutrons.

*ANSWER:* c

*POINTS:* 1

*DIFFICULTY:* easy

*REFERENCES:* 2.3

*HAS VARIABLES:* False

*LEARNING OBJECTIVES:* GENE.EBBI.13.31 - Define atomic number, mass number, and nuclide.

*TOPICS:* early atomic theory
atomic theory of matter

*KEYWORDS:* nuclear structure

*OTHER:* general chemistry

22. If two different nuclides have the same mass number, it must mean that

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a. the combined number of protons and neutrons are the same.
b. both have the same number of neutrons.
c. both have the same number of electrons.
d. both have the same number of protons.
e. they are isotopes.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.31 - Define atomic number, mass number, and nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* nuclear structure
*OTHER:* general chemistry

23. The number of protons in a given nucleus determines the
a. mass number.
b. atomic number.
c. number of electrons.
d. number of protons.
e. number of isotopes.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.31 - Define atomic number, mass number, and nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* nuclear structure
*OTHER:* general chemistry

24. Which nuclide has the same number of protons as $^{14}_{7}\mathrm{N}$?
a. $^{19}_{9}\mathrm{F}$
b. $^{15}_{8}\mathrm{O}$
c. $^{12}_{6}\mathrm{C}$
d. $^{31}_{15}\mathrm{P}$
e. $^{15}_{7}\mathrm{N}$

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*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* nuclear structure
*OTHER:* general chemistry

25. How many electrons does the ion $^{35}_{17}Cl^-$ have?

a. 18
b. 36
c. 16
d. 34
e. 19

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter

26. How many protons are there in the chromium-52 nuclide?

a. 29
b. 76
c. 23
d. 24
e. 28

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol

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*OTHER:* general chemistry

27. How many neutrons are there in the cobalt-59 nuclide?
    a. 27
    b. 2
    c. 86
    d. 59
    e. 32

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

28. An atom that has the same number of neutrons as $^{59}$Ni is
    a. $^{58}$Zn.
    b. $^{60}$Cu.
    c. $^{57}$Cr.
    d. $^{58}$Mn.
    e. $^{59}$Co.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

29. Which combination of protons, neutrons, and electrons correctly represents a $^{57}$Fe nuclide?
    a. 26 protons, 31 neutrons, 57 electrons
    b. 26 protons, 31 neutrons, 31 electrons
    c. 26 protons, 31 neutrons, 26 electrons

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d. 57 protons, 26 neutrons, 57 electrons

e. 57 protons, 26 neutrons, 26 electrons

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

30. The species that has the same number of neutrons as $^{37}_{17}\text{Cl}$ is

a. $^{36}_{16}\text{S}$.

b. $^{35}_{17}\text{Cl}$.

c. $^{40}_{18}\text{Ar}$.

d. $^{32}_{16}\text{S}$.

e. $^{31}_{15}\text{P}$.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic symbol
*OTHER:* general chemistry

31. Which of the following nuclides contains more protons than neutrons?

a. $^{1}_{1}\text{H}$

b. $^{19}_{9}\text{F}$

c. $^{34}_{16}\text{S}$

d. $^{24}_{12}\text{Mg}$

e. $^{4}_{2}\text{He}$

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*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory
atomic theory of matter

32. How many neutrons are there in 8 molecules of $^{19}_{9}F_2$?

a. 160
b. 80
c. 3
d. 304
e. 144

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.32 - Write the nuclide symbol for a given nuclide.
*TOPICS:* early atomic theory | atomic theory of matter

33. Suppose atom 1 has the same number of protons as atom 2, and atom 2 has the same number of neutrons as atom 3. Atom 1 does not have the same number of neutrons as atom 3. Which of the following statements is true?

a. Atom 3 must have the same number of protons as atom 2.
b. Atoms 1 and 2 must be isotopes.
c. Atoms 1 and 3 must be isotopes.
d. Atom 2 must have the same number of neutrons as atom 1.
e. Atom 3 must have the same number of protons as atom 1.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* nuclear structure
*OTHER:* general chemistry

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34. Which of the following statements is true concerning the two nuclides $^{16}O$ and $^{17}O$ ?

a. They have the same number of neutrons.
b. They are isotopes.
c. They have the same relative atomic mass.
d. They have the same mass number.
e. They have different chemical properties.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* isotope
*OTHER:* general chemistry

35. Which of the following atomic symbols represents an isotope of $^{94}Mo$?

a. $^{93}Nb$
b. $^{95}Tc$
c. $^{94}Tc$
d. $^{95}Mo$
e. $^{94}Nb$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* isotope
*OTHER:* general chemistry

36. Which of the following represents a pair of isotopes?

| | Atomic Number | Mass Number |
|---|---|---|
| a. I | 17 | 34 |
| II | 18 | 34 |
| b. I | 7 | 14 |

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| | | | |
|---|---|---|---|
| | II | 8 | 14 |
| c. | I | 17 | 35 |
| | II | 17 | 37 |
| d. | I | 17 | 37 |
| | II | 18 | 38 |
| e. | I | 7 | 15 |
| | II | 8 | 16 |

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* isotope
*OTHER:* general chemistry

37. There are three isotopes of carbon differing with respect to
    a. electron configuration.
    b. nuclear charge.
    c. number of neutrons.
    d. number of protons.
    e. atomic number.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* isotope
*OTHER:* general chemistry

38. Which of the following about the isotopes of a particular element is not true?
    a. Each unique isotope has a different atomic mass.
    b. Each unique isotope has a different atomic number.
    c. Each unique isotope has a different number of neutrons.
    d. Each unique isotope has the same number of protons.
    e. In neutral atoms of each unique isotope, the number of electrons equals the number of protons.

