2.1 Multiple-Choice and Bimodal Questions

1) A certain mass of carbon reacts with 13.6 g of oxygen to form carbon monoxide. _____ grams of oxygen would react with that same mass of carbon to form carbon dioxide, according to the law of multiple proportions?

A) 25.6
B) 6.8
C) 13.6
D) 136
E) 27.2

Answer: E
Diff: 3
Page Ref: Sec. 2.1

2) Methane and ethane are both made up of carbon and hydrogen. In methane, there are 12.0 g of carbon for every 4.00 g of hydrogen, a ratio of 3:1 by mass. In ethane, there are 24.0 g of carbon for every 6.00 g of hydrogen, a ratio of 4:1 by mass. This is an illustration of the law of _____.

A) constant composition
B) multiple proportions
C) conservation of matter
D) conservation of mass
E) octaves

Answer: B
Diff: 2
Page Ref: Sec. 2.1

3) Which statement below correctly describes the responses of alpha, beta, and gamma radiation to an electric field?

A) Both beta and gamma are deflected in the same direction, while alpha shows no response.
B) Both alpha and gamma are deflected in the same direction, while beta shows no response.
C) Both alpha and beta are deflected in the same direction, while gamma shows no response.
D) Alpha and beta are deflected in opposite directions, while gamma shows no response.
E) Only alpha is deflected, while beta and gamma show no response.

Answer: D
Diff: 2
Page Ref: Sec. 2.2

4) _____ and _____ reside in the atomic nucleus.

A) Protons, electrons
B) Electrons, neutrons
C) Protons, neutrons
D) none of the above
E) Neutrons, only neutrons

Answer: C
Diff: 1
Page Ref: Sec. 2.2

5) 200 pm is the same as _____ Å.

A) 2000
B) 20
C) 200
D) 2
E) 2×10^{-12}

Answer: D
Diff: 1
Page Ref: Sec. 2.3

6) The atomic number indicates _____.

A) the number of neutrons in a nucleus
B) the total number of neutrons and protons in a nucleus
C) the number of protons or electrons in a neutral atom
D) the number of atoms in 1 g of an element
E) the number of different isotopes of an element

Answer: C
Diff: 1
Page Ref: Sec. 2.3

7) Which pair of atoms constitutes a pair of isotopes of the same element?

A) $^{14}_{6}X$ $^{14}_{7}X$
B) $^{14}_{6}X$ $^{12}_{6}X$
C) $^{17}_{9}X$ $^{17}_{8}X$
D) $^{19}_{10}X$ $^{19}_{9}X$
E) $^{20}_{10}X$ $^{21}_{11}X$

Answer: B
Diff: 1
Page Ref: Sec. 2.3

8) The nucleus of an atom contains _____.

A) electrons
B) protons, neutrons, and electrons
C) protons and neutrons
D) protons and electrons
E) protons

Answer: C
Diff: 1
Page Ref: Sec. 2.3

9) In the periodic table, the rows are called _____ and the columns are called _____.

A) octaves, groups
B) staffs, families
C) periods, groups
D) cogeners, families
E) rows, groups

Answer: C
Diff: 1
Page Ref: Sec. 2.5

10) Which group in the periodic table contains only nonmetals?

A) 1A
B) 6A
C) 2B
D) 2A
E) 8A

Answer: E
Diff: 1
Page Ref: Sec. 2.5

11) The element _____ is the most similar to strontium in chemical and physical properties.

A) Li
B) At
C) Rb
D) Ba
E) Cs

Answer: D
Diff: 3
Page Ref: Sec. 2.5

12) Horizontal rows of the periodic table are known as _____.

A) periods
B) groups
C) metalloids
D) metals
E) nonmetals

Answer: A
Diff: 1
Page Ref: Sec. 2.5

13) Vertical columns of the periodic table are known as _____.

A) metals
B) periods
C) nonmetals
D) groups
E) metalloids

Answer: D
Diff: 1
Page Ref: Sec. 2.5

14) Elements in Group 1A are known as the _____.

A) chalcogens
B) alkaline earth metals
C) alkali metals
D) halogens
E) noble gases

Answer: C
Diff: 1
Page Ref: Sec. 2.5

15) Elements in Group 2A are known as the _____.

A) alkaline earth metals
B) alkali metals
C) chalcogens
D) halogens
E) noble gases

Answer: A
Diff: 1
Page Ref: Sec. 2.5

16) Elements in Group 6A are known as the _____.

A) alkali metals
B) chalcogens
C) alkaline earth metals
D) halogens
E) noble gases

Answer: B
Diff: 1
Page Ref: Sec. 2.5

17) Elements in Group 7A are known as the _____.

A) chalcogens
B) alkali metals
C) alkaline earth metals
D) halogens
E) noble gases

Answer: D
Diff: 1
Page Ref: Sec. 2.5

18) Elements in Group 8A are known as the _____.

A) halogens
B) alkali metals
C) alkaline earth metals
D) chalcogens
E) noble gases

Answer: E
Diff: 1
Page Ref: Sec. 2.5

19) Potassium is a _____ and chlorine is a _____.

A) metal, nonmetal
B) metal, metal
C) metal, metalloid
D) metalloid, nonmetal
E) nonmetal, metal

Answer: A
Diff: 1
Page Ref: Sec. 2.5

20) Lithium is a _____ and magnesium is a _____.

A) nonmetal, metal
B) nonmetal, nonmetal
C) metal, metal
D) metal, metalloid
E) metalloid, metalloid

Answer: C
Diff: 1
Page Ref: Sec. 2.5

21) Oxygen is a _____ and nitrogen is a _____.

A) metal, metalloid
B) nonmetal, metal
C) metalloid, metalloid
D) nonmetal, nonmetal
E) nonmetal, metalloid

Answer: D
Diff: 1
Page Ref: Sec. 2.5

22) Calcium is a _____ and silver is a _____.

A) nonmetal, metal
B) metal, metal
C) metalloid, metal
D) metal, metalloid
E) nonmetal, metalloid

Answer: B
Diff: 1
Page Ref: Sec. 2.5

23) _____ are found uncombined, as monatomic species in nature.

A) Noble gases
B) Chalcogens
C) Alkali metals
D) Alkaline earth metals
E) Halogens

Answer: A
Diff: 1
Page Ref: Sec. 2.6

24) When a metal and a nonmetal react, the _____ tends to lose electrons and the _____ tends to gain electrons.

A) metal, metal
B) nonmetal, nonmetal
C) metal, nonmetal
D) nonmetal, metal
E) None of the above, these elements share electrons.

Answer: C
Diff: 1
Page Ref: Sec. 2.6

25) The empirical formula of a compound with molecules containing 12 carbon atoms, 14 hydrogen atoms, and 6 oxygen atoms is _____.

A) $C_{12}H_{14}O_6$
B) CHO
C) CH_2O
D) $C_6H_7O_3$
E) C_2H_4O

Answer: D
Diff: 2
Page Ref: Sec. 2.6

26) _____ typically form ions with a 2+ charge.

