Chemistry, 5e **(Burdge)**
Chapter 2 Atoms, Molecules, and Ions

1) The scientist who determined the magnitude of the electric charge on the electron was
A) John Dalton.
B) Robert Millikan.
C) J. J. Thomson.
D) Henry Moseley.
E) J. Burdge.

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

2) When J. J. Thomson discovered the electron, what physical property of the electron did he measure?
A) its charge, e
B) its charge-to-mass ratio, e/m
C) its temperature, T
D) its mass, m
E) its atomic number, Z

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

3) Which field of study made a big contribution toward understanding the composition of the atom?
A) Electricity
B) Radiation
C) Solution chemistry
D) Electrochemistry
E) Quantum mechanics

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

4) Which of the following is a type of radioactive radiation that has no charge and is unaffected by external electric or magnetic fields?
A) α rays
B) β rays
C) γ rays
D) δ rays
E) ε rays

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

5) Which of the following is a type of radioactive radiation that consists of positively charged particles and is deflected away from the positively charged plate?
A) α rays
B) β rays
C) γ rays
D) δ rays
E) ε rays

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

6) Which of the following is a type of radioactive radiation that consists of electrons and is deflected away from the negatively charged plate?
A) α rays
B) β rays
C) γ rays
D) δ rays
E) ε rays

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

7) Which of these scientists developed the nuclear model of the atom?
A) John Dalton
B) Robert Millikan
C) J. J. Thomson
D) Henry Moseley
E) Ernest Rutherford

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

8) Rutherford's experiment with alpha particle scattering by gold foil established that
A) positive charge not evenly distributed throughout an atom.
B) electrons have a negative charge.
C) electrons have a positive charge.
D) atoms are made of protons, neutrons, and electrons.
E) protons are 1840 times heavier than electrons.

Answer: A
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

9) Who is credited with measuring the mass/charge ratio of the electron?
A) Dalton
B) Chadwick
C) Thomson
D) Millikan
E) Rutherford

Answer: C
Difficulty: 1 Easy
Bloom's: 1. Remember
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

10) Who is credited with first measuring the charge of the electron?
A) Dalton
B) Gay-Lussac
C) Thomson
D) Millikan
E) Rutherford

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

11) Millikan's oil-drop experiment

A) established the charge on an electron.
B) showed that all oil drops carried the same charge.
C) provided support for the nuclear model of the atom.
D) suggested that some oil drops carried fractional numbers of electrons.
E) suggested the presence of a neutral particle in the atom.

Answer: A
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

12) Who is credited with discovering the atomic nucleus?
A) Dalton
B) Gay-Lussac
C) Thomson
D) Chadwick
E) Rutherford

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

13) Which one of the following statements about atoms and subatomic particles is correct?
A) Rutherford discovered the atomic nucleus by bombarding gold foil with electrons.
B) The proton and the neutron have identical masses.
C) The neutron's mass is equal to that of a proton plus an electron.
D) A neutral atom contains equal numbers of protons and electrons.
E) An atomic nucleus contains equal numbers of protons and neutrons.

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

14) Who discovered the neutron, the subatomic particle having a neutral charge?
A) Millikan
B) Dalton
C) Chadwick
D) Rutherford
E) Thomson

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

15) What is the term for the number of protons in the nucleus of each atom of an element? It also indicates the number of electrons in the atom.
A) Isotope number
B) Mass number
C) Mass-to-charge ratio
D) Atomic number
E) Atomic mass units

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

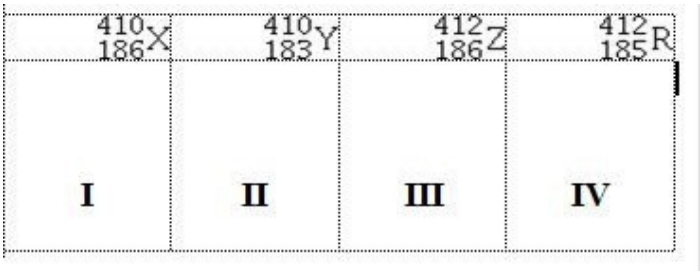
16) What is the term for the total number of neutrons and protons in the nucleus of each atom of an element?
A) Isotope number
B) Mass number
C) Mass-to-charge ratio
D) Atomic number
E) Atomic mass units

