Chapter 02 - Atoms, Molecules, and Ions

1. The first people to attempt to explain why chemical changes occur were
   a. alchemists
   b. metallurgists
   c. physicians
   d. physicists
   e. the Greeks

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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2. The Greeks proposed that matter consisted of four fundamental substances:
   a. fire, earth, water, air
   b. fire, metal, water, air
   c. earth, metal, water, air
   d. atoms, fire, water, air
   e. atoms, metal, fire, air

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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3. The first chemist to perform truly quantitative experiments was
   a. Paracelsus
   b. Boyle
   c. Priestly
   d. Bauer
   e. Lavoisier

ANSWER: b

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POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.1
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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4. The scientist who discovered the law of conservation of mass and is also called the father of modern chemistry is

a. Proust
b. Boyle
c. Priestly
d. Bauer
e. Lavoisier

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: Chemistry | general chemistry | general concepts | Law of Conservation of Mass | matter
OTHER: Conceptual
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5. Which of the following pairs of compounds can be used to illustrate the law of multiple proportions?

a. NH_4 and NH_4Cl
b. ZnO_2 and $ZnCl_2$
c. H_2O and HCl
d. NO and NO_2
e. CH_4 and CO_2

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False

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KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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6. Which of the following pairs can be used to illustrate the law of multiple proportions?
   a. SO and SO_2
   b. CO and $CaCO_3$
   c. H_2O and $C_{12}H_{22}O_{11}$
   d. H_2SO_4 and H_2S
   e. KCl and $KClO_2$

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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7. According to the law of multiple proportions:
   a. If the same two elements form two different compounds, they do so in the same ratio.
   b. It is not possible for the same two elements to form more than one compound.
   c. The ratio of the masses of the elements in a compound is always the same.
   d. The total mass after a chemical change is the same as before the change.
   e. None of these.

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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8. A sample of chemical X is found to contain 5.0 grams of oxygen, 10.0 grams of carbon, and 20.0 grams of nitrogen. The law of definite proportion would predict that a 75 gram sample of chemical X should contain how many grams of carbon?

a. 5.0 grams
b. 7.5 grams
c. 10. grams
d. 15 grams
e. 21 grams

ANSWER: e
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.2
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Quantitative
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9. Consider the following two compounds: H_2O  and H_2O_2  . According to the law of multiple proportions, the ratio of hydrogen atoms per gram of oxygen in H_2O to hydrogen atoms per gram of oxygen in H_2O_2 is

a. 1:1
b. 2:1
c. 1:2
d. 2:2
e. 4:1

ANSWER: b
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.2
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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10. Which of the following statements from Dalton's atomic theory is no longer true, according to modern atomic theory?

a. Elements are made up of tiny particles called atoms.
b. Atoms are not created or destroyed in chemical reactions.
c. All atoms of a given element are identical.
d. Atoms are indivisible in chemical reactions.
e. All of these statements are true according to modern atomic theory.

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.3
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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11. How many of the following postulates of Dalton's atomic theory are still scientifically accepted?

I. All atoms of the same element are identical.
II. Compounds are combinations of different atoms.
III. A chemical reaction changes the way atoms are grouped together.
IV. Atoms are indestructible.

a. 0
b. 1
c. 2
d. 3
e. 4

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.3
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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12. The chemist credited for inventing a set of symbols for writing elements and a system for writing the

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formulas of compounds (and for discovering selenium, silicon, and thorium) is

a. Boyle
b. Lavoisier
c. Priestly
d. Berzelius
e. Dalton

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.3
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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13. Avogadro's hypothesis states that:

a. Each atom of oxygen is 16 times more massive than an atom of hydrogen.
b. A given compound always contains exactly the same proportion of elements by mass.
c. When two elements form a series of compounds, the ratios of masses that combine with 1 gram of the first element can always be reduced to small whole numbers.
d. At the same temperature and pressure, equal volumes of different gases contain an equal number of particles.
e. Mass is neither created nor destroyed in a chemical reaction.