A) Alkaline earth metals
B) Halogens
C) Chalcogens
D) Alkali metals
E) Transition metals

Answer: A
Diff: 2
Page Ref: Sec. 2.7

27) What is the formula of the compound formed between strontium ions and nitrogen ions?

A) SrN
B) Sr_3N_2
C) Sr_2N_3
D) SrN_2
E) SrN_3

Answer: B
Diff: 3
Page Ref: Sec. 2.7

28) Magnesium reacts with a certain element to form a compound with the general formula MgX. What would the most likely formula be for the compound formed between potassium and element X?

A) K_2X
B) KX_2
C) K_2X_3
D) K_2X_2
E) KX

Answer: A
Diff: 1
Page Ref: Sec. 2.7

29) The formula of a salt is XCl_2. The X-ion in this salt has 28 electrons. The metal X is _____.

A) Ni
B) Zn
C) Fe
D) V
E) Pd

Answer: B
Diff: 2
Page Ref: Sec. 2.7

30) The charge on the manganese in the salt MnF_3 is _____.

A) 1+
B) 1-
C) 2+
D) 2-
E) 3+

Answer: E
Diff: 1
Page Ref: Sec. 2.7

31) Aluminum reacts with a certain nonmetallic element to form a compound with the general formula AlX. Element X is a diatomic gas at room temperature. Element X must be _____.

A) oxygen
B) fluorine
C) chlorine
D) nitrogen
E) sulfur

Answer: D
Diff: 2
Page Ref: Sec. 2.7

32) Sodium forms an ion with a charge of _____.

A) 1+
B) 1-
C) 2+
D) 2-
E) 0

Answer: A
Diff: 1
Page Ref: Sec. 2.7

33) Potassium forms an ion with a charge of _____.

A) 2+
B) 1-
C) 1+
D) 2-
E) 0

Answer: C
Diff: 1
Page Ref: Sec. 2.7

34) Calcium forms an ion with a charge of _____.

A) 1-
B) 2-
C) 1+
D) 2+
E) 0

Answer: D
Diff: 1
Page Ref: Sec. 2.7

35) Barium forms an ion with a charge of _____.

A) 1+
B) 2-
C) 3+
D) 3-
E) 2+

Answer: E
Diff: 1
Page Ref: Sec. 2.7

36) Aluminum forms an ion with a charge of _____.

A) 2+
B) 3-
C) 1+
D) 3+
E) 1-

Answer: D
Diff: 1
Page Ref: Sec. 2.7

37) Fluorine forms an ion with a charge of _____.

A) 1-
B) 1+
C) 2+
D) 3+
E) 3-

Answer: A
Diff: 1
Page Ref: Sec. 2.7

38) Iodine forms an ion with a charge of _____.

A) 7-
B) 1+
C) 2-
D) 2+
E) 1-

Answer: E
Diff: 1
Page Ref: Sec. 2.7

39) Oxygen forms an ion with a charge of _____.

A) 2-
B) 2+
C) 3-
D) 3+
E) 6+

Answer: A
Diff: 1
Page Ref: Sec. 2.7

40) Sulfur forms an ion with a charge of _____.

A) 2+
B) 2-
C) 3+
D) 6-
E) 6+

Answer: B
Diff: 2
Page Ref: Sec. 2.7

41) Predict the empirical formula of the ionic compound that forms from sodium and fluorine.

A) NaF
B) Na_2F
C) NaF_2
D) Na_2F_3
E) Na_3F_2

Answer: A
Diff: 1
Page Ref: Sec. 2.7

42) Predict the empirical formula of the ionic compound that forms from magnesium and fluorine.

A) Mg_2F_3
B) MgF
C) Mg_2F
D) Mg_3F_2
E) MgF_2

Answer: E
Diff: 1
Page Ref: Sec. 2.7

43) Predict the empirical formula of the ionic compound that forms from magnesium and oxygen.

A) Mg_2O
B) MgO
C) MgO_2
D) Mg_2O_2
E) Mg_3O_2

Answer: B
Diff: 1
Page Ref: Sec. 2.7

44) Predict the empirical formula of the ionic compound that forms from aluminum and oxygen.

A) AlO
B) Al_3O_2
C) Al_2O_3
D) AlO_2
E) Al_2O

Answer: C
Diff: 1
Page Ref: Sec. 2.7

45) The correct name for SrO is _____.

A) strontium oxide
B) strontium hydroxide
C) strontium peroxide
D) strontium monoxide
E) strontium dioxide

Answer: A
Diff: 1
Page Ref: Sec. 2.8

46) The correct name for K_2S is _____.

A) potassium sulfate
B) potassium disulfide
C) potassium bisulfide
D) potassium sulfide
E) dipotassium sulfate

Answer: D
Diff: 1
Page Ref: Sec. 2.8

47) The correct name for Al_2O_3 is _____.

A) aluminum oxide
B) dialuminum oxide
C) dialuminum trioxide
D) aluminum hydroxide
E) aluminum trioxide

Answer: A
Diff: 2
Page Ref: Sec. 2.8

48) The correct name for CaH_2 is _____.

A) hydrocalcium
B) calcium dihydride
C) calcium hydroxide
D) calcium dihydroxide
E) calcium hydride

Answer: E
Diff: 1
Page Ref: Sec. 2.8

49) The correct name for SO is _____.

A) sulfur oxide
B) sulfur monoxide
C) sulfoxide
D) sulfate
E) sulfite

Answer: B
Diff: 1
Page Ref: Sec. 2.8

50) The correct name for CCl_4 is _____.

A) carbon chloride
B) carbon tetrachlorate
C) carbon perchlorate
D) carbon tetrachloride
E) carbon chlorate

Answer: D
Diff: 1
Page Ref: Sec. 2.8

51) The correct name for N_2O_5 is _____.

A) nitrous oxide
B) nitrogen pentoxide
C) dinitrogen pentoxide
D) nitric oxide
E) nitrogen oxide

Answer: C
Diff: 1
Page Ref: Sec. 2.8

52) The correct name for H_2CO_3 is _____.

A) carbonous acid
B) hydrocarbonate
C) carbonic acid
D) carbohydrate
E) carbohydric acid

Answer: C
Diff: 1
Page Ref: Sec. 2.8

53) The correct name for H_2SO_3 is _____.

A) sulfuric acid
B) sulfurous acid
C) hydrosulfuric acid
D) hydrosulfic acid
E) sulfur hydroxide

Answer: B
Diff: 1
Page Ref: Sec. 2.8

54) The correct name for $HClO_3$ is _____.

A) hydrochloric acid
B) perchloric acid
C) chloric acid
D) chlorous acid
E) hydrochlorous acid

Answer: C
Diff: 1
Page Ref: Sec. 2.8

55) The correct name for $HClO_2$ is _____.

A) perchloric acid
B) chloric acid
C) hypochlorous acid
D) hypychloric acid
E) chlorous acid

Answer: E
Diff: 2
Page Ref: Sec. 2.8

56) The correct name of the compound Na_3N is _____.