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

17) Bromine is the only nonmetal that is a liquid at room temperature. Consider the isotope bromine-81, $^{81}_{35}Br$. Select the combination which lists the correct atomic number, number of neutrons, and mass number, respectively.
A) 35, 46, 81
B) 35, 81, 46
C) 81, 46, 35
D) 46, 81, 35
E) 35, 81, 116

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

18) Atoms X, Y, Z, and R have the following nuclear compositions:



Which of the following are isotopes of the same element?
A) I & II
B) I & IV
C) II & IV
D) III & IV
E) I & III

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

19) Which isotope is *not* possible?

A) $^{1}_{1}H$

B) $^{2}_{1}H$

C) $^{52}_{24}Cr$

D) $^{25}_{54}Mn$

E) All of these isotopes are possible.

Answer: D
Difficulty: 3 Hard
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

20) Atoms of the same element with different mass numbers are called
A) ions.
B) neutrons.
C) chemical groups.
D) chemical families.
E) isotopes.

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

21) How many neutrons are there in an atom of lead whose mass number is 208?
A) 82
B) 126
C) 208
D) 290
E) none of them

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

22) An atom of the isotope sulfur-31 consists of how many protons, neutrons, and electrons? (p = proton, n = neutron, e = electron)
A) 15 p, 16 n, 15 e
B) 16 p, 15 n, 16 e
C) 16 p, 31 n, 16 e
D) 32 p, 31 n, 32 e
E) 16 p, 16 n, 15 e

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

23) Select the correct number of protons (p), electrons (e), and neutrons (n) in one atom of chlorine-37.
A) 37 p, 37 e, 17 n
B) 17 p, 17 e, 37 n
C) 17 p, 17 e, 20 n
D) 37 p, 17 e, 20 n
E) 17 p, 37 e, 17 n

Answer: C
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and

Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

24) Two isotopes of an element differ only in their
A) symbol.
B) atomic number.
C) atomic mass.
D) number of protons.
E) number of electrons.

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

25) The elements in a column of the periodic table are known as
A) metalloids.
B) a period.
C) noble gases.
D) a group.
E) nonmetals.

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

26) Which of these materials are typically poor conductors of heat and electricity?
A) Metals
B) Metalloids
C) Nonmetals
D) Alkaline earth metals
E) Alkali metals

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand

Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

27) Which of these elements is most likely to be a good conductor of electricity?
A) N
B) S
C) He
D) Cl
E) Fe

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

28) Which of the following is a nonmetal?
A) Lithium, Li, $Z = 3$
B) Bromine, Br, $Z = 35$
C) Mercury, Hg, $Z = 80$
D) Bismuth, Bi, $Z = 83$
E) Sodium, Na, $Z = 11$

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

29) Which of the following is a metal?
A) Nitrogen, N, $Z = 7$
B) Phosphorus, P, $Z = 15$
C) Arsenic, As, Z = 33
D) Thallium, Tl, $Z = 81$
E) Silicon, Si, $Z = 14$

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements

Gradable: automatic
Accessibility: Keyboard Navigation

30) Which of the following is a metalloid?
A) Carbon, C, $Z = 6$
B) Sulfur, S, $Z = 16$
C) Germanium, Ge, $Z = 32$
D) Iridium, Ir, Z = 77
E) Bromine, Br, $Z = 35$

Answer: C
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

31) A row of the periodic table is called a(n)
A) group.
B) period.
C) isotopic mixture.
D) family.
E) subshell.