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*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter

39. The neutral atoms of all the isotopes of the same element have
    a. different numbers of protons.
    b. the same number of neutrons.
    c. the same number of electrons.
    d. the same mass.
    e. the same mass number.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.3
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.33 - Define and provide examples of isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* isotope
*OTHER:* general chemistry

40. What is the symbol of the nuclide having 13 protons and 14 neutrons?
    a. $^{27}_{13}\mathrm{Si}$
    b. $^{14}_{13}\mathrm{Si}$
    c. $^{27}_{13}\mathrm{Al}$
    d. $^{27}_{14}\mathrm{Si}$
    e. $^{14}_{13}\mathrm{Al}$

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.3
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.34 - Write the nuclide symbol of an element. (Example 2.1)
*TOPICS:* early atomic theory

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| | |
|---|---|
| | atomic theory of matter |
| *KEYWORDS:* | atomic symbol |
| *OTHER:* | general chemistry |

41. Which of the following has 62 neutrons, 46 protons, and 46 electrons?
    a. $^{108}_{48}Cd^{2+}$
    b. $^{108}_{46}Pd$
    c. $^{108}_{47}Ag^{+}$
    d. $^{110}_{48}Cd^{2+}$
    e. $^{103}_{45}Rh^{3+}$

| | |
|---|---|
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 2.3 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.34 - Write the nuclide symbol of an element. (Example 2.1) |
| *TOPICS:* | general concepts<br>atomic theory of matter |

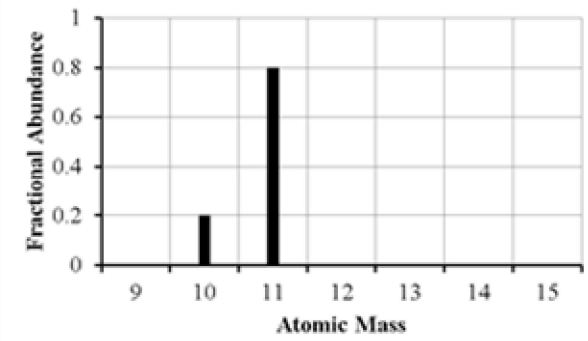
42. Which of the following elements has the largest atomic mass?
    a. hafnium
    b. nickel
    c. mercury
    d. argon
    e. carbon

| | |
|---|---|
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 2.4 |
| *HAS VARIABLES:* | True |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.35 - Define atomic mass unit and atomic weight. |
| *TOPICS:* | early atomic theory<br>atomic theory of matter |
| *KEYWORDS:* | atomic mass unit \| atomic weight |
| *OTHER:* | general chemistry |

43. The mass spectrum of an element with two naturally occurring isotopes is shown below. What is the best estimate of the element's atomic mass?

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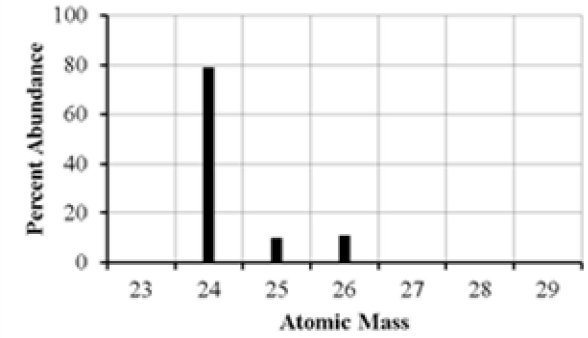

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a. 10 amu
b. 11 amu
c. 10.8 amu
d. 10.2 amu
e. 10.5 amu

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.36 - Describe how a mass spectrometer can be used to determine the fractional abundance of the isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter

44. The mass spectrum of an element with two naturally occurring isotopes is shown below. Its average atomic mass would be best estimated as




a. less than 26 amu but greater than 25 amu.
b. less than 25 amu but greater than 24 amu.
c. equal to 24 amu.
d. equal to 25 amu.
e. greater than 26 amu.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate

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*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.36 - Describe how a mass spectrometer can be used to determine the fractional abundance of the isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter

45. Lithium has two naturally occurring isotopes, $^{6}Li$ and $^{7}Li$ . The average atomic mass of lithium is 6.941. Which of the following statements concerning the relative abundance of each isotope is correct?

a. The abundance of $^{7}Li$ is greater than $^{6}Li$.
b. The abundance of $^{7}Li$ is less than $^{6}Li$.
c. The abundance of $^{6}Li$ is equal to the abundance of $^{7}Li$.
d. Not enough data is provided to determine the correct answer.
e. Based on the atomic mass, only $^{7}Li$ occurs naturally.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.36 - Describe how a mass spectrometer can be used to determine the fractional abundance of the isotopes of an element.
*TOPICS:* early atomic theory
atomic theory of matter

46. A certain element is listed as having an atomic mass of 63.5 amu. It is probably true that this element contains

a. a mixture of isotopes.
b. a mixture of neutrons.
c. a mixture of isomers.
d. a mixture of allotropes.
e. a mixture of ions.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.37 - Determine the atomic mass of an element from the isotopic masses and fractional abundances. (Example 2.2)
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic weight

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*OTHER:* general chemistry

47. The average atomic mass of Eu is 151.96 amu. There are only two naturally occurring isotopes of europium, $^{151}$Eu with a mass of 151.0 amu and $^{153}$Eu with a mass of 153.0 amu. The natural abundance of the $^{131}$Eu isotope must be approximately

a. 60%.
b. 20%.
c. 50%.
d. 80%.
e. 40%.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.37 - Determine the atomic mass of an element from the isotopic masses and fractional abundances. (Example 2.2)
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic weight
*OTHER:* general chemistry

48. Naturally occurring element X exists in three isotopic forms: X-28 (27.979 amu, 92.21% abundance), X-29 (28.976 amu, 4.70% abundance), and X-30 (29.974 amu, 3.09% abundance). Calculate the atomic weight of X.

a. 29.09 amu
b. 28.09 amu
c. 35.29 amu
d. 86.93 amu
e. 25.80 amu

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.37 - Determine the atomic mass of an element from the isotopic masses and fractional abundances. (Example 2.2)
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic weight
*OTHER:* general chemistry

49. Neon has three naturally occuring isotopes. The abundance of $^{20}$Ne is 90.48% and $^{22}$Ne is 9.25%. What is

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the percent abundance of $^{21}Ne$?

a. 9.25%
b. 0.27%
c. 49.9%
d. 33.2%
e. 81.2%

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.38 - Determine the atomic mass of an element from the isotopic masses and fractional abundances.
*TOPICS:* early atomic theory
atomic theory of matter

50. An element, X, has the following isotopic composition: X-200, 90%; X-199, 8.0%; and X-202, 2.0%. Its average atomic mass is closest to

a. 200 amu.
b. 203 amu.
c. 199 amu.
d. 202 amu.
e. 201 amu.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.37 - Determine the atomic mass of an element from the isotopic masses and fractional abundances. (Example 2.2)
*TOPICS:* early atomic theory
atomic theory of matter
*KEYWORDS:* atomic weight
*OTHER:* general chemistry

51. Which of the following concerning atomic mass is/are correct?

1. The atomic mass listed on a modern periodic table for each element is the mass of the most abundant isotope.
2. The atomic mass listed on a modern periodic table is a relative atomic mass, based on the definition that $^{12}C$ equals 12 amu.
3. Relative atomic masses can only be determined with a mass spectrometer.

