Test Bank for Chemistry 4th Edition by Burdge ISBN 0078021529 9780078021527

Chapter 02
Atoms and the Periodic Table

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.

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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*

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

8. Rutherford's experiment with alpha particle scattering by gold foil established that **A.** protons are 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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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.

Blooms: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

18. Atoms X, Y, Z, and R have the following nuclear compositions:
$^{410}_{186}X$ $^{410}_{183}Y$ $^{412}_{186}Z$ $^{412}_{185}R$

I II III IV
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

Blooms: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Topic: Components of Matter

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.

Blooms: 5. Evaluate
Difficulty: Hard
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Topic: Components of Matter

20. Atoms of the same element with different mass numbers are called

A. ions.
B. neutrons.
C. chemical groups.
D. chemical families.
E. isotopes.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

23. Give the 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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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.

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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.

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Components of Matter

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, $Z = 11$

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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, $Z = 14$

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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, $Z = 35$

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

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%

Blooms: 3. Apply
Difficulty: Hard
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

38. What terms 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

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Topic: Components of Matter

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

Blooms: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Components of Matter

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

Blooms: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Components of Matter

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

Blooms: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

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, ${}^{18}_{17}Cl$
D. 17 electrons, ${}^{17}_{35}Cl$
E. 18 electrons, ${}^{18}_{36}Ar$

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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, $^{20}_{40}Ca$

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

46. Which of these compounds is most likely to be ionic?
A. KF
B. CCl_4
C. CS_2
D. CO_2
E. ICl

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

48. Which of these compounds is most likely to be ionic?
A. NCl_3

C. CO
D. SO_2
E. SF_4

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

52. An anion is defined as
A. a charged 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.

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Molecules and Ions
Topic: Components of Matter
Topic: Electron Configuration

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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Electron Configurations of Cations and Anions
Subtopic: Molecules and Ions
Topic: Electron Configuration

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Bond Polarity
Subtopic: Electronegativity
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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. $CaNO_3$

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Topic: Components of Matter

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. $CaSe_3$

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Topic: Components of Matter

58. Which is the correct formula for copper(II) phosphate? A. Cu_2PO_4

C. Cu_2PO_3
D. $Cu(PO_4)_2$
E. $Cu(PO_3)_2$

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Acid-Base Definitions
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Acids and Bases
Topic: Components of Matter

60. The formula for magnesium sulfateis A. MnS.
B. MgS. C. $MnSO_3$. **D.** $MgSO_4$. E. $MnSO_4$.

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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. $Fe(NO_2)_2$.

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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. $Cu(CN)_2$

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

64. What is the formula for lead(II) oxide? **A.** PbO
B. PbO_2
C. Pb_2O
D. PbO_4
E. Pb_2O_3

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

65. Potassium permanganate is a strong oxidizer that reacts explosively with easily oxidized materials. What is its formula?
A. $KMnO_3$

C. K_2MnO_4
D. $K(MnO_4)_2$
E. $K_2Mn_2O_7$

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 4. Analyze
Difficulty: Hard
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Molecules and Ions
Topic: Chemical Bonding
Topic: Components of Matter

69. What is the formula of hydrobromic acid?
A. H_2OBr
B. $HBrO_3$
C. HBrO
D. HBr
E. $HBr \cdot 2H_2O$

Blooms: 3. Apply
Difficulty: Hard
Gradable: automatic
Subtopic: Acid-Base Definitions
Subtopic: Chemical Formulas
Subtopic: Nomenclature
Topic: Acids and Bases
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Hard
Gradable: automatic
Subtopic: Acid-Base Definitions
Subtopic: Chemical Formulas
Subtopic: Nomenclature
Topic: Acids and Bases
Topic: Components of Matter

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. $FeCl_3{\cdot}6H_2O$

Blooms: 3. Apply
Difficulty: Hard
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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^-

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

73. What types of elements undergo ionic bonding? A. two metals
B. a nonmetal and a metal
C. two nonmetals
D. two Group 1A elements
E. two noble gases

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Ionic Bonding and Lattice Energy
Subtopic: Periodic Classification of the Elements
Topic: Chemical Bonding
Topic: Chemical Periodicity

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

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Covalent Bonding
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Covalent Bonding
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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. $(IO_5)_2$

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Covalent Bonding
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Covalent Bonding
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Chemical Bonding
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Components of Matter

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-}

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Components of Matter

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. $C_{0.43}H$

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Components of Matter
Topic: Stoichiometry and Chemical Reactions

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.

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Subtopic: Molecules and Ions
Subtopic: Nomenclature
Topic: Components of Matter
Topic: Stoichiometry and Chemical Reactions

83. Which of the following substances is a molecule, but not a compound? A. SO_2

C. CS_2
D. Ar
E. CO_3^{2-}

Blooms: 5. Evaluate
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Topic: Components of Matter

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 names is correct.