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

32) Silicon, which makes up about 25% of Earth's crust by mass, is used widely in the modern electronics industry. It has three naturally occurring isotopes, ^{28}Si, ^{29}Si, and ^{30}Si. Calculate the atomic mass of silicon.

Isotope	Isotopic Mass (amu)	Abudance %
^{28}Si	27.976927	92.22
^{29}Si	28.976495	4.69
^{30}Si	29.973770	3.09

A) 29.2252 amu
B) 28.9757 amu
C) 28.7260 amu
D) 28.0855 amu
E) 27.9801 amu

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

33) Lithium forms compounds which are used in dry cells, storage batteries, and in high-temperature lubricants. It has two naturally occurring isotopes, ^{6}Li (isotopic mass = 6.015123 amu) and ^{7}Li (isotopic mass = 7.016005 amu). Lithium has an atomic mass of 6.9412 amu. What is the percent abundance of lithium-6?
A) 92.53%
B) 86.65%
C) 49.47%
D) 7.47%
E) 6.015%

Answer: D
Difficulty: 3 Hard
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Elements and the Periodic Table; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

34) In the periodic table, atoms are arranged in order of
A) increasing atomic mass.
B) increasing atomic number.
C) physical properties.
D) periodicity.
E) chemical reactivities.

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Elements and the Periodic Table; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

35) The elements in Group 7A are known by what name?
A) Transition metals
B) Halogens
C) Alkali metals
D) Alkaline earth metals
E) Noble gases

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

36) The elements in Group 2A are known by what name?
A) Transition metals
B) Halogens
C) Alkali metals
D) Alkaline earth metals
E) Noble gases

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

37) The alkali metal elements are found in _____ of the periodic table.
A) Group 1A
B) Group 2A
C) Group 3A
D) Period 7
E) Period 1

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

38) What term defines a mass which is exactly equal to 1/12 the mass of one carbon-12 atom?
A) Isotope number
B) Mass number
C) Mass-to-charge ratio
D) Atomic number
E) Atomic mass unit

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

39) Which of these elements is chemically similar to magnesium?
A) Sulfur
B) Calcium
C) Iron
D) Nickel
E) Potassium

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

40) Which of these elements is chemically similar to oxygen?
A) Sulfur
B) Calcium
C) Iron
D) Nickel
E) Potassium

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

41) Which of these elements is chemically similar to potassium?
A) calcium
B) arsenic
C) phosphorus
D) cerium
E) cesium

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

42) What element is represented by X in the atomic symbol notation $^{195}_{78}X$?
A) Iridium
B) Platinum
C) Palladium
D) Selenium
E) Magnesium

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Elements and the Periodic Table; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

43) Determine the number of electrons and identify the correct symbol for an atom with 17 protons and 18 neutrons.

A) 17 electrons, $^{35}_{17}Cl$

B) 18 electrons, $^{36}_{18}Ar$

C) 17 electrons, $^{18}_{17}Cl^{\cdot}$

D) 17 electrons, $^{17}_{35}Cl^{\cdot}$

E) 18 electrons, $^{18}_{36}Ar$

Answer: A
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

44) Determine the number of protons, electrons, and neutrons for the isotope gold-118. The symbol for gold is Au.
A) 118 protons, 118 electrons, 79 neutrons
B) 79 protons, 79 electrons, 118 neutrons
C) 79 protons, 79 electrons, 39 neutrons
D) 118 protons, 118 electrons, 39 neutrons
E) 79 protons, 39 electrons, 118 neutrons

Answer: C
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

45) Determine the number of protons and identify the correct symbol for an atom with 20 neutrons and 20 electrons.