A) sodium nitride
B) sodium azide
C) sodium trinitride
D) sodium(III) nitride
E) trisodium nitride

Answer: A
Diff: 1
Page Ref: Sec. 2.8

57) The formula of bromic acid is _____.

A) HBr
B) $HBrO_4$
C) HBrO
D) $HBrO_3$
E) $HBrO_2$

Answer: D
Diff: 1
Page Ref: Sec. 2.8

58) The correct formula for molybdenum(IV) hypochlorite is _____.

A) $Mo(ClO_3)_4$
B) $Mo(ClO)_4$
C) $Mo(ClO_2)_4$
D) $Mo(ClO_4)_4$
E) $MoCl_4$

Answer: B
Diff: 2
Page Ref: Sec. 2.8

59) The name of PCl_3 is _____.

A) potassium chloride
B) phosphorus trichloride
C) phosphorous(III) chloride
D) monophosphorous trichloride
E) trichloro potassium

Answer: B
Diff: 1
Page Ref: Sec. 2.8

60) The ions Ca^{2+} and PO_4^{3-} form a salt with the formula _____.

A) $CaPO_4$
B) $Ca_2(PO_4)_3$
C) Ca_2PO_4
D) $Ca(PO_4)_2$
E) $Ca_3(PO_4)_2$

Answer: E
Diff: 1
Page Ref: Sec. 2.8

61) The correct formula of iron(III) bromide is _____.

A) $FeBr_2$
B) $FeBr_3$
C) FeBr
D) Fe_3Br_3
E) Fe_3Br

Answer: B
Diff: 1
Page Ref: Sec. 2.8

62) Element M reacts with fluorine to form an ionic compound with the formula MF_3. The M-ion has 18 electrons. Element M is _____.

A) P
B) Sc
C) Ar
D) Ca
E) Cr

Answer: B
Diff: 2
Page Ref: Sec. 2.8

63) Magnesium and sulfur form an ionic compound with the formula _____.

A) MgS
B) Mg_2S
C) MgS_2
D) Mg_2S_2
E) Mg_2S_3

Answer: A
Diff: 1
Page Ref: Sec. 2.8

64) The formula of ammonium carbonate is _____.

A) $(NH_4)_2CO_3$
B) NH_4CO_2
C) $(NH_3)_2CO_4$
D) $(NH_3)_2CO_3$
E) $N_2(CO_3)_3$

Answer: A
Diff: 1
Page Ref: Sec. 2.8

65) The formula of the chromate ion is _____.

A) CrO_4^{2-}
B) CrO_2^{3-}
C) CrO^{-}
D) CrO_3^{2-}
E) CrO^{2-}

Answer: A
Diff: 1
Page Ref: Sec. 2.8

66) The formula of the carbonate ion is _____.

A) CO_2^{2-}
B) CO_3^{2-}
C) CO_3^{3-}
D) CO_2^{-}
E) CO^{-}

Answer: B
Diff: 1
Page Ref: Sec. 2.8

67) The correct name for $Mg(ClO_3)_2$ is _____.

A) magnesium chlorate
B) manganese chlorate
C) magnesium chloroxide
D) magnesium perchlorate
E) manganese perchlorate

Answer: A
Diff: 1
Page Ref: Sec. 2.8

68) What is the correct formula for ammonium sulfide?

A) NH_4SO_3
B) $(NH_4)_2SO_4$
C) $(NH_4)_2S$
D) NH_3S
E) N_2S_3

Answer: C
Diff: 1
Page Ref: Sec. 2.8

69) When calcium reacts with sulfur the compound formed is _____.

A) Ca_2S_2
B) Ca_3S_2
C) CaS
D) CaS_2
E) Ca_2S_3

Answer: C
Diff: 1
Page Ref: Sec. 2.8

70) Chromium and chlorine form an ionic compound whose formula is $CrCl_3$. The name of this compound is _____.

A) chromium chlorine
B) chromium(III) chloride
C) monochromium trichloride
D) chromium(III) trichloride
E) chromic trichloride

Answer: B
Diff: 1
Page Ref: Sec. 2.8

71) The name of the binary compound N_2O_4 is _____.

A) nitrogen oxide
B) nitrous oxide
C) nitrogen(IV) oxide
D) dinitrogen tetroxide
E) oxygen nitride

Answer: D
Diff: 2
Page Ref: Sec. 2.8

72) The formula for zinc phosphate is $Zn_3(PO_4)_2$. What is the formula for cadmium arsenate?

A) $Cd_4(AsO_2)_3$
B) $Cd_3(AsO_4)_2$
C) $Cd_3(AsO_3)_4$
D) $Cd_2(AsO_4)_3$
E) $Cd_2(AsO_4)_4$

Answer: B
Diff: 1
Page Ref: Sec. 2.8

73) The formula for aluminum hydroxide is _____.

A) AlOH
B) Al_3OH
C) $Al_2(OH)_3$
D) $Al(OH)_3$
E) Al_2O_3

Answer: D
Diff: 1
Page Ref: Sec. 2.8

74) The name of the ionic compound $KBrO_4$ is _____.

A) potassium perbromate
B) potassium bromate
C) potassium hypobromate
D) potassium perbromite
E) potassium bromide

Answer: A
Diff: 2
Page Ref: Sec. 2.8

75) The name of the ionic compound V_2O_3 is _____.

A) vanadium(III) oxide
B) vanadium oxide
C) vanadium(II) oxide
D) vanadium(III) trioxide
E) divanadium trioxide

Answer: A
Diff: 1
Page Ref: Sec. 2.8

76) The name of the ionic compound NH_4CN is _____.

A) nitrogen hydrogen cyanate
B) ammonium carbonitride
C) ammonium cyanide
D) ammonium hydrogen cyanate
E) cyanonitride

Answer: C
Diff: 1
Page Ref: Sec. 2.8

77) The name of the ionic compound $(NH_4)_3PO_4$ is _____.

A) ammonium phosphate
B) nitrogen hydrogen phosphate
C) tetrammonium phosphate
D) ammonia phosphide
E) triammonium phosphate

Answer: A
Diff: 1
Page Ref: Sec. 2.8

78) What is the formula for perchloric acid?

A) HClO
B) $HClO_3$
C) $HClO_4$
D) $HClO_2$
E) HCl

Answer: C
Diff: 1
Page Ref: Sec. 2.8

79) The correct name for HIO_2 is _____.

A) hypoiodic acid
B) hydriodic acid
C) periodous acid
D) iodous acid
E) periodic acid

Answer: D
Diff: 2
Page Ref: Sec. 2.8

80) What is the molecular formula for propane?

A) C_2H_8
B) C_3H_6
C) C_3H_8
D) C_4H_8
E) C_4H_{10}

Answer: C
Diff: 1
Page Ref: Sec. 2.9

81) What is the molecular formula for nonane?

A) C_9H_{18}
B) C_9H_{20}
C) $C_{10}H_{20}$
D) $C_{10}H_{22}$
E) $C_{10}H_{24}$

Answer: B
Diff: 2
Page Ref: Sec. 2.9

82) What is the molecular formula for heptane?