a. 1 only

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b. 2 only
c. 1 and 2
d. 2 and 3
e. 1, 2, and 3

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.4
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.38 - Determine the atomic mass of an element from the isotopic masses and fractional abundances.
*TOPICS:* early atomic theory
atomic theory of matter

52. A periodic law based on atomic masses would necessitate Te and I changing places in the periodic table. This was not done in the early periodic table because
a. a periodic law based on atomic masses is not valid.
b. it was thought that the atomic masses might be in error.
c. iodine behaves chemically like chlorine and bromine.
d. the tellurium samples could contain a heavy impurity.
e. iodine contains one naturally occurring isotope, whereas tellurium consists of several isotopes.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.39 - Identify periods and groups on the periodic table.
*TOPICS:* early atomic theory
periodic table
*KEYWORDS:* group
*OTHER:* general chemistry

53. The elements in a row of the periodic table are known as
a. metals.
b. a period.
c. metalloids.
d. a family.
e. a group.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy

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*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.39 - Identify periods and groups on the periodic table.
*TOPICS:* early atomic theory
periodic table
*KEYWORDS:* period
*OTHER:* general chemistry

54. Which of the following statements about different elements is incorrect?
    a. Potassium is an alkali metal.
    b. Fluorine is a halogen.
    c. Aluminum is a transition element.
    d. Barium is an alkaline earth metal.
    e. Helium is a noble gas.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.40 - Find the main-group and transition elements on the periodic table.
*TOPICS:* early atomic theory
periodic table
*OTHER:* general chemistry

55. Which of the following statements is <u>not</u> true about the element iron?
    a. It is a metal.
    b. It is a transition element.
    c. It is in period 4.
    d. It has chemical and physical properties most similar to zirconium.
    e. It is in group VIIIB (group 8).

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.40 - Find the main-group and transition elements on the periodic table.
*TOPICS:* early atomic theory
periodic table

56. The elements in groups 1A-8A or 1-2 and 15-18 are known as the

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a. main group.
b. metalloids or semimetals.
c. halogens.
d. transition metals.
e. inner transition metals.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.41 - Locate the alkali metal and halogen groups on the periodic table.
*TOPICS:* early atomic theory
periodic table

57. Choose the group containing the most reactive nonmetals.
a. Group 5A
b. Group 3A
c. Group 7A
d. Group 8A
e. Group 1A

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.41 - Locate the alkali metal and halogen groups on the periodic table.
*TOPICS:* early atomic theory
periodic table
*KEYWORDS:* nonmetal
*OTHER:* general chemistry

58. Which element belongs to the alkali metals?
a. rubidium
b. germanium
c. barium
d. iodine
e. argon

*ANSWER:* a
*POINTS:* 1

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*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.41 - Locate the alkali metal and halogen groups on the periodic table.
*TOPICS:* early atomic theory
periodic table

59. Which of the following statements about different elements is/are true?

1. As is a metalloid and Se is a nonmetal.
2. Cu is a transition element and Ge is a metalloid.
3. Both F and I are halogens.

a. 1 only
b. 2 only
c. 3 only
d. 1 and 2
e. 1, 2, and 3

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.42 - Recognize the portions of the periodic table that contain the metals, nonmetals, and metalloids (semimetals).
*TOPICS:* early atomic theory
periodic table
*OTHER:* general chemistry

60. Which of the following is a metalloid?

a. oxygen
b. hydrogen
c. silicon
d. carbon
e. copper

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.42 - Recognize the portions of the periodic table that contain the metals, nonmetals, and metalloids (semimetals).

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*TOPICS:* early atomic theory
periodic table
*KEYWORDS:* metalloid
*OTHER:* general chemistry

61. All of the following elements are best classified as metalloids except
    a. Si.
    b. Te.
    c. As.
    d. B.
    e. Ga.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.5
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.42 - Recognize the portions of the periodic table that contain the metals, nonmetals, and metalloids (semimetals).
*TOPICS:* early atomic theory
periodic table
*KEYWORDS:* metalloid
*OTHER:* general chemistry

62. Which formula is best described as a (condensed) structural formula?
    a. $C_2B_{10}H_{12}$
    b. $C_6H_{11}Cl$
    c. $CH_3CH_2CH_2CH_2Cl$
    d. $C_{12}H_{22}O_{11}$
    e. $C_2H_6O$

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance

63. Which of the following is/are information that is unique to a space-filling molecular model?

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1. The model shows the relative sizes of each element.
2. The model shows the charge distribution.
3. The model shows the types of bonds (single or multiple) connecting the atoms.

a. 1 only
b. 2 only
c. 3 only
d. 1 and 2
e. 1, 2, and 3

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance

64. In a particular mass of $KAu(CN)_2$, there are $6.66 \times 10^{20}$ atoms of gold. What is the total number of atoms in this sample?

a. $1.33 \times 10^{21}$
b. $2.00 \times 10^{21}$
c. $4.00 \times 10^{21}$
d. $3.33 \times 10^{21}$
e. $2.66 \times 10^{21}$

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula
*OTHER:* general chemistry

65. A sample of TNT, $C_7H_5N_3O_6$ , has $8.94 \times 10^{21}$ nitrogen atoms. How many hydrogen atoms are there in this sample of TNT?

a. $1.79 \times 10^{22}$

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b. $11.92 \times 10^{21}$

c. $1.49 \times 10^{22}$

d. $8.94 \times 10^{21}$

e. $2.09 \times 10^{22}$

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula
*OTHER:* general chemistry

66. A 2.0-g sample of washing soda, $Na_2CO_3 \bullet 10H_2O$, has $4.2 \times 10^{21}$ carbon atoms. How many oxygen atoms are present in 2.0g of washing soda?

a. $4.2 \times 10^{22}$

b. $4.2 \times 10^{21}$

c. $8.4 \times 10^{21}$

d. $5.5 \times 10^{22}$

e. $1.3 \times 10^{22}$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula
*OTHER:* general chemistry

67. A sample of the mineral troegerite, $(UO_2)_3(AsO_4)_2 \bullet 12H_2O$, has $1.34 \times 10^{21}$ U atoms. How many arsenic atoms are present in this sample of troegerite?

a. $2.01 \times 10^{22}$

b. $1.61 \times 10^{22}$

c. $2.68 \times 10^{21}$

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d. $6.70 \times 10^{22}$

e. $8.93 \times 10^{20}$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.43 - Determine whether a chemical formula is also a molecular formula.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula
*OTHER:* general chemistry

68. An ion is formed

a. by either adding electrons to or subtracting electrons from the atom.