A) 20 protons, $^{20}_{20}Ca$

B) 20 protons, $^{40}_{20}Ca$

C) 20 protons, $^{20}_{40}Ca$

D) 40 protons, $^{40}_{20}Ca$

E) 40 protons, $^{18}_{36}Ar$

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

46) Which of these compounds is most likely to be ionic?
A) KF

B) CCl_4

C) CS_2

D) CO_2
E) ICl

Answer: A
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

47) Which of these compounds is most likely to be ionic?
A) GaAs
B) $SrBr_2$
C) NO_2
D) CBr_4
E) H_2O

Answer: B
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

48) Which of these compounds is most likely to be ionic?
A) NCl_3
B) $BaCl_2$
C) CO
D) SO_2
E) SF_4

Answer: B
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

49) Which of these pairs of elements would be most likely to form an ionic compound?
A) Cl and I
B) Al and K
C) Cl and Mg
D) C and S
E) Al and Mg

Answer: C
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

50) Which of the following contains ionic bonding?
A) CO
B) SrF_2
C) Al
D) OCl_2
E) HCl

Answer: B
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

51) Which of the following is an ionic compound?
A) H_2S
B) NH_3
C) I_2
D) KI
E) CCl_4

Answer: D
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

52) An anion is defined as
A) an atom or group of atoms with a net negative charge.
B) a stable atom.
C) a group of stable atoms.
D) an atom or group of atoms with a net positive charge.
E) neutral.

Answer: A
Difficulty: 1 Easy
Topic: Components of Matter; Electron Configuration
Bloom's: 1. Remember
Subtopic: Molecules and Ions; Electron Configurations of Cations and Anions
Gradable: automatic
Accessibility: Keyboard Navigation

53) Which one of these species is an ion?
A) B^{3+}
B) NaCl
C) He
D) ^{14}C
E) None of these species is an ion.

Answer: A
Difficulty: 1 Easy
Topic: Electron Configuration
Bloom's: 2. Understand
Subtopic: Molecules and Ions; Electron Configurations of Cations and Anions
Gradable: automatic
Accessibility: Keyboard Navigation

54) Which of these pairs of elements would be most likely to form an ionic compound?
A) P and Br
B) Cu and K
C) C and O
D) O and Zn
E) Al and Rb

Answer: D
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

55) Which pair of elements would be most likely to form an ionic compound?
A) P and Br
B) Zn and K
C) F and Al
D) C and S
E) Al and Rb

Answer: C
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Electronegativity; Bond Polarity
Gradable: automatic
Accessibility: Keyboard Navigation

56) What is the formula for the ionic compound formed by calcium ions and nitrate ions?

A) Ca_3N_2

B) $Ca(NO_3)_2$

C) Ca_2NO_3

D) Ca_2NO_2

E) $CaNO_3$

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

57) What is the formula for the ionic compound formed by calcium and selenium?

A) CaSe

B) Ca_2Se

C) $CaSe_2$

D) Ca_3Se

E) $CaSe_3$

Answer: A
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

58) Which is the correct formula for copper(II) phosphate?

A) Cu_2PO_4

B) $Cu_3(PO_4)_2$

C) Cu_2PO_3

D) $Cu(PO_4)_2$

E) $Cu(PO_3)_2$

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Molecules and Ions; Chemical Formulas

Gradable: automatic
Accessibility: Keyboard Navigation

59) The chemical name for ClO_3^- is "chlorate ion". What is the common name for $HClO_3$?
A) hydrochloric acid
B) chloroform
C) hydrogen trioxychloride
D) chlorous acid
E) chloric acid

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter; Acids and Bases
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Acid-Base Definitions
Gradable: automatic
Accessibility: Keyboard Navigation

60) The formula for magnesium sulfate is
A) MnS.
B) MgS.
C) $MnSO_3$.
D) $MgSO_4$.
E) $MnSO_4$.

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

61) The formula for sodium sulfide is
A) NaS.
B) K_2S.
C) NaS_2.
D) Na_2S.
E) SeS.

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

62) The chemical formula for iron(II) nitrate is
A) $Fe_2(NO_3)_3$.
B) $Ir(NO_2)_2$.
C) Fe_2N_3.
D) $Fe(NO_3)_2$.
E) $Fe(NO_2)_2$.