A) C_6H_{12}
B) C_6H_{14}
C) C_7H_{14}
D) C_7H_{16}
E) C_7H_{18}

Answer: D
Diff: 2
Page Ref: Sec. 2.9

83) What is the molecular formula for n-hexanol?

A) $C_6H_{12}OH$
B) $C_6H_{13}OH$
C) $C_6H_{14}OH$
D) $C_7H_{13}OH$
E) $C_7H_{14}OH$

Answer: B
Diff: 2
Page Ref: Sec. 2.9

2.2 Multiple-Choice Questions

1) A molecule of water contains hydrogen and oxygen in a 1:8 ratio by mass. This is a statement of _____.

A) the law of multiple proportions
B) the law of constant composition
C) the law of conservation of mass
D) the law of conservation of energy
E) none of the above

Answer: B
Diff: 2
Page Ref: Sec. 2.1

2) Which one of the following is not one of the postulates of Dalton's atomic theory?

A) Atoms are composed of protons, neutrons, and electrons.
B) All atoms of a given element are identical; the atoms of different elements are different and have different properties.
C) Atoms of an element are not changed into different types of atoms by chemical reactions: atoms are neither created nor destroyed in chemical reactions.
D) Compounds are formed when atoms of more than one element combine; a given compound always has the same relative number and kind of atoms.
E) Each element is composed of extremely small particles called atoms.

Answer: A
Diff: 1
Page Ref: Sec. 2.1

3) Consider the following selected postulates of Dalton's atomic theory:
(i) Each element is composed of extremely small particles called atoms.
(ii) Atoms are indivisible.
(iii) Atoms of a given element are identical.
(iv) Atoms of different elements are different and have different properties.

Which of the postulates is(are) no longer considered valid?

A) (i) and (ii)
B) (ii) only
C) (ii) and (iii)
D) (iii) only
E) (iii) and (iv)

Answer: C
Diff: 2
Page Ref: Sec. 2.1

4) Which pair of substances could be used to illustrate the law of multiple proportions?

A) SO_2, H_2SO_4
B) CO, CO_2
C) H_2O, O_2
D) CH_4, $C_6H_{12}O_6$
E) NaCl, KCl

Answer: B
Diff: 1
Page Ref: Sec. 2.1

5) Which one of the following is not true concerning cathode rays?

A) They originate from the negative electrode.
B) They travel in straight lines in the absence of electric or magnetic fields.
C) They impart a negative charge to metals exposed to them.
D) They are made up of electrons.
E) The characteristics of cathode rays depend on the material from which they are emitted.

Answer: E
Diff: 2
Page Ref: Sec. 2.2

6) The charge on an electron was determined in the _____.

A) cathode ray tube, by J. J. Thompson
B) Rutherford gold foil experiment
C) Millikan oil drop experiment
D) Dalton atomic theory
E) atomic theory of matter

Answer: C
Diff: 1
Page Ref: Sec. 2.2

7) _____-rays consist of fast-moving electrons.

A) Alpha
B) Beta
C) Gamma
D) X
E) none of the above

Answer: B
Diff: 1
Page Ref: Sec. 2.2

8) The gold foil experiment performed in Rutherford's lab _____.

A) confirmed the plum-pudding model of the atom
B) led to the discovery of the atomic nucleus
C) was the basis for Thomson's model of the atom
D) utilized the deflection of beta particles by gold foil
E) proved the law of multiple proportions

Answer: B
Diff: 1
Page Ref: Sec. 2.2

9) In the Rutherford nuclear-atom model, _____.

A) the heavy subatomic particles, protons and neutrons, reside in the nucleus
B) the three principal subatomic particles (protons, neutrons, and electrons) all have essentially the same mass
C) the light subatomic particles, protons and neutrons, reside in the nucleus
D) mass is spread essentially uniformly throughout the atom
E) the three principal subatomic particles (protons, neutrons, and electrons) all have essentially the same mass and mass is spread essentially uniformly throughout the atom

Answer: A
Diff: 1
Page Ref: Sec. 2.2

10) Cathode rays are _____.

A) neutrons
B) x-rays
C) electrons
D) protons
E) atoms

Answer: C
Diff: 1
Page Ref: Sec. 2.2

11) Cathode rays are deflected away from a negatively charged plate because _____.

A) they are not particles
B) they are positively charged particles
C) they are neutral particles
D) they are negatively charged particles
E) they are emitted by all matter

Answer: D
Diff: 1
Page Ref: Sec. 2.2

12) In the absence of magnetic or electric fields, cathode rays _____.

A) do not exist
B) travel in straight lines
C) cannot be detected
D) become positively charged
E) bend toward a light source

Answer: B
Diff: 1
Page Ref: Sec. 2.2

13) Of the three types of radioactivity characterized by Rutherford, which is/are electrically charged?

A) β-rays
B) α-rays and β-rays
C) α-rays, β-rays, and γ-rays
D) α-rays
E) α-rays and γ-rays

Answer: B
Diff: 1
Page Ref: Sec. 2.2

14) Of the three types of radioactivity characterized by Rutherford, which is/are not electrically charged?

A) α-rays
B) α-rays, β-rays, and γ-rays
C) γ-rays
D) α-rays and β-rays
E) α-rays and γ-rays

Answer: C
Diff: 1
Page Ref: Sec. 2.2

15) Of the three types of radioactivity characterized by Rutherford, which are particles?

A) β-rays
B) α-rays, β-rays, and γ-rays
C) γ-rays
D) α-rays and γ-rays
E) α-rays and β-rays

Answer: E
Diff: 1
Page Ref: Sec. 2.2

16) Of the three types of radioactivity characterized by Rutherford, which is/are not particles?

A) β-rays
B) α-rays and β-rays
C) α-rays
D) γ-rays
E) α-rays, β-rays, and γ-rays

Answer: D
Diff: 1
Page Ref: Sec. 2.2

17) Of the following, the smallest and lightest subatomic particle is the _____.

A) neutron
B) proton
C) electron
D) nucleus
E) alpha particle

Answer: C
Diff: 1
Page Ref: Sec. 2.3

18) All atoms of a given element have the same _____.

A) mass
B) number of protons
C) number of neutrons
D) number of electrons and neutrons
E) density

Answer: B
Diff: 1
Page Ref: Sec. 2.3

19) Which atom has the smallest number of neutrons?

A) carbon-14
B) nitrogen-14
C) oxygen-16
D) fluorine-19
E) neon-20

Answer: B
Diff: 1
Page Ref: Sec. 2.3

20) Which atom has the largest number of neutrons?

A) phosphorus-30
B) chlorine-37
C) potassium-39
D) argon-40
E) calcium-40

Answer: D
Diff: 3
Page Ref: Sec. 2.3

21) There are _____ electrons, _____ protons, and _____ neutrons in an atom of $^{132}_{54}\text{Xe}$.