b. by either adding protons to or subtracting protons from the atom.

c. by either adding neutrons to or subtracting neutrons from the atom.

d. All of the above are true.

e. Two of the above are true.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.44 - Define ion, cation, and anion.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

69. The species $Ag^{+}$, $Pt^{2+}$, and $Tl^{3+}$ are all

a. anions.

b. isotopes.

c. isoelectronic.

d. allotropes.

e. cations.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy

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*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.44 - Define ion, cation, and anion.
*TOPICS:* early atomic theory
chemical substance

70. The species that is formed when a molecule gains or loses an electron is called
    a. an ion.
    b. a metalloid.
    c. an isotope.
    d. an atom.
    e. a metal.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.44 - Define ion, cation, and anion.
*TOPICS:* early atomic theory
chemical substance

71. Which of the following statements is true about one formula unit of $RuF_2$?
    a. It is composed of one Ru atom and one $F_2$ molecule.
    b. It is composed of one Ru atom and two F atoms.
    c. It is composed of one $Ru^{2+}$ ion and one $F_2^{2-}$ ion.
    d. It is composed of one $RuF_2$ molecule.
    e. It is composed of one $Ru^{2+}$ ion and two $F^-$ ions.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.45 - Classify compounds as ionic or molecular.
*TOPICS:* early atomic theory
chemical substance

72. Bismuth(III) sulfate is an ionic compound formed from $Bi^{3+}$ and $SO_4^{2-}$. What is the correct way to represent the formula?
    a. $BiSO_4^+$
    b. $Bi(SO_4)_2^-$

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c. $Bi^{3+}SO_4^{2-}$

d. $Bi_2(SO_4)_3$

e. $Bi_9(SO_4)_{13.5}$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.46 - Write an ionic formula, given the ions..
*TOPICS:* chemical formulas

73. Chemical reactions between nonmetals and nonmetals primarily involve

a. sharing of electrons.

b. interactions between protons.

c. transfer of electrons.

d. interactions among protons, electrons, and neutrons.

e. interactions between protons and electrons.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.45 - Classify compounds as ionic or molecular.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | molecular substance
*OTHER:* general chemistry

74. Which of the following is an ionic compound?

a. HOClO

b. $NH_3$

c. $CH_3OH$

d. $N_2O_3$

e. $NH_4CN$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.6
*HAS VARIABLES:* False

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*LEARNING OBJECTIVES:* GENE.EBBI.13.45 - Classify compounds as ionic or molecular.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

75. The formula of water, $H_2O$, suggests
a. there is twice as much mass of hydrogen as oxygen in each molecule.
b. there are two oxygen atoms and one hydrogen atom per water molecule.
c. there is twice as much mass of oxygen as of hydrogen in each molecule.
d. there are two hydrogen atoms and one oxygen atom per water molecule.
e. none of these

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.47 - Define and provide examples for the term formula unit.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula
*OTHER:* general chemistry

76. How many oxygen atoms are there in a formula unit of $UO_2(C_2H_3O_2)_2 \bullet NH_4C_2H_3O_2 \bullet 5H_2O$?
a. 4
b. 13
c. 23
d. 9
e. 11

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.47 - Define and provide examples for the term formula unit.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

77. What is the ratio of oxygen atoms to hydrogen atoms in the compound $Fe_4(PO_4)_3(OH)_3 \bullet 12H_2O$?

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a. 15:3
b. 27:15
c. 27:27
d. 18:27
e. 25:17

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.47 - Define and provide examples for the term formula unit.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

78. What is the ratio of oxygen atoms to hydrogen atoms in the mineral carnotite, $K_2(UO_2)_3(VO_4)_2 \cdot 3H_2O$?

a. 8:6
b. 8:3
c. 17:3
d. 9:6
e. 17:6

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.47 - Define and provide examples for the term formula unit.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

79. Which statement is <u>incorrect</u> concerning the formation of ionic compounds?

a. Halogens tend to form anions with a charge of –1.
b. Alkali metals tend to form cations with a charge of +1.
c. Metals tend to form cations, while nonmetals tend to form anions.
d. Transition metals tend to form cations with a charge of +3.
e. Noble gases tend not to form ionic compounds.

*ANSWER:* d
*POINTS:* 1

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*DIFFICULTY:* easy
*REFERENCES:* 2.6
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.48 - Specify the charge on all substances, ionic and molecular.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic compound
*OTHER:* general chemistry

80. The empirical formula of a salt consisting of $Ba^{2+}$ and $OH^-$ ions is
    a. $Ba^{2+}OH^-$.
    b. BaOH.
    c. $Ba_2OH$.
    d. $Ba_2(OH)_3$.
    e. $Ba(OH)_2$.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.6
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.49 - Write an ionic formula, given the ions.
*TOPICS:* early atomic theory
chemical substance

81. Which of the following molecules is a hydrocarbon?
    a. $H_2O$
    b. $CH_3CH_2CH_3$
    c. $C_6H_{12}O_6$
    d. $CH_3CH_2OH$
    e. $CH_3OCH_3$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.50 - Explain what makes a molecule a hydrocarbon.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* organic compound

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*OTHER:* general chemistry

82. Which of the following molecules contains the ether functional group?

a. $CH_3CH_2NH_2$

b. $CH_3CH_2OCH_2CH_3$

c. $CH_3CH_2OH$

d. $CH_3CH_2COOH$

e. $H_2O$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.51 - Recognize some functional groups of organic molecules.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* organic compound
*OTHER:* general chemistry

83. Which of the following molecules contains the carboxylic acid functional group?

a. $CH_3CH_2CH_2OH$

b. $CH_3CH_2COCH_2CH_3$

c. $CH_3NHCH_3$

d. $CH_3OCH_2CH_3$

e. $CH_3CH_2CH_2COOH$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.51 - Recognize some functional groups of organic molecules.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* organic compound
*OTHER:* general chemistry

84. Which of the following molecules contains the alcohol functional group?

a. $C_6H_6$

b. $CH_3OH$

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c. $CH_4$

d. $CH_3OCH_3$

e. $C_2H_2$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.51 - Recognize some functional groups of organic molecules.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* organic compound
*OTHER:* general chemistry

85. How many electrons does a barium ion have?

a. 56

b. 8

c. 54

d. 44

e. 2

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

86. Which of the following statements is false?

a. A crystal of calcium fluoride has equal numbers of calcium ions and fluoride ions.

b. A sodium atom is most likely to ionize to form a cation of charge +1.

c. A sulfide ion has a total of 18 $e^-$.

d. A potassium ion has a total of 18 $e^-$.

e. The charge on a neutral chlorine atom is zero.