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

63) Which one of the following formulas of ionic compounds is the least likely to be correct?
A) NH_4Cl

B) $Ba(OH)_2$

C) Na_2SO_4

D) Ca_2NO_3

E) $Cu(CN)_2$

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

64) What is the formula for lead(II) oxide?
A) PbO

B) PbO_2

C) Pb_2O

D) PbO_4

E) Pb_2O_3

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

65) Potassium permanganate is a strong oxidizer that reacts explosively with easily oxidized materials. What is its formula?

A) $KMnO_3$

B) $KMnO_4$

C) K_2MnO_4

D) $K(MnO_4)_2$

E) $K_2Mn_2O_7$

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

66) Ferric oxide is used as a pigment in metal polishing. Which of the following is its formula?

A) FeO

B) Fe_2O

C) FeO_3

D) Fe_2O_5

E) Fe_2O_3

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

67) What is the name of $Mn(CO_3)_2$?

A) manganese carbide
B) magnesium(IV) carbonate
C) manganese(II) carbonate
D) magnesium(II) carbonate
E) manganese(IV) carbonate

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

68) What is the name of $Ba(NO_2)_2 \cdot 3H_2O$?

A) barium nitrite
B) trihydrobarium(II) nitrite
C) barium nitrite trihydrate
D) barium(II) nitrite trihydrate
E) barium nitrate trihydrate

Answer: C
Difficulty: 3 Hard
Topic: Components of Matter; Chemical Bonding
Bloom's: 4. Analyze
Subtopic: Ionic Bonding and Lattice Energy; Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

69) What is the formula of hydrobromic acid?

A) H_2OBr
B) $HBrO_3$
C) HBrO
D) HBr
E) $HBr \cdot 2H_2O$

Answer: D
Difficulty: 3 Hard
Topic: Components of Matter; Acids and Bases
Bloom's: 3. Apply
Subtopic: Chemical Formulas; Nomenclature; Acid-Base Definitions
Gradable: automatic
Accessibility: Keyboard Navigation

70) What is the formula of iodous acid?
A) HI
B) HIO_3
C) HIO
D) HIO_4
E) HIO_2

Answer: E
Difficulty: 3 Hard
Topic: Components of Matter; Acids and Bases
Bloom's: 3. Apply
Subtopic: Chemical Formulas; Nomenclature; Acid-Base Definitions
Gradable: automatic
Accessibility: Keyboard Navigation

71) Iron(III) chloride hexahydrate is used as a coagulant for sewage and industrial wastes. What is its formula?
A) $Fe(Cl \cdot 6H_2O)_3$
B) $Fe_3Cl \cdot 6H_2O$
C) $FeCl_3(H_2O)_6$
D) $Fe_3Cl(H_2O)_6$
E) $FeCl_3 \cdot 6H_2O$

Answer: E
Difficulty: 3 Hard
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Ionic Bonding and Lattice Energy; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

72) Which of the following is the oxoanion of bromine called the bromate ion?
A) BrO_3^-
B) BrO_3^{2-}
C) BrO_4^{2-}
D) BrO_2^-
E) BrO^-

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Ionic Bonding and Lattice Energy; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

73) What combination of element types will typically result in ionic bonding?
A) two metals
B) a nonmetal and a metal
C) two nonmetals
D) two Group 1A elements
E) two noble gases

Answer: B
Difficulty: 1 Easy
Topic: Chemical Periodicity; Chemical Bonding
Bloom's: 2. Understand
Subtopic: Periodic Classification of the Elements; Ionic Bonding and Lattice Energy
Gradable: automatic
Accessibility: Keyboard Navigation

74) What is the name of PCl_3?
A) phosphorus chloride
B) phosphoric chloride
C) phosphorus trichlorate
D) trichlorophosphide
E) phosphorus trichloride

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Covalent Bonding
Gradable: automatic
Accessibility: Keyboard Navigation