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.3
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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14. The first scientist to show that atoms emit any negative particles was

a. J. J. Thomson
b. Lord Kelvin
c. Ernest Rutherford

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d. William Thomson
e. John Dalton

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | discovery of electron | early atomic theory | general chemistry | structure of the atom
OTHER: Conceptual
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15. Many classic experiments have given us indirect evidence of the nature of the atom. Which of the experiments listed below did not give the results described?

a. The Rutherford experiment proved the Thomson "plum-pudding" model of the atom to be essentially correct.
b. The Rutherford experiment was useful in determining the nuclear charge on the atom.
c. Millikan's oil-drop experiment showed that the charge on any particle was a simple multiple of the charge on the electron.
d. The electric discharge tube proved that electrons have a negative charge.
e. All of the above experiments gave the results described.

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | structure of the atom
OTHER: Conceptual
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16. The scientist whose alpha-particle scattering experiment led him to conclude that the nucleus of an atom contains a dense center of positive charge is

a. J. J. Thomson
b. Lord Kelvin
c. Ernest Rutherford
d. William Thomson
e. John Dalton

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ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear model of atom | structure of the atom
OTHER: Conceptual
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17. Alpha particles beamed at thin metal foil may
    a. pass directly through without changing direction
    b. be slightly diverted by attraction to electrons
    c. be reflected by direct contact with nuclei
    d. A and C
    e. A, B, and C

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear model of atom | structure of the atom
OTHER: Conceptual
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18. Which one of the following statements about atomic structure is false?
    a. An atom is mostly empty space.
    b. Almost all of the mass of the atom is concentrated in the nucleus.
    c. The protons and neutrons in the nucleus are very tightly packed.
    d. The number of protons and neutrons is always the same in the neutral atom.
    e. All of the above statements (A-D) are true.

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multiple Choice

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HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear model of atom | structure of the atom
OTHER: Conceptual
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19. If the Thomson model of the atom had been correct, Rutherford would have observed:
    a. Alpha particles going through the foil with little or no deflection.
    b. Alpha particles greatly deflected by the metal foil.
    c. Alpha particles bouncing off the foil.
    d. Positive particles formed in the foil.
    e. None of the above observations is consistent with the Thomson model of the atom.

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear model of atom | structure of the atom
OTHER: Conceptual
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20. Which statement is *not* correct?
    a. The mass of an alpha particle is 7300 times that of the electron.
    b. An alpha particle has a 2+ charge.
    c. Three types of radioactive emission are gamma rays, beta rays, and alpha particles.
    d. A gamma ray is high-energy light.
    e. There are only three types of radioactivity known to scientists today.

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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21. Rutherford's experiment was important because it showed that:
    a. Radioactive elements give off alpha particles.
    b. Gold foil can be made to be only a few atoms thick.
    c. A zinc sulfide screen scintillates when struck by a charged particle.
    d. The mass of the atom is uniformly distributed throughout the atom.
    e. An atom is mostly empty space.

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.4
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear model of atom | structure of the atom
OTHER: Conceptual
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22. Bromine exists naturally as a mixture of bromine-79 and bromine-81 isotopes. An atom of bromine-79 contains
    a. 35 protons, 44 neutrons, 35 electrons
    b. 34 protons and 35 electrons, only
    c. 44 protons, 44 electrons, and 35 neutrons
    d. 35 protons, 79 neutrons, and 35 electrons
    e. 79 protons, 79 electrons, and 35 neutrons

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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23. Which of the following atomic symbols is incorrect?
    a. $^{14}_{6}C$
    b. $^{37}_{17}Cl$

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c. $^{32}_{15}\mathrm{P}$

d. $^{39}_{19}\mathrm{K}$

e. $^{14}_{8}\mathrm{N}$

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | structure of the atom
OTHER: Conceptual
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24. The element rhenium (Re) exists as two stable isotopes and 18 unstable isotopes. Rhenium-185 has in its nucleus

a. 75 protons, 75 neutrons
b. 75 protons, 130 neutrons
c. 130 protons, 75 neutrons
d. 75 protons, 110 neutrons
e. not enough information

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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25. Which among the following represent a set of isotopes? Atomic nuclei containing:

I. 20 protons and 20 neutrons
II. 21 protons and 19 neutrons
III. 22 neutrons and 18 protons
IV. 20 protons and 22 neutrons
V. 21 protons and 20 neutrons

a. I, II, III

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b. III, IV
c. I, V
d. I, IV and II, V
e. No isotopes are indicated.