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Subtopic: Molecules and Ions
Topic: Components of Matter

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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Chemical Formulas
Topic: Components of Matter

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.

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Topic: Components of Matter

87. The fact that when 48.6 g of magnesium completely reacts with 32.0 g of oxygen, exactly 80.6 g of magnesium oxide is formed 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.

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Topic: Components of Matter

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.

Blooms: 4. Analyze
Difficulty: Medium
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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.

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Topic: Components of Matter

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.

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Molecules and Ions
Topic: Components of Matter

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

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Chemical Formulas
Topic: Components of Matter

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.

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Nomenclature
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

95. Copper (Cu) is a transition metal.
TRUE

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Theories
Subtopic: Structure of the Atom
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Medium
Gradable: automatic
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

99. The empirical formula of C_6H_6 is CH.
TRUE

Blooms: 4. Analyze
Difficulty: Easy
Gradable: automatic
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

101. Many compounds can be represented with the same empirical formula.
TRUE

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

103. The molecular formula is a whole number multiple of the empirical formula.
FALSE

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

104. The elements in Group 8A are called the_____.
noble gases

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

105. The elements in Group 2A are called the_____.
alkaline earth metals

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

106. The elements in Group 7A are called the_____.
halogens

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

107. The elements in Group 1A are called the_____.
alkali metals

Blooms: 1. Remember
Difficulty: Medium
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

108. _____are electrons that are deflected away from negatively charged plates.
β particles

Blooms: 3. Apply
Difficulty: Medium
Gradable: automatic
Subtopic: Radioactivity and Nuclear Stability
Topic: Nuclear Chemistry

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

Blooms: 3. Apply
Difficulty: Easy
Gradable: automatic
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

110. _____have properties that are intermediate between those of metals and nonmetals.
Metalloids

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

111. The elements in Group 8A are called the_____.
noble gases

Blooms: 1. Remember
Difficulty: Easy
Gradable: automatic
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

112. _____is defined as a mass exactly equal to one-twelfth the mass of one carbon-12 atom.
One atomic mass unit

Blooms: 2. Understand
Difficulty: Easy
Gradable: automatic
Subtopic: Structure of the Atom
Topic: Components of Matter

113. What is the name given for the elements in Group 1A in the periodic table?
Alkali metals

Blooms: 1. Remember
Difficulty: Easy
Gradable: manual
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: manual
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

115. Which group is given the name chalcogens?
Group 6A

Blooms: 1. Remember
Difficulty: Easy
Gradable: manual
Subtopic: Elements and the Periodic Table
Subtopic: Periodic Classification of the Elements
Topic: Chemical Periodicity
Topic: Components of Matter

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?
Atoms A and D represent the same element, and Atoms B and C represent the same element.

Blooms: 4. Analyze
Difficulty: Medium
Gradable: manual
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Subtopic: Structure of the Atom
Topic: Components of Matter

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.
(Answers will vary.) Atoms are mostly empty space. The mass is concentrated mostly at the center of the atom.

Blooms: 4. Analyze
Difficulty: Easy
Gradable: manual
Subtopic: Structure of the Atom
Topic: Components of Matter

118. State the two important experimental results (and the names of the responsible scientists) which enabled the mass of the electron to be determined.
Thomson measured *m/e*, the mass-to-charge ratio. Millikan measured *e*, the charge. Thus, the mass *m* could be calculated.

Blooms: 2. Understand
Difficulty: Medium
Gradable: manual
Subtopic: Structure of the Atom
Topic: Components of Matter

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.
(10.0129 amu)(0.199) + (11.0093 amu)(0.801) = 10.81 amu

Blooms: 3. Apply
Difficulty: Medium
Gradable: manual
Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: manual
Subtopic: Ionic Bonding and Lattice Energy
Topic: Chemical Bonding

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: manual
Subtopic: Chemical Formulas
Subtopic: Mass Percent Composition
Topic: Components of Matter
Topic: Stoichiometry and Chemical Reactions

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

Blooms: 1. Remember
Difficulty: Easy
Gradable: manual
Subtopic: Classes of Organic Molecules (Functional Groups)
Topic: Organic Molecules

123. What is the name of
Cu_2O? Copper(I) oxide

Blooms: 4. Analyze
Difficulty: Medium
Gradable: manual
Subtopic: Chemical Formulas
Subtopic: Nomenclature
Topic: Components of Matter

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

Blooms: 2. Understand
Difficulty: Easy
Gradable: manual
Subtopic: Formula Determination of Unknown Compounds (Empirical and Molecular Formulas)
Topic: Stoichiometry and Chemical Reactions

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