A) 132, 132, 54
B) 54, 54, 132
C) 78, 78, 54
D) 54, 54, 78
E) 78, 78, 132

Answer: D
Diff: 2
Page Ref: Sec. 2.3

22) An atom of the most common isotope of gold, ^{197}Au, has _____ protons, _____ neutrons, and _____ electrons.

A) 197, 79, 118
B) 118, 79, 39
C) 79, 197, 197
D) 79, 118, 118
E) 79, 118, 79

Answer: E
Diff: 2
Page Ref: Sec. 2.3

23) Which combination of protons, neutrons, and electrons is correct for the isotope of copper, $^{63}_{29}\text{Cu}$?

A) 29 p^+, 34 n°, 29 e^-
B) 29 p^+, 29 n°, 63 e^-
C) 63 p^+, 29 n°, 63 e^-
D) 34 p^+, 29 n°, 34 e^-
E) 34 p^+, 34 n°, 29 e^-

Answer: A
Diff: 1
Page Ref: Sec. 2.3

24) Which isotope has 45 neutrons?

A) $^{80}_{36}\text{Kr}$
B) $^{80}_{35}\text{Br}$
C) $^{78}_{34}\text{Se}$
D) $^{34}_{17}\text{Cl}$
E) $^{103}_{45}\text{Rh}$

Answer: B
Diff: 1
Page Ref: Sec. 2.3

25) Which isotope has 36 electrons in an atom?

A) $^{80}_{36}\text{Kr}$
B) $^{80}_{35}\text{Br}$
C) $^{78}_{34}\text{Se}$
D) $^{34}_{17}\text{Cl}$
E) $^{36}_{80}\text{Hg}$

Answer: A
Diff: 1
Page Ref: Sec. 2.3

26) Isotopes are atoms that have the same number of _____ but differing number of _____.

A) protons, electrons
B) neutrons, protons
C) protons, neutrons
D) electrons, protons
E) neutrons, electrons

Answer: C
Diff: 1
Page Ref: Sec. 2.3

27) The nucleus of an atom does not contain _____.

A) protons
B) protons or neutrons
C) neutrons
D) subatomic particles
E) electrons

Answer: E
Diff: 1
Page Ref: Sec. 2.3

28) The nucleus of an atom contains _____.

A) electrons
B) protons
C) neutrons
D) protons and neutrons
E) protons, neutrons, and electrons

Answer: D
Diff: 1
Page Ref: Sec. 2.3

29) Different isotopes of a particular element contain the same number of _____.

A) protons
B) neutrons
C) protons and neutrons
D) protons, neutrons, and electrons
E) subatomic particles

Answer: A
Diff: 1
Page Ref: Sec. 2.3

30) Different isotopes of a particular element contain different numbers of _____.

A) protons
B) neutrons
C) protons and neutrons
D) protons, neutrons, and electrons
E) None of the above is correct.

Answer: B
Diff: 1
Page Ref: Sec. 2.3

31) In the symbol shown below, x = _____.

$^{13}_{x}C$

A) 7
B) 13
C) 12
D) 6
E) not enough information to determine

Answer: D
Diff: 1
Page Ref: Sec. 2.3

32) In the symbol below, X = _____.

$^{13}_{6}X$

A) N
B) C
C) Al
D) K
E) not enough information to determine

Answer: B
Diff: 1
Page Ref: Sec. 2.3

33) In the symbol below, x = _____.

$^{x}_{6}C$

A) 19
B) 13
C) 6
D) 7
E) not enough information to determine

Answer: E
Diff: 2
Page Ref: Sec. 2.3

34) In the symbol below, x is _____.

$^{x}_{6}C$

A) the number of neutrons
B) the atomic number
C) the mass number
D) the isotope number
E) the elemental symbol

Answer: C
Diff: 1
Page Ref: Sec. 2.3

35) Which one of the following basic forces is so small that it has no chemical significance?

A) weak nuclear force
B) strong nuclear force
C) electromagnetism
D) gravity
E) Coulomb's law

Answer: D
Diff: 2
Page Ref: Sec. 2.3

36) Gravitational forces act between objects in proportion to their _____.

A) volumes
B) masses
C) charges
D) polarizability
E) densities

Answer: B
Diff: 1
Page Ref: Sec. 2.3

37) Silver has two naturally occurring isotopes with the following isotopic masses:

$^{107}_{47}Ar$	$^{107}_{47}Ar$
106.90509	108.9047

The average atomic mass of silver is 107.8682 amu. The fractional abundance of the lighter of the two isotopes is _____.

A) 0.24221
B) 0.48168
C) 0.51835
D) 0.75783
E) 0.90474

Answer: C
Diff: 4
Page Ref: Sec. 2.4

38) The atomic mass unit is presently based on assigning an exact integral mass (in amu) to an isotope of _____.

A) hydrogen
B) oxygen
C) sodium
D) carbon
E) helium

Answer: D
Diff: 1
Page Ref: Sec. 2.4

39) The element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{221}X	74.22	220.9
^{220}X	12.78	220.0
^{218}X	13.00	218.1

A) 219.7
B) 220.4
C) 220.42
D) 218.5
E) 221.0

Answer: B
Diff: 1
Page Ref: Sec. 2.4

40) Element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{38}X	5.07	37.919
^{39}X	15.35	39.017
^{42}X	79.85	42.111

A) 41.54
B) 39.68
C) 39.07
D) 38.64
E) 33.33

Answer: A
Diff: 1
Page Ref: Sec. 2.4

41) The element X has three naturally occurring isotopes. The isotopic masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{159}X	30.60	159.37
^{163}X	15.79	162.79
^{164}X	53.61	163.92

A) 161.75
B) 162.03
C) 162.35
D) 163.15
E) 33.33

Answer: C
Diff: 1
Page Ref: Sec. 2.4

42) The element X has three naturally occurring isotopes. The isotopic masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{53}X	19.61	52.62
^{56}X	53.91	56.29
^{58}X	26.48	58.31

A) 33.33
B) 55.74
C) 56.11
D) 57.23
E) 56.29

Answer: C
Diff: 1
Page Ref: Sec. 2.4

43) The element X has two naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance (%)	Mass (amu)
^{31}X	35.16	31.16
^{34}X	64.84	34.30

A) 30.20
B) 33.20
C) 34.02
D) 35.22
E) 32.73

Answer: B
Diff: 1
Page Ref: Sec. 2.4

44) The average atomic weight of copper, which has two naturally occurring isotopes, is 63.5. One of the isotopes has an atomic weight of 62.9 amu and constitutes 69.1% of the copper isotopes. The other isotope has an abundance of 30.9%. The atomic weight (amu) of the second isotope is _____ amu.

A) 63.2
B) 63.8
C) 64.1
D) 64.8
E) 28.1

Answer: D
Diff: 4
Page Ref: Sec. 2.4

45) The element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance (%)	Mass (amu)
^{15}X	28.60	15.33
^{17}X	13.30	17.26
^{16}X	58.10	18.11

A) 17.20
B) 16.90
C) 17.65
D) 17.11
E) 16.90

Answer: A
Diff: 1
Page Ref: Sec. 2.4

46) Vanadium has two naturally occurring isotopes, ^{50}V with an atomic mass of 49.9472 amu and ^{51}V with an atomic mass of 50.9440. The atomic weight of vanadium is 50.9415. The percent abundances of the vanadium isotopes are _____% ^{50}V and _____% ^{51}V.