75) The compound, P_4S_{10}, is used in the manufacture of safety matches. What is its name?
A) phosphorus sulfide
B) phosphoric sulfide
C) phosphorus decasulfide
D) tetraphosphorus decasulfide
E) phosphorus sulfite

Answer: D
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Covalent Bonding
Gradable: automatic
Accessibility: Keyboard Navigation

76) Diiodine pentaoxide is used as an oxidizing agent that converts carbon monoxide to carbon dioxide. What is its chemical formula?
A) I_2O_5
B) IO_5
C) $2IO_5$
D) I_5O_2
E) $(IO_5)_2$

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Covalent Bonding
Gradable: automatic
Accessibility: Keyboard Navigation

77) What is the name of P_4Se_3?
A) phosphorus selenide
B) phosphorus triselenide
C) tetraphosphorus selenide
D) phosphoric selenide
E) tetraphosphorus triselenide

Answer: E
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Bonding
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Covalent Bonding
Gradable: automatic

Accessibility: Keyboard Navigation

78) What is the name of ClO^- ion?
A) hypochlorite
B) chlorate
C) chlorite
D) perchlorate
E) perchlorite

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

79) What is the formula for the permanganate ion?
A) MnO_2^-
B) MnO_4^-
C) MgO_4^{2-}
D) $Mn_2O_7^-$
E) MgO_2^{2-}

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

80) Tetrasulfur dinitride decomposes explosively when heated. What is its formula?

A) S_2N_4

B) S_4N_2

C) $4SN_2$

D) S_4N

E) S_2N

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

81) Which of the following is the empirical formula for hexane, C_6H_{14}?

A) $C_{12}H_{28}$

B) C_6H_{14}

C) C_3H_7

D) $CH_{2.3}$

E) $C_{0.43}H$

Answer: C
Difficulty: 2 Medium
Topic: Components of Matter; Stoichiometry and Chemical Reactions
Bloom's: 4. Analyze
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

82) Which of the following is a molecular formula for a compound with an empirical formula of CH?

A) C_2H_6

B) C_3H_9

C) C_4H_{10}

D) C_6H_6

E) None of the answers is correct.

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter; Stoichiometry and Chemical Reactions
Bloom's: 4. Analyze
Subtopic: Molecules and Ions; Chemical Formulas; Nomenclature; Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

83) Which of the following substances is a molecule, but not a compound?

A) SO_2

B) O_2

C) CS_2

D) Ar

E) CO_3^{2-}

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 5. Evaluate
Subtopic: Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

84) What is the chemical name of $FeSO_3$?
A) Iron(II) sulfite
B) Iron(III) sulfate
C) Iron sulfate
D) Iron sulfur trioxide
E) None of the above names is correct.

Answer: A
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Molecules and Ions; Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

85) Polyatomic molecules contain
A) two different types of atoms.
B) two of the same types of atoms.
C) only two atoms of the same or different type.
D) more than two atoms of the same or different type.

Answer: D
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

86) Common examples of diatomic molecules from Group 7A elements include
A) fluorine, hydrogen, and nitrogen.
B) nitrogen, chlorine, and bromine.
C) chlorine, bromine, and iodine.
D) iodine, lead, and oxygen.

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table
Gradable: automatic
Accessibility: Keyboard Navigation

87) The fact that the complete reaction of 48.6 g of magnesium with 32.0 g of oxygen forms exactly 80.6 g of magnesium oxide illustrates
A) the law of definite proportions.
B) the law of conservation of mass.
C) the law of multiple proportions.
D) Dalton's description of the atom.

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

88) Why was it more difficult to design an experiment that would prove the existence of neutrons than it was to design an experiment that would prove the existence of either protons or electrons?
A) Neutrons are smaller than either protons or electrons, so their presence is much more difficult to detect.
B) Because neutrons are 1840 times heavier than protons, they are difficult to separate, and therefore, to count.
C) Neutrons do not deflect charged particles.
D) The similarity of the magnetic and electrical properties of protons and neutrons made them experimentally indistinguishable.