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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26. By knowing the number of protons a neutral atom has, you should be able to determine
a. the number of neutrons in the neutral atom
b. the number of electrons in the neutral atom
c. the name of the atom
d. two of the above
e. none of the above

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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27. Which of the following statements are *true* of uranium-238?

I. Its chemical properties will be exactly like those of uranium-235.
II. Its mass will be slightly different from that of an atom of uranium-235.
III. It will contain a different number of protons than an atom of uranium-235.
IV. It is more plentiful in nature than uranium-235.

a. III, IV
b. I, II, III
c. I, II, IV

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d. II, III, IV
e. all of these

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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28. An isotope, *X*, of a particular element has an atomic number of 8 and a mass number of 18. Therefore:
a. *X* is an isotope of oxygen.
b. *X* has 10 neutrons per atom.
c. *X* has an atomic mass of 15.9994.
d. A and B.
e. A, B, and C.

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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29. Which of the following statements is true?
a. Ions are formed by adding or removing protons or electrons.
b. Scientists believe that solids are mostly open space.
c. Heating water with a Bunsen burner results in a 2:1 mixture of hydrogen and oxygen gases.
d. At least two of the above statements (A-C) are true.
e. All of the statements (A-C) are false.

ANSWER: b
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice

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HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry
OTHER: Conceptual
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30. The number of neutrons in an atom is the same for all neutral atoms of that element.
    a. True
    b. False
ANSWER: False
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: True / False
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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31. The number of electrons in an atom is the same for all neutral atoms of that element.
    a. True
    b. False
ANSWER: True
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: True / False
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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32. $^{40}_{20}Ca^{2+}$ has
    a. 20 protons, 20 neutrons, and 18 electrons
    b. 22 protons, 20 neutrons, and 20 electrons
    c. 20 protons, 22 neutrons, and 18 electrons
    d. 22 protons, 18 neutrons, and 18 electrons
    e. 20 protons, 20 neutrons, and 22 electrons

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ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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33. Which of the following statements is (are) true?
    a. $^{18}_{8}O$ and $^{19}_{9}F$ have the same number of neutrons.
    b. $^{14}_{6}C$ and $^{14}_{7}N$ are isotopes of each other because their mass numbers are the same.
    c. $^{18}_{8}O^{2-}$ has the same number of electrons as $^{20}_{10}Ne$.
    d. A and B
    e. A and C

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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34. A species with 12 protons and 10 electrons is
    a. Ne^{2+}
    b. Ti^{2+}
    c. Mg^{2+}
    d. Mg
    e. Ne^{2-}

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multi-Mode (Multiple choice)

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HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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35. The numbers of protons, neutrons, and electrons in $^{39}_{19}K^{+}$ are:

a. 20 p, 19 n, 19 e
b. 20 p, 19 n, 20 e
c. 19 p, 20 n, 20 e
d. 19 p, 20 n, 19 e
e. 19 p, 20 n, 18 e

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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36. An ion is formed

a. By either adding or subtracting protons from the atom.
b. By either adding or subtracting electrons from the atom
c. By either adding or subtracting neutrons from the atom.
d. All of the above are true.
e. Two of the above are true.

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual

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37. The formula of water, H_2O, suggests:
    a. There is twice as much mass of hydrogen as oxygen in each molecule.
    b. There are two hydrogen atoms and one oxygen atom per water molecule.
    c. There is twice as much mass of oxygen as hydrogen in each molecule.
    d. There are two oxygen atoms and one hydrogen atom per water molecule.
    e. None of these.