*ANSWER:* a
*POINTS:* 1

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*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

87. As an ion, sodium has _____ electrons?
    a. 24
    b. 14
    c. 11
    d. 29
    e. 10

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

88. How many electrons does a sulfide ion have?
    a. 13
    b. 22
    c. 16
    d. 18
    e. 2

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.

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*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

89. Which metals form cations with varying positive charges?
    a. many transition metals
    b. Zn and Al
    c. Group 1 metals
    d. Group 1 and Group 2 metals
    e. Group 2 metals

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

90. Which of the following represents a known ion?
    a. $S^{2+}$
    b. $Sc^{4+}$
    c. $Sn^{2+}$
    d. $P^{4-}$
    e. $Na^{-}$

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.52 - Learn the rules for predicting the charges of monatomic ions in ionic compounds.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* chemical formula | ionic substance
*OTHER:* general chemistry

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91. The formula for the sulfide ion is
    a. $SO_3^{2-}$.
    b. $SO_4^{2-}$.
    c. $S_2O_3^{2-}$.
    d. $S^{2-}$.
    e. $HSO_4^-$.

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.53 - Apply the rules for naming monatomic ions.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

92. The correct name for $Zn^{2+}$ is
    a. monozinc ion.
    b. zinc ion.
    c. zinc(2) ion.
    d. zinc(I) ion.
    e. zinc.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.53 - Apply the rules for naming monatomic ions.
*TOPICS:* early atomic theory
chemical substance

93. The formula of the chlorite ion is
    a. $Cl_2O_3^-$.
    b. $ClO_4^-$.
    c. $Cl^-$.
    d. $ClO_2^-$.
    e. $ClO_3^-$.

*ANSWER:* d

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*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

94. The name of the $SO_4^{2-}$ ion is
    a. persulfate.
    b. thiosulfite.
    c. sulfite.
    d. sulfate.
    e. sulfide.

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

95. The formulas of the nitrite, phosphate, and nitrate ions are represented, respectively, as
    a. $N^{3-}$, $PO_3^{3-}$, $NO_3^-$.
    b. $NO^-$, $P^{5-}$, $NO_3^-$.
    c. $NO_2^-$, $P^{3-}$, $NO_3^-$.
    d. $NO_3^-$, $PO_2^-$, $N^{3-}$.
    e. $NO_2^-$, $PO_4^{3-}$, $NO_3^-$.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions.
*TOPICS:* early atomic theory

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| | |
|---|---|
| | chemical substance |
| *KEYWORDS:* | ionic compound \| nomenclature |
| *OTHER:* | general chemistry |

96. The formulas of the hydroxide ion, the nitrate ion, and the phosphate ion are represented, respectively, as
    a. $OH^-$, $NO_2^-$, $PO_3^{3-}$.
    b. $OH^-$, $NO_2^-$, $PO_4^{3-}$.
    c. $H^-$, $NO_2^-$, $P^{3-}$.
    d. $H^-$, $NO_3^-$, $P^{3-}$.
    e. $OH^-$, $NO_3^-$, $PO_4^{3-}$.

| | |
|---|---|
| *ANSWER:* | e |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 2.8 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions. |
| *TOPICS:* | early atomic theory<br>chemical substance |
| *KEYWORDS:* | ionic compound \| nomenclature |
| *OTHER:* | general chemistry |

97. All the following ions have the same charge except
    a. sulfate.
    b. dichromate.
    c. chlorate.
    d. sulfide.
    e. sulfite.

| | |
|---|---|
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *DIFFICULTY:* | easy |
| *REFERENCES:* | 2.8 |
| *HAS VARIABLES:* | False |
| *LEARNING OBJECTIVES:* | GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions. |
| *TOPICS:* | early atomic theory<br>chemical substance |
| *KEYWORDS:* | ionic compound \| nomenclature of simple compound |
| *OTHER:* | general chemistry |

98. All the following ions have the same charge except
    a. oxide.

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b. monohydrogen phosphate.
c. peroxide.
d. permanganate.
e. oxalate.

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

99. The formulas of the carbonate ion, the ammonium ion, and the chlorate ion are represented, respectively, as
a. $CO_3^{2-}$, $NH_2^-$, $ClO_3^-$.
b. $CO_3^{2-}$, $NH_4^+$, $ClO_3^-$.
c. $CO_2^-$, $NH_4^+$, $ClO^-$.
d. $P^{3-}$, $NH_3^+$, $ClO_2^-$.
e. $CO_3^{2-}$, $NH_3^+$, $ClO_2^-$.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.54 - Learn the names and charges of common polyatomic ions.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

100. The systematic name for $BaH_2$ is
a. barium(II) hydrate.
b. barium hydride.
c. barium dihydrate.
d. barium dihydrogen.
e. barium dihydride.

*ANSWER:* b
*POINTS:* 1

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*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.55 - Name an ionic compound from its formula. (Example 2.4)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

101. What is the name of the compound whose formula is $Al_2(SO_4)_3$?
a. aluminum sulfate
b. dialuminum tri(sulfur tetraoxygen)
c. aluminum sulfide
d. aluminum persulfate
e. aluminum sulfite
*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.55 - Name an ionic compound from its formula. (Example 2.4)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

102. The correct name for FeO is
a. iron(I) oxide.
b. iron oxide.
c. iron monoxide.
d. iron(II) oxide.
e. iron(III) oxide.
*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.55 - Name an ionic compound from its formula. (Example 2.4)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound

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*OTHER:* general chemistry

103. What is the formula for the chloride of gadolinium(III)?

a. $Gd_2(ClO_2)_3$
b. $Gd(ClO_4)_2$
c. $Gd_3Cl$
d. $GdCl_3$
e. $Gd(ClO_3)_3$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

104. What is the correct formula for manganese(III) oxide?

a. MnO
b. $Mn_2O$
c. $Mn_3O_2$
d. $Mn_2O_3$
e. $MnO_2$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.57 - Write the formula of an ionic compound from its name.
*TOPICS:* chemical formulas

105. What is the correct name for $Ga_2S_3$?

a. indium(III) sulfide
b. indium sulfide
c. diindium trisulfide
d. indium trisulfide

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e. diindium(II) sulfide

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.57 - Write the formula of an ionic compound from its name.
*TOPICS:* chemical formulas

106. What is the formula for calcium nitride?

a. $CaNO_2$
b. $Ca(NO_3)_2$
c. $Ca(NO_2)_2$
d. $Ca_3N_2$
e. $Ca_2N_3$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

107. The formula of calcium sulfide is

a. CaS.
b. $CaSO_2$.
c. $CaSO_3$.
d. $CaSO_4$.
e. $Ca(SO_4)_2$.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name.