A) 0.25, 99.75
B) 99.75, 0.25
C) 49, 51
D) 1.0, 99
E) 99, 1.0

Answer: A
Diff: 4
Page Ref: Sec. 2.4

47) An unknown element is found to have three naturally occurring isotopes with atomic masses of 35.9675 (0.337%), 37.9627 (0.063%), and 39.9624 (99.600%). Which of the following is the unknown element?

A) Ar
B) K
C) Cl
D) Ca
E) None of the above could be the unknown element.

Answer: A
Diff: 2
Page Ref: Sec. 2.4

48) In the periodic table, the elements are arranged in _____.

A) alphabetical order
B) order of increasing atomic number
C) order of increasing metallic properties
D) order of increasing neutron content
E) reverse alphabetical order

Answer: B
Diff: 1
Page Ref: Sec. 2.5

49) Elements _____ exhibit similar physical and chemical properties.

A) with similar chemical symbols
B) with similar atomic masses
C) in the same period of the periodic table
D) on opposite sides of the periodic table
E) in the same group of the periodic table

Answer: E
Diff: 1
Page Ref: Sec. 2.5

50) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?

A) H, Li
B) Cs, Ba
C) Ca, Sr
D) Ga, Ge
E) C, O

Answer: C
Diff: 1
Page Ref: Sec. 2.5

51) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?

A) O, S
B) C, N
C) K, Ca
D) H, He
E) Si, P

Answer: A
Diff: 1
Page Ref: Sec. 2.5

52) Which one of the following is a nonmetal?

A) W
B) Sr
C) Os
D) Ir
E) Br

Answer: E
Diff: 1
Page Ref: Sec. 2.5

53) Of the following, only _____ is not a metalloid.

A) B
B) Al
C) Si
D) Ge
E) As

Answer: B
Diff: 1
Page Ref: Sec. 2.5

54) Which of the following elements is a metaloid?

A) B
B) C
C) Ga
D) Se
E) In

Answer: A
Diff: 3
Page Ref: Sec. 2.5

55) The elements in groups 1A, 6A, and 7A are called, _____, respectively.

A) alkaline earth metals, halogens, and chalcogens
B) alkali metals, chalcogens, and halogens
C) alkali metals, halogens, and noble gases
D) alkaline earth metals, transition metals, and halogens
E) halogens, transition metals, and alkali metals

Answer: B
Diff: 2
Page Ref: Sec. 2.5

56) Which pair of elements below should be the most similar in chemical properties?

A) C and O
B) B and As
C) I and Br
D) K and Kr
E) Cs and He

Answer: C
Diff: 1
Page Ref: Sec. 2.5

57) An element in the upper right corner of the periodic table _____.

A) is either a metal or metalloid
B) is definitely a metal
C) is either a metalloid or a non-metal
D) is definitely a non-metal
E) is definitely a metalloid

Answer: D
Diff: 1
Page Ref: Sec. 2.5

58) An element that appears in the lower left corner of the periodic table is _____.

A) either a metal or metalloid
B) definitely a metal
C) either a metalloid or a non-metal
D) definitely a non-metal
E) definitely a metalloid

Answer: B
Diff: 1
Page Ref: Sec. 2.5

59) Elements in the same group of the periodic table typically have _____.

A) similar mass numbers
B) similar physical properties only
C) similar chemical properties only
D) similar atomic masses
E) similar physical and chemical properties

Answer: E
Diff: 1
Page Ref: Sec. 2.5

60) Which one of the following does not occur as diatomic molecules in elemental form?

A) oxygen
B) nitrogen
C) sulfur
D) hydrogen
E) bromine

Answer: C
Diff: 1
Page Ref: Sec. 2.6

61) Which one of the following molecular formulas is also an empirical formula?

A) $C_6H_6O_2$
B) C_2H_6SO
C) H_2O_2
D) $H_2P_4O_6$
E) C_6H_6

Answer: B
Diff: 2
Page Ref: Sec. 2.6

62) Which compounds do not have the same empirical formula?

A) C_2H_2, C_6H_6
B) CO, CO_2
C) C_2H_4, C_3H_6
D) $C_2H_4O_2$, $C_6H_{12}O_6$
E) $C_2H_5COOCH_3$, CH_3CHO

Answer: B
Diff: 2
Page Ref: Sec. 2.6

63) Of the choices below, which one is not an ionic compound?

A) PCl_5
B) $MoCl_6$
C) RbCl
D) $PbCl_2$
E) NaCl

Answer: A
Diff: 1
Page Ref: Sec. 2.6

64) Which type of formula provides the most information about a compound?

A) empirical
B) molecular
C) simplest
D) structural
E) chemical

Answer: D
Diff: 1
Page Ref: Sec. 2.6

65) A molecular formula always indicates _____.

A) how many of each atom are in a molecule
B) the simplest whole-number ratio of different atoms in a compound
C) which atoms are attached to which in a molecule
D) the isotope of each element in a compound
E) the geometry of a molecule

Answer: A
Diff: 1
Page Ref: Sec. 2.6

66) An empirical formula always indicates _____.

A) which atoms are attached to which in a molecule
B) how many of each atom are in a molecule
C) the simplest whole-number ratio of different atoms in a compound
D) the isotope of each element in a compound
E) the geometry of a molecule

Answer: C
Diff: 1
Page Ref: Sec. 2.6

67) The molecular formula of a compound is always _____ the empirical formula.

A) more complex than
B) different from
C) an integral multiple of
D) the same as
E) simpler than

Answer: C
Diff: 1
Page Ref: Sec. 2.6

68) Formulas that show how atoms are attached in a molecule are called _____.

A) molecular formulas
B) ionic formulas
C) empirical formulas
D) diatomic formulas
E) structural formulas

Answer: E
Diff: 1
Page Ref: Sec. 2.6

69) Of the following, _____ contains the greatest number of electrons.

A) P^{3+}
B) P
C) P^{2-}
D) P^{3-}
E) P^{2+}

Answer: D
Diff: 1
Page Ref: Sec. 2.7

70) Which one of the following is most likely to lose electrons when forming an ion?

A) F
B) P
C) Rh
D) S
E) N

Answer: C
Diff: 2
Page Ref: Sec. 2.7

71) Which species has 54 electrons?

A) $^{132}_{54}Xe^{+}$
B) $^{128}_{52}Te^{2-}$
C) $^{118}_{50}Sn^{2+}$
D) $^{112}_{48}Cd$
E) $^{132}_{54}Xe^{2+}$

Answer: B
Diff: 1
Page Ref: Sec. 2.7

72) Which species has 16 protons?