Answer: C
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

89) The $^{80}Br^-$ ion has
A) 45 protons, 35 neutrons, 45 electrons.
B) 35 protons, 45 neutrons, 34 electrons.
C) 35 protons, 45 neutrons, 36 electrons.
D) 45 protons, 35 neutrons, 46 electrons.
E) 35 protons, 45 neutrons, 46 electrons.

Answer: C
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic
Accessibility: Keyboard Navigation

90) C(graphite) and C(diamond) are examples of
A) isotopes of carbon.
B) allotropes of carbon.
C) the law of definite proportions.
D) different carbon ions.

Answer: B
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Molecules and Ions
Gradable: automatic
Accessibility: Keyboard Navigation

91) What binary compound would be formed from barium ions and fluoride ions?
A) Ba_2F_3
B) BaF_3
C) BaF
D) Ba_2F
E) BaF_2

Answer: E
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Chemical Formulas
Gradable: automatic
Accessibility: Keyboard Navigation

92) The chemical name for SO_3^{2-} (aq) is sulfite ion. Therefore, the chemical name of H_2SO_3 (aq) is
A) dihydrosulfuric acid.
B) sulfurous acid.
C) dihydrogen sulfite.
D) hyposulfurous acid.
E) sulfuric acid.

Answer: B
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 1. Remember
Subtopic: Nomenclature
Gradable: automatic
Accessibility: Keyboard Navigation

93) The mass of a neutron is equal to the mass of a proton plus the mass of an electron.

Answer: FALSE
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

94) All neutral atoms of tin have 50 protons and 50 electrons.

Answer: TRUE
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic
Accessibility: Keyboard Navigation

95) Copper (Cu) is a transition metal.

Answer: TRUE
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 2. Understand
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

96) Lead (Pb) is a main group element.

Answer: TRUE
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 2. Understand
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic
Accessibility: Keyboard Navigation

97) Almost all the mass of an atom is concentrated in the nucleus.

Answer: TRUE
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom; Atomic Theories
Gradable: automatic
Accessibility: Keyboard Navigation

98) Ionic compounds may carry a net positive or net negative charge.

Answer: FALSE
Difficulty: 2 Medium
Topic: Chemical Bonding
Bloom's: 2. Understand
Subtopic: Ionic Bonding and Lattice Energy
Gradable: automatic
Accessibility: Keyboard Navigation

99) The empirical formula of C_6H_6 is CH.

Answer: TRUE
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 4. Analyze
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

100) The empirical formula is the simplest whole number ratio of atoms representing a chemical formula of a molecule.

Answer: TRUE
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

101) Many different compounds might be represented by the same empirical formula.

Answer: TRUE
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

102) There is only one distinct empirical formula for each compound that exists.

Answer: TRUE
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

103) The molecular formula of a molecular substance is a whole number multiple of its empirical formula.

Answer: TRUE
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: automatic
Accessibility: Keyboard Navigation

104) The elements in Group 8A are called the _____.

Answer: noble gases
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

105) The elements in Group 2A are called the _____.

Answer: alkaline earth metals
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

106) The elements in Group 7A are called the _____.

Answer: halogens
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

107) The elements in Group 1A are called the _____.

Answer: alkali metals
Difficulty: 2 Medium
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

108) _____ are electrons that are deflected away from negatively charged plates.

Answer: β particles
Difficulty: 2 Medium
Topic: Nuclear Chemistry
Bloom's: 3. Apply
Subtopic: Radioactivity and Nuclear Stability
Gradable: automatic

109) _____ are atoms that have the same atomic number (*Z*) but different mass numbers (*A*).

Answer: Isotopes
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: automatic

110) _____ have properties that are intermediate between those of metals and nonmetals.