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(Example 2.5)

*TOPICS:* early atomic theory
chemical substance

*KEYWORDS:* ionic compound | nomenclature of simple compound

*OTHER:* general chemistry

108. What is the formula of calcium nitrite?

a. $Ca(NO_2)_2$

b. $Ca_3N_2$

c. $Ca_2(NO_2)_2$

d. $Ca_2N_3$

e. $Ca(NO_2)_3$

*ANSWER:* a

*POINTS:* 1

*DIFFICULTY:* easy

*REFERENCES:* 2.8

*HAS VARIABLES:* True

*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)

*TOPICS:* early atomic theory
chemical substance

*KEYWORDS:* ionic compound | nomenclature of simple compound

*OTHER:* general chemistry

109. The formula for aluminum bromide is

a. AlB.

b. AlBr.

c. $Al_2Br_3$.

d. $AlBr_2$.

e. $AlBr_3$.

*ANSWER:* e

*POINTS:* 1

*DIFFICULTY:* easy

*REFERENCES:* 2.8

*HAS VARIABLES:* True

*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)

*TOPICS:* early atomic theory
chemical substance

*KEYWORDS:* ionic compound | nomenclature of simple compound

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*OTHER:* general chemistry

110. The chemical formula for iron(III) sulfide is

a. $Fe_2(SO_4)_3$.

b. $Fe_2S_3$.

c. $Fe_2(SO_3)_3$.

d. $Fe_3(SO_3)_2$.

e. $Fe_3(SO_4)_2$.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

111. The formula for aluminum sulfate is

a. $Al_3(SO_4)_2$.

b. $Al_3S_2$.

c. $Al_2(SO_4)_3$.

d. $Al_2S_3$.

e. $Al_2(SO_3)_3$.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

112. The formula for copper(II) phosphate is

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a. $Co_2(PO_4)_3$.

b. $CuPO_4$.

c. $Co_3(PO_4)_2$.

d. $Cu_2(PO_4)_3$.

e. $Cu_3(PO_4)_2$.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

113. Choose the name–formula pair that does not match.

a. calcium fluoride, $CaF_2$

b. iron(III) oxide, $Fe_2O_3$

c. aluminum oxide, $Al_2O_3$

d. potassium permanganate, $K_2MnO_4$

e. sodium sulfite, $Na_2SO_3$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

114. Choose the name–formula pair that does not match.

a. calcium hydride, $CaH_2$

b. ammonium hydrogen carbonate, $NH_4CO_3$

c. sodium chlorite, $NaClO_2$

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d. calcium hydroxide, $Ca(OH)_2$

e. nitric acid, $HNO_3$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

115. The formula for aluminum chloride is

a. $AlCl_3$.

b. AlCl.

c. $Al_2Cl$.

d. $AlCl_4$.

e. $AlCl_2$.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

116. The formula for potassium carbonate is

a. $P_2C$.

b. $K_2CO_3$.

c. $Po_2CO_3$.

d. $P_2CO_3$.

e. $K_2C$.

*ANSWER:* b

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*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

117. The formula for magnesium nitride is

a. $Mg_2N_3$.
b. $Mg_3N_2$.
c. $MgNO_2$.
d. $Mg(NO_2)_2$.
e. MgN.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

118. What is the subscript of potassium in the formula for potassium carbonate?

a. 2
b. 5
c. 3
d. 4
e. 1

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True

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*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

119. What is the formula for sodium peroxide?

a. $Na_3O_2$
b. NaO
c. $Na_2O$
d. $NaO_2$
e. $Na_2O_2$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

120. What is the formula for the chlorate of ytterbium(III)?

a. $Yb(ClO_4)_2$
b. $YbCl_2$
c. $Yb_2(ClO_3)_3$
d. $YbCl_3$
e. $Yb(ClO_3)_3$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance

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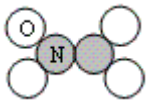
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

121. What is the formula for the nitride of europium(III)?
a. EuN
b. $Eu_2N_3$
c. $Eu(NO_3)_2$
d. $Eu(NO_3)_3$
e. $Eu(NO_2)_3$

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.56 - Write the formula of an ionic compound from its name. (Example 2.5)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

122. The correct name for LiCl is
a. monolithium chloride.
b. lithium chloride.
c. lithium(I) chloride.
d. monolithium monochloride.
e. lithium monochloride.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.58 - Name a binary compound from its formula. (Example 2.6)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* ionic compound | nomenclature of simple compound
*OTHER:* general chemistry

123. The chemical name for the model  is

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a. dinitrogen tetroxide.
b. nitrogen tetroxide.
c. nitrogen oxide.
d. nitric oxide.
e. nitrogen trioxide

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.59 - Name a binary molecular compound from its molecular model. (Example 2.8)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* binary molecular compound | nomenclature of simple compound
*OTHER:* general chemistry

124. The chemical name for the binary, non-ionic molecule with the formula HI is
a. hydrogen iodide.
b. monohydrogen iodide.
c. hydride iodide.
d. hydrogen iodine.
e. monohydrogen iodine.

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.60 - Name a binary molecular compound from its molecular model.
*TOPICS:* early atomic theory
chemical substance

125. The formula for hypochlorous acid is
a. $HClO_4$.
b. HClO.
c. HCl.
d. $HClO_2$.
e. HClO.

*ANSWER:* e
*POINTS:* 1

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*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.61 - Learn the approach for naming binary acids and oxoacids.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* acid | nomenclature of simple compound
*OTHER:* general chemistry

126. Which name–formula pair is incorrect?

a. $HNO_3$, nitric acid
b. $H_3PO_4$, phosphoric acid
c. HClO, hypochlorous acid
d. HCl, hydrochloric acid
e. HBr, perchloric acid

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.61 - Learn the approach for naming binary acids and oxoacids.
*TOPICS:* early atomic theory
chemical substance

127. Which name–formula pair is incorrect?

a. hypochlorous acid, $HClO_2$
b. titanium(IV) carbide, TiC
c. strontium nitride, $Sr_3N_2$
d. magnesium sulfate heptahydrate, $MgSO_4 \cdot 7H_2O$
e. dinitrogen tetroxide, $N_2O_4$

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.8
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.61 - Learn the approach for naming binary acids and oxoacids.
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* nomenclature of simple compound
*OTHER:* general chemistry

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128. The oxoanion that comes from nitric acid is

a. $N_2O_3^-$.