A) ^{31}P
B) $^{34}S^{2-}$
C) ^{36}Cl
D) $^{80}Br^{-}$
E) ^{16}O

Answer: B
Diff: 1
Page Ref: Sec. 2.7

73) Which species has 18 electrons?

A) ^{39}K
B) $^{32}S^{-2}$
C) ^{35}Cl
D) $^{27}Al^{+3}$
E) $^{64}Cu^{+2}$

Answer: B
Diff: 2
Page Ref: Sec 2.7

74) The species _____ contains 16 neutrons.

A) ^{31}P
B) $^{34}S^{2-}$
C) ^{36}Cl
D) $^{80}Br^{-}$
E) ^{16}O

Answer: A
Diff: 1
Page Ref: Sec. 2.7

75) Which species is an isotope of ^{39}Cl?

A) $^{40}Ar^{+}$
B) $^{34}S^{2-}$
C) $^{36}Cl^{-}$
D) ^{80}Br
E) ^{39}Ar

Answer: C
Diff: 1
Page Ref: Sec. 2.7

76) Which one of the following species has as many electrons as it has neutrons?

A) ^{1}H
B) $^{40}Ca^{2+}$
C) ^{14}C
D) $^{19}F^{-}$
E) $^{14}C^{2+}$

Answer: D
Diff: 2
Page Ref: Sec. 2.7

77) There are _____ protons, _____ neutrons, and _____ electrons in $^{131}I^-$.

A) 131, 53, and 54
B) 131, 53, and 52
C) 53, 78, and 54
D) 53, 131, and 52
E) 78, 53, and 72

Answer: C
Diff: 2
Page Ref: Sec. 2.7

78) Which species has 48 electrons?

A) $^{118}_{50}Sn^{+2}$
B) $^{116}_{50}Sn^{+4}$
C) $^{112}_{48}Cd^{+2}$
D) $^{68}_{31}Ga$
E) $^{48}_{22}Ti$

Answer: A
Diff: 1
Page Ref: Sec. 2.7

79) Which of the following compounds would you expect to be ionic?

A) SF_6
B) H_2O
C) H_2O_2
D) NH_3
E) CaO

Answer: E
Diff: 1
Page Ref: Sec. 2.7

80) Which of the following compounds would you expect to be ionic?

A) H_2O
B) CO_2
C) $SrCl_2$
D) SO_2
E) H_2S

Answer: C
Diff: 1
Page Ref: Sec. 2.7

81) Which pair of elements is most apt to form an ionic compound with each other?

A) barium, bromine
B) calcium, sodium
C) oxygen, fluorine
D) sulfur, fluorine
E) nitrogen, hydrogen

Answer: A
Diff: 1
Page Ref: Sec. 2.7

82) Which pair of elements is most apt to form a molecular compound with each other?

A) aluminum, oxygen
B) magnesium, iodine
C) sulfur, fluorine
D) potassium, lithium
E) barium, bromine

Answer: C
Diff: 1
Page Ref: Sec. 2.7

83) Which species below is the nitride ion?

A) Na^+
B) NO_3^-
C) NO_2^-
D) NH_4^+
E) N^{3-}

Answer: E
Diff: 1
Page Ref: Sec. 2.7

84) Which species below is the sulfite ion?

A) SO_2^{-2}
B) SO_3^{-2}
C) S^{2-}
D) SO_4^{-2}
E) HS^-

Answer: B
Diff: 1
Page Ref: Sec. 2.7

85) Which species below is the nitrate ion?

A) NO_2^-
B) NH_4^+
C) NO_3^-
D) N_3^-
E) N^{3-}

Answer: C
Diff: 1
Page Ref: Sec. 2.7

86) Barium reacts with a polyatomic ion to form a compound with the general formula $Ba_3(X)_2$. What would be the most likely formula for the compound formed between sodium and the polyatomic ion X?

A) NaX
B) Na_2X
C) Na_2X_2
D) Na_3X
E) Na_3X_2

Answer: D
Diff: 2
Page Ref: Sec. 2.8

87) Aluminum reacts with a certain nonmetallic element to form a compound with the general formula Al_2X_3. Element X must be from Group _____ of the Periodic Table of Elements.

A) 3A
B) 4A
C) 5A
D) 6A
E) 7A

Answer: D
Diff: 2
Page Ref: Sec. 2.8

88) The formula for a salt is XBr. The X-ion in this salt has 46 electrons. The metal X is _____.

A) Ag
B) Pd
C) Cd
D) Cu
E) Cs

Answer: A
Diff: 2

Page Ref: Sec. 2.8

89) The charge on the iron ion in the salt Fe_2O_3 is _____.

A) +1
B) +2
C) +3
D) -5
E) -6

Answer: C
Diff: 2
Page Ref: Sec. 2.8

90) Which formula/name pair is incorrect?

A) $Mn(NO_2)_2$ manganese(II) nitrite
B) $Mg(NO_3)_2$ magnesium nitrate
C) $Mn(NO_3)_2$ manganese(II) nitrate
D) Mg_3N_2 magnesium nitrite
E) $Mg(MnO_4)_2$ magnesium permanganate

Answer: D
Diff: 2
Page Ref: Sec. 2.8

91) Which formula/name pair is incorrect?

A) $FeSO_4$ iron(II) sulfate
B) $Fe_2(SO_3)_3$ iron(III) sulfite
C) FeS iron(II) sulfide
D) $FeSO_3$ iron(II) sulfite
E) $Fe_2(SO_4)_3$ iron(III) sulfide

Answer: E
Diff: 1
Page Ref: Sec. 2.8

92) Which one of the following is the formula of hydrochloric acid?

A) $HClO_3$
B) $HClO_4$
C) HClO
D) HCl
E) $HClO_2$

Answer: D
Diff: 1
Page Ref: Sec. 2.8

93) The suffix -ide is used primarily _____.

A) for monatomic anion names
B) for polyatomic cation names
C) for the name of the first element in a molecular compound
D) to indicate binary acids
E) for monoatomic cations

Answer: A
Diff: 1
Page Ref: Sec. 2.8

94) Which one of the following compounds is chromium(III) oxide?

A) Cr_2O_3
B) CrO_3
C) Cr_3O_2
D) Cr_3O
E) Cr_2O_4

Answer: A
Diff: 1
Page Ref: Sec. 2.8

95) Which one of the following compounds is copper(I) chloride?

A) CuCl
B) $CuCl_2$
C) Cu_2Cl
D) Cu_2Cl_3
E) Cu_3Cl_2

Answer: A
Diff: 1
Page Ref: Sec. 2.8

96) The correct name for MgF_2 is _____.

A) monomagnesium difluoride
B) magnesium difluoride
C) manganese difluoride
D) manganese bifluoride
E) magnesium fluoride

Answer: E
Diff: 2
Page Ref: Sec. 2.8

97) A correct name for $Fe(NO_3)_2$ is _____.

A) iron nitrite
B) ferrous nitrite
C) ferrous nitrate
D) ferric nitrite
E) ferric nitrate

Answer: C
Diff: 3
Page Ref: Sec. 2.8

98) The correct name for HNO_2 is _____.