Answer: Metalloids
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 2. Understand
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

111) The elements in Group 8A are called the _____.

Answer: noble gases
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: automatic

112) _____ is defined as a mass exactly equal to one-twelfth the mass of one carbon-12 atom.

Answer: One atomic mass unit
1 amu
1 atomic mass unit
One amu
One atomic mass unit
1 amu
1 atomic mass unit
One amu
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: automatic

113) What is the name given for the elements in Group 1A in the periodic table?

Answer: Alkali metals
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: manual

114) What is the name given for the elements in Group 7A in the periodic table?

Answer: Halogens
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: manual

115) Which group is given the name chalcogens?

Answer: Group 6A
Difficulty: 1 Easy
Topic: Components of Matter; Chemical Periodicity
Bloom's: 1. Remember
Subtopic: Elements and the Periodic Table; Periodic Classification of the Elements
Gradable: manual

116) The table below describes four atoms.

	Atom A	Atom B	Atom C	Atom D
Number of protons	79	80	80	79
Number of neutrons	118	120	118	120
Number of electrons	79	80	80	79

Which atoms represent the same element?

Answer: Atoms A and D represent the same element, and Atoms B and C represent the same element.
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom; Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: manual

117) In the early 1900s, Ernest Rutherford performed an experiment with thin foils of gold and alpha particles to probe the structure of the atoms. He observed that most of these alpha particles penetrated the foil and were not deflected. Realizing that atoms are electrically neutral (that is, they have equal numbers of protons and electrons) and that the mass of a proton is significantly greater than the mass of an electron, use Rutherford's data to propose a structural model of an atom.

Answer: (Answers will vary.) Atoms are mostly empty space. The mass is concentrated mostly at the center of the atom.
Difficulty: 1 Easy
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Structure of the Atom
Gradable: manual

118) State the two important experimental results (and the names of the responsible scientists) which enabled the mass of the electron to be determined.

Answer: Thomson measured m/e, the mass-to-charge ratio. Millikan measured e, the charge. Thus, the mass m could be calculated.
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 2. Understand
Subtopic: Structure of the Atom
Gradable: manual

119) Determine the average atomic mass of boron. The natural abundance of ^{10}B (weighing 10.0129 amu) is 19.9% and the natural abundance of ^{11}B (weighing 11.0093 amu) is 80.1%. Show all your work.

Answer: (10.0129 amu)(0.199) + (11.0093 amu)(0.801) = 10.81 amu
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 3. Apply
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Gradable: manual

120) What is the electrostatic attraction called that holds oppositely charged ions together in a compound?

Answer: ionic bond
Difficulty: 1 Easy
Topic: Chemical Bonding
Bloom's: 2. Understand
Subtopic: Ionic Bonding and Lattice Energy
Gradable: manual

121) What is the law that describes different samples of a given compound that always contain the same elements in the same mass ratio?

Answer: law of definite proportions
Difficulty: 1 Easy
Topic: Components of Matter; Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Chemical Formulas; Mass Percent Composition
Gradable: manual

122) What name is given to the simplest organic compounds which only contain carbons and hydrogens?

Answer: hydrocarbons
Difficulty: 1 Easy
Topic: Organic Molecules
Bloom's: 1. Remember
Subtopic: Classes of Organic Molecules (Functional Groups)
Gradable: manual

123) What is the name of Cu_2O?

Answer: Copper(I) oxide
Difficulty: 2 Medium
Topic: Components of Matter
Bloom's: 4. Analyze
Subtopic: Chemical Formulas; Nomenclature
Gradable: manual

124) Describe the difference between an empirical formula and a molecular formula.

Answer: An empirical formula is the simplest chemical formula that has the smallest possible whole number ratio of atoms in the formula. A molecular formula is the true formula of a molecule which is a whole number multiple of its empirical formula.
Difficulty: 1 Easy
Topic: Stoichiometry and Chemical Reactions
Bloom's: 2. Understand
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Gradable: manual