b. $NO_3^-$.

c. $HNO_3^-$.

d. $NO^-$.

e. $NO_2^-$.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.8
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.62 - Write the name and formula of an anion from the acid. (Example 2.9)
*TOPICS:* early atomic theory
chemical substance
*KEYWORDS:* acid | nomenclature of simple compound
*OTHER:* general chemistry

129. For the following balanced chemical equation, which substance represents the catalyst?

$2CO(g) + 2NO(g) \xrightarrow{Rh(s)} 2CO_2(g) + N_2(g)$

a. $NO(g)$

b. $CO(g)$

c. $CO_2(g)$

d. $N_2(g)$

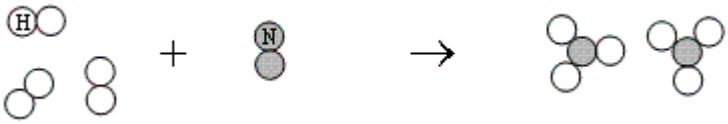
e. $Rh(s)$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.63 - Identify the reactants and products in a chemical equation.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* writing equation
*OTHER:* general chemistry

130. What is the balanced chemical equation that represents the following reaction?

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a. $6H + 2N \rightarrow 2NH_3$

b. $6H + 2N \rightarrow 2HN_3$

c. $2N + 2H_3 \rightarrow 2H_3N$

d. $6H + 2N \rightarrow 2N_3H$

e. $3H_2 + N_2 \rightarrow 2NH_3$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.63 - Identify the reactants and products in a chemical equation.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* writing equation
*OTHER:* general chemistry

131. In the following chemical equation, what is the reactant?
$CuSO_4 \cdot 5H_2O(s) \rightarrow CuO(s) + SO_3(g) + 5H_2O(l)$

a. $CuSO_4 \cdot 5H_2O(s)$

b. $H_2O(l)$

c. $CuO(s)$

d. $SO_3(g)$

e. $CuSO_4(s)$

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.63 - Identify the reactants and products in a chemical equation.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* writing equation
*OTHER:* general chemistry

132. Which is a correct balanced chemical equation corresponding to the following description of a chemical reaction?

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Hydrochloric acid reacts with magnesium metal to produce aqueous magnesium chloride and hydrogen gas.

a. $2HCl(aq) + Mg(s) \rightarrow MgCl_2(aq) + 2H(g)$

b. $2HCl(aq) + Mg(s) \rightarrow MgCl_2(aq) + H_2(g)$

c. $2HCl(aq) + Mg(s) \rightarrow MgCl(aq) + H_2(g)$

d. $2HCl(aq) + Mg(aq) \rightarrow MgCl_2(s) + H_2(g)$

e. $HCl(aq) + Mg(s) \rightarrow MgCl(aq) + H(g)$

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.64 - Write chemical equations using appropriate phase labels,symbols of reactions conditions, and the presence of a catalyst.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

133. Sulfuric acid reacts with aqueous sodium hydroxide to produce aqueous sodium sulfate and liquid water. Which is the correct balanced chemical equation for this reaction description?

a. $H_2SO_4(aq) + 2NaOH(aq) \rightarrow Na_2S(aq) + 2H_2O(l) + 2O_2(g)$

b. $H_2S(aq) + 2NaOH(aq) \rightarrow Na_2S(aq) + 2H_2O(l)$

c. $H_2SO_4(aq) + NaOH(aq) \rightarrow NaSO_4(aq) + H_2O(g)$

d. $H_2SO_4(aq) + 2NaOH(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

e. $H_2SO_4(aq) + (NaOH)_2(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.64 - Write chemical equations using appropriate phase labels,symbols of reactions conditions, and the presence of a catalyst.
*TOPICS:* early atomic theory
chemical reaction

134. How many of the following statements are true concerning chemical equations?
I. Coefficients can be fractions.
II. Subscripts can be fractions.
III. Coefficients represent the relative masses of the reactants and/or products.
IV. Changing the subscripts to balance an equation can be done only once.
V. Atoms are conserved when balancing chemical equations.

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a. 3
b. 4
c. 2
d. 5
e. 1

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

135. When the following equation is balanced with lowest whole-number coefficients, what is the coefficient for NO(*g*)?

___$NH_3(g)$ + ___$O_2(g)$ → ___$NO(g)$ + ___$H_2O(g)$

a. 3
b. 2
c. 5
d. 4
e. 1

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

136. The complete combustion of propane, $C_3H_8$, yields carbon dioxide and water:

__ $C_3H_8$ + __ $O_2$→ __ $CO_2$ + __ $H_2O$

The smallest whole-number coefficient of oxygen in the balanced equation is

a. 6.

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b. 3.
c. 7.
d. 4.
e. 5.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.10
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

137. The products of the combustion of acetaldehyde with oxygen are shown in the following equation:
__ $CH_3CHO$ + __ $O_2$ → __ $CO_2$ + __ $H_2O$
When properly balanced, the equation indicates that ____ molecules of $O_2$ are required to burn 2 molecules of $CH_3CHO$.

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

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

138. The complete combustion of octane, $C_8H_{18}$, yields carbon dioxide and water:
__ $C_8H_{18}$ + __ $O_2$ → __ $CO_2$ + __ $H_2O$
The smallest whole-number coefficient of oxygen in the balanced equation is

a. 24.

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b. 26.
c. 22.
d. 23.
e. 25.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* True
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

139. Energy from the following reaction provided the lift for the moon lander:
__ $(CH_3)_2N_2H_2$ + __ $N_2O_4$ → __ $N_2$ + __ $H_2O$ + __ $CO_2$
When the equation is balanced, the smallest whole-number coefficient of nitrogen is

a. 5.
b. 4.
c. 1.
d. 3.
e. 2.

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

140. Treatment of sodium borohydride with sulfuric acid is a convenient method for the preparation of diborane:
__ $NaBH_4$ + __ $H_2SO_4$ → __ $B_2H_6$ + __ $H_2$ + __$Na_2SO_4$
When the equation is balanced, the lowest whole number coefficient for hydrogen is

a. 5.
b. 2.

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c. 4.
d. 1.
e. 3.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

141. All the following may change during a chemical reaction except
a. the total volume of the system.
b. the density of the system.
c. the temperature of the system.
d. the total number of atoms in the system.
e. the total number of molecules in the system.

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

142. The complete combustion of phenylhydrazine, $C_6H_5NHNH_2$, with the oxidizer dinitrogen tetraoxide is shown in the following equation:
__ $C_6H_5NHNH_2$ + __ $N_2O_4$ → __ $CO_2$ + __ $H_2O$ + __ $N_2$
When this equation is balanced, the sum of all the coefficients (using smallest whole numbers) is
a. 30.
b. 20.
c. 25.
d. 10.