A) nitrous acid
B) nitric acid
C) hydrogen nitrate
D) hyponitrous acid
E) pernitric acid

Answer: A
Diff: 3
Page Ref: Sec. 2.8

99) The proper formula for the hydronium ion is _____.

A) H^-
B) OH^-
C) N^{-3}
D) H_3O^+
E) NH_4^+

Answer: D
Diff: 2
Page Ref: Sec. 2.8

100) The charge on the _____ ion is -3.

A) sulfate
B) acetate
C) permanganate
D) oxide
E) nitride

Answer: E
Diff: 2
Page Ref: Sec. 2.8

101) Which one of the following polyatomic ions has the same charge as the hydroxide ion?

A) ammonium
B) carbonate
C) nitrate
D) sulfate
E) phosphate

Answer: C
Diff: 1
Page Ref: Sec. 2.8

102) Which element forms an ion with the same charge as the ammonium ion?

A) potassium
B) chlorine
C) calcium
D) oxygen
E) nitrogen

Answer: A
Diff: 1
Page Ref: Sec. 2.8

103) Which element forms an ion with the same charge as the sulfate ion?

A) magnesium
B) copper
C) iron
D) phosphorus
E) oxygen

Answer: E
Diff: 2
Page Ref: Sec. 2.8

104) When a fluorine atom forms the fluoride ion, it has the same charge as the _____ ion.

A) sulfide
B) ammonium
C) nitrate
D) phosphate
E) sulfite

Answer: C
Diff: 1
Page Ref: Sec. 2.8

105) The formula for the compound formed between aluminum ions and phosphate ions is _____.

A) $Al_3(PO_4)_3$
B) $AlPO_4$
C) $Al(PO_4)_3$
D) $Al_2(PO_4)_3$
E) AlP

Answer: B
Diff: 1
Page Ref: Sec. 2.8

106) Which metal does not form cations of differing charges?

A) Na
B) Cu
C) Co
D) Fe
E) Sn

Answer: A
Diff: 1
Page Ref: Sec. 2.8

107) Which metal forms cations of differing charges?

A) K
B) Cs
C) Ba
D) Al
E) Sn

Answer: E
Diff: 1
Page Ref: Sec. 2.8

108) The correct name for $Ni(CN)_2$ is _____.

A) nickel (I) cyanide
B) nickel cyanate
C) nickel carbonate
D) nickel (II) cyanide
E) nickel (I) nitride

Answer: D
Diff: 1
Page Ref: Sec. 2.8

109) The correct name for Na_2O_2 is _____.

A) sodium oxide
B) sodium dioxide
C) disodium oxide
D) sodium peroxide
E) disodium dioxide

Answer: D
Diff: 2
Page Ref: Sec. 2.8

110) Which metal is not required to have its charge specified in the names of ionic compounds it forms?

A) Mn
B) Fe
C) Cu
D) Ca
E) Pb

Answer: D
Diff: 1
Page Ref: Sec. 2.8

111) What is the molecular formula for n-propanol?

A) CH_3OH
B) C_2H_5OH
C) C_3H_7OH
D) C_4H_9OH
E) $C_5H_{11}OH$

Answer: C
Diff: 3
Page Ref: Sec. 2.9

2.3 Short Answer Questions

1) What group in the periodic table would the fictitious element $:\ddot{\underset{\cdot\cdot}{X}}:$ be found?

Answer: VIIA
Diff: 2
Page Ref: Sec. 2.5

2) Carbon can exist in different forms called _____.

Answer: allotropes
Diff: 3
Page Ref: Sec. 2.5

3) Which element in Group IA is the most electropositive?

Answer: francium
Diff: 2
Page Ref: Sec. 2.5

4) Which element in the halogen family is the most electronegative?

Answer: fluorine
Diff: 1
Page Ref: Sec. 2.5

5) The formula for potassium sulfide is _____.

Answer: K_2S
Diff: 1
Page Ref: Sec. 2.8

6) What is the name of an alcohol derived from hexane _____?

Answer: hexanol
Diff: 2
Page Ref: Sec. 2.9

2.4 True/False Questions

1) The least electronegative halogen is astatine.
Answer: True

Diff: 3
Page Ref: Sec. 2.5

2) The possible oxidation numbers for iron are +1 and +2.
Answer: False

Diff: 1
Page Ref: Sec. 2.7

3) The formula for chromium (II) iodide is CrI_2.
Answer: True

Diff: 1
Page Ref: Sec. 2.8

4) H_2SeO_4 is called selenic acid.
Answer: True

Diff: 2
Page Ref: Sec. 2.8

5) The correct name for Na_3N is sodium azide.
Answer: False

Diff: 2
Page Ref: Sec. 2.8

2.5 Algorithmic Questions

1) An atom of ^{17}O contains _____ protons.

A) 8
B) 25
C) 9
D) 11
E) 17

Answer: A
Diff: 1
Page Ref: Sec. 2.3

2) An atom of ^{15}N contains _____ neutrons.

A) 7
B) 22
C) 8
D) 10
E) 15

Answer: C
Diff: 2
Page Ref: Sec. 2.3

3) An atom of ^{131}I contains _____ electrons.

A) 131
B) 184
C) 78
D) 124
E) 53

Answer: E
Diff: 1
Page Ref: Sec. 2.3

4) 420 pm is the same as _____ Angstroms.

A) 4200
B) 42
C) 420
D) 4.2
E) 0.42

Answer: D
Diff: 2
Page Ref: Sec. 2.3

5) The mass number of an atom of ^{118}Xe is _____.

A) 54
B) 172
C) 64
D) 118
E) 110

Answer: D
Diff: 2
Page Ref: Sec. 2.5

6) The atomic number of an atom of ^{80}Br is _____.

A) 115
B) 35
C) 45
D) 73
E) 80

Answer: B
Diff: 1
Page Ref: Sec. 2.5

7) An ion has 8 protons, 9 neutrons, and 10 electrons. The symbol for the ion is _____.

A) $^{17}O^{2-}$
B) $^{17}O^{2+}$
C) $^{19}F^{+}$
D) $^{19}F^{-}$
E) $^{17}Ne^{2+}$

Answer: A
Diff: 1
Page Ref: Sec. 2.5

8) How many electrons does the Al^{3+} ion possess?

A) 16
B) 10
C) 6
D) 0
E) 13

Answer: B
Diff: 1
Page Ref: Sec. 2.7

9) How many protons does the Br^{-} ion possess?

A) 34
B) 36
C) 6
D) 8
E) 35

Answer: E
Diff: 1
Page Ref: Sec. 2.7

10) Predict the charge of the most stable ion of bromine.

A) 2+
B) 1+
C) 3+
D) 1-
E) 2-

Answer: D
Diff: 1
Page Ref: Sec. 2.7

11) Predict the charge of the most stable ion of potassium.

A) 3+
B) 1-
C) 2+
D) 2-
E) 1+

Answer: E
Diff: 1
Page Ref: Sec. 2.7