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e. 15.

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

143. The complete combustion of pentane yields carbon dioxide and water. When the equation
__ $C_5H_{12}(l)$ + __ $O_2(g)$ → __ $CO_2(g)$ + __ $H_2O(l)$
is balanced, the ratio of the coefficient of $CO_2$ to the coefficient of $O_2$ is

a. 8:5.
b. 8:6.
c. 6:5.
d. 5:6.
e. 5:8.

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

144. A reaction occurs between sodium carbonate and hydrochloric acid, producing sodium chloride, carbon dioxide, and water. Which is the correct set of coefficients, respectively, for the balanced reaction?

a. 3 6 6 3 4
b. 8 6 5 10 5
c. 5 10 10 5 5
d. 1 2 2 1 1
e. none of these

*ANSWER:* d

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*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

145. When the equation
__ $(CH_3)_2NNH_2$ + __ $N_2O_4$ → __ $N_2$ + __ $H_2O$ + __ $CO_2$
is balanced, the sum of all the coefficients (simplest whole number) is
a. 13.
b. 12.
c. 9.
d. 10.
e. 11.
*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* difficult
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

146. When the equation
__ $C_5H_6N_2OS(s)$ + __ $O_2(g)$ → __ $CO_2(g)$ + __ $H_2O(l)$ + __ $N_2(g)$ + __ $SO_2(g)$
is balanced, the sum of all the coefficients (simplest whole number) is
a. 19.
b. 20.
c. 24.
d. 18.
e. 21.
*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* difficult

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*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

147. Ammonia can be made by reaction of water with magnesium nitride:
__ $Mg_3N_2(s)$ + __ $H_2O(l)$ → __ $Mg(OH)_2(s)$ + __ $NH_3(g)$
When the equation is properly balanced, the sum of the coefficients is

a. 6.
b. 14.
c. 12.
d. 9.
e. 8.

*ANSWER:* c
*POINTS:* 1
*DIFFICULTY:* moderate
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.65 - Master techniques for balancing chemical equations. (Example 2.12)
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

148. Which one of the following equations is properly balanced?

a. $Sn + 4HNO_3 \rightarrow SnO_2 + 4NO_2 + 2H_2O$
b. $2Na_2SO_4 + 3Bi(NO_3)_3 \rightarrow Bi_2(SO_4)_3 + 9NaNO_3$
c. $CH_3CHO + 3O_2 \rightarrow 2CO_2 + 2H_2O$
d. $NH_4NO_3 \rightarrow 2H_2O + N_2$
e. $Na_2CO_3 + 2H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O + CO_2$

*ANSWER:* a
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.10
*HAS VARIABLES:* False

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*LEARNING OBJECTIVES:* GENE.EBBI.13.66 - Determine if a chemical reaction is balanced.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

149. Which of the following chemical equations is not balanced?

a. $NH_4NO_3 \rightarrow N_2O + 2H_2O$

b. $C_{12}H_{22}O_{11} \rightarrow 12C + 11H_2O$

c. $2NH_4SCN + Ba(OH)_2 \bullet 8H_2O \rightarrow 2NH_3 + 10H_2O + Ba(SCN)_2$

d. $(NH_4)_2Cr_2O_7 \rightarrow N_2O + Cr_2O_3 + 4H_2O$

e. $2Mg + CO_2 \rightarrow 2MgO + C$

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.66 - Determine if a chemical reaction is balanced.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

150. Which of the following equations is not balanced?

a. $2Sb_2OS_2 + 10O_2 \rightarrow 2Sb_2O_5 + 4SO_3$

b. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + 4H_2O + Cr_2O_3$

c. $C_{12}H_{22}O_{11} + 12O_2 \rightarrow 12CO_2 + 11H_2O$

d. $2NaCl + Pb(NO_3)_2 \rightarrow PbCl_2 + 2NaNO_3$

e. $Fe_3O_4 + 3CO \rightarrow 3Fe + 3CO_2$

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* easy
*REFERENCES:* 2.10
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.66 - Determine if a chemical reaction is balanced.
*TOPICS:* early atomic theory
chemical equation
*KEYWORDS:* balancing chemical equation
*OTHER:* general chemistry

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151. Identify the true statement(s) about a nucleus.
1. A nucleus is an atom's central core.
2. A nucleus is positively charged.
3. A nucleus contains most of an atom's mass.

a. 1 only
b. 2 only
c. 3 only
d. 1 and 3
e. 2 and 3

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* Easy
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.30 - Describe Rutherford's experiment that led to the nuclear model of the atom.
*TOPICS:* The Structure of the Atom

152. _____ are very light, negatively charged particles that exists in the region around an atom's positively charged nucleus.

a. Protons
b. Electrons
c. Bosons
d. Positrons
e. Neutrons

*ANSWER:* b
*POINTS:* 1
*DIFFICULTY:* Easy
*REFERENCES:* 2.2
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.28 - Describe Thomson's experiment in which he discovered the electron.
*TOPICS:* The Structure of the Atom

153. An important class of molecular substances that contain carbon combined with other elements, such as hydrogen, oxygen, and nitrogen, is _____.

a. organic compounds
b. radioactive isotones
c. radioactive isotopes
d. inorganic compounds
e. stable isotopes

*ANSWER:* a

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*POINTS:* 1
*DIFFICULTY:* Moderate
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*TOPICS:* Organic Compounds

154. Which of the following is/are true about urea?
1. Urea is a molecular compound in human urine.
2. Urea can be synthesized from ammonia and cyanic acid.
3. Urea belongs to the hydrocarbon group.

a. 1 only
b. 2 only
c. 3 only
d. 1 and 2
e. 1, 2, and 3

*ANSWER:* d
*POINTS:* 1
*DIFFICULTY:* Moderate
*REFERENCES:* 2.7
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.51 - Recognize some functional groups of organic molecules.
*TOPICS:* Organic Compounds

155. A _____ is the symbolic representation of a chemical reaction in terms of chemical formulas.
a. chemical bond
b. chemical reagent
c. chemical energy
d. chemical reactant
e. chemical equation

*ANSWER:* e
*POINTS:* 1
*DIFFICULTY:* Easy
*REFERENCES:* 2.9
*HAS VARIABLES:* False
*LEARNING OBJECTIVES:* GENE.EBBI.13.63 - Identify the reactants and products in a chemical equation.
*TOPICS:* Writing Chemical Equations

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