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | molecular substance
OTHER: Conceptual
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38. All of the following are true *except*:
    a. Ions are formed by adding electrons to a neutral atom.
    b. Ions are formed by changing the number of protons in an atom's nucleus.
    c. Ions are formed by removing electrons from a neutral atom.
    d. An ion has a positive or negative charge.
    e. Metals tend to form positive ions.

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.6
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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39. Which of the following are incorrectly paired?
    a. K, alkali metal

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b. Ba, alkaline earth metal
c. O, halogen
d. Ne, noble gas
e. Ni, transition metal

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | group | periodic table
OTHER: Conceptual
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40. Which of the following are *incorrectly* paired?
a. Sr, alkaline earth metal
b. Ir, transition metal
c. F, halogen
d. As, halogen
e. V, transition metal

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
KEYWORDS: Chemistry | early atomic theory | general chemistry | group | periodic table
OTHER: Conceptual
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41. Which of the following are *incorrectly* paired?
a. Phosphorus, Pr
b. Palladium, Pd
c. Platinum, Pt
d. Lead, Pb
e. Potassium, K

ANSWER: a
POINTS: 1
DIFFICULTY: Easy

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REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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42. Which of the following are *incorrectly* paired?
    a. Copper, Cu
    b. Carbon, C
    c. Cobalt, Co
    d. Calcium, Ca
    e. Cesium, Ce

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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43. Which of the following are *incorrectly* paired?
    a. Antimony, Sb
    b. Silicon, Si
    c. Silver, Ag
    d. Argon, Ar
    e. Astatine, As

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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44. All of the following are characteristics of metals *except*:
    a. good conductors of heat
    b. malleable
    c. ductile
    d. often lustrous
    e. tend to gain electrons in chemical reactions

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | metal | periodic table
OTHER: Conceptual
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45. All of the following are characteristics of nonmetals *except*:
    a. poor conductors of electricity
    b. often bond to each other by forming covalent bonds
    c. tend to form negative ions in chemical reactions with metals
    d. appear in the upper left-hand corner of the periodic table
    e. do not have a shiny (lustrous) appearance

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | nonmetal | periodic table
OTHER: Conceptual
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46. Which of the following has 61 neutrons, 47 protons, and 46 electrons?
    a. $^{80}_{61}\text{Pm}$
    b. $^{108}_{47}\text{Ag}^{+}$

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c. $^{108}_{46}Pd^{-}$

d. $^{108}_{47}Cd^{+}$

e. $^{108}_{47}Ag$

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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47. How many protons and electrons does the most stable ion for magnesium have?

	# protons	# electrons
a.	10 p	12 e
b.	12 p	14 e
c.	14 p	12 e
d.	12 p	12 e
e.	12 p	10 e

ANSWER: e
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: Chemistry | early atomic theory | general chemistry | group | periodic table
OTHER: Conceptual
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48. You are given a compound with the formula MCl_2, in which M is a metal. You are told that the metal ion has 24 electrons. What is the identity of the metal?

a. Cr
b. Al
c. Ni
d. Mn

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e. Fe

ANSWER: e
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.7
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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49. Which of the following names is incorrect?
a. cobalt(II) chloride
b. magnesium oxide
c. aluminum(III) oxide
d. diphosphorus pentoxide
e. All of the above names are correct.

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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50. Which of the following pairs is incorrect?
a. iodine trichloride, ICl_3
b. phosphorus pentoxide, P_2O_5
c. ammonia, NH_3
d. sulfur hexafluoride, SF_6
e. All of the above pairs are correct.

ANSWER: b
POINTS: 1
DIFFICULTY: Easy

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REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: binary molecular compound | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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51. The correct name for LiCl is
    a. lithium monochloride
    b. lithium(I) chloride
    c. monolithium chloride
    d. lithium chloride
    e. monolithium monochloride

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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52. How many oxygen atoms are there in one formula unit of $Ca_3(PO_4)_2$?
    a. 2
    b. 4
    c. 6
    d. 8
    e. none of these

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance

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OTHER: Conceptual
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53. How many oxygen atoms are there in 3 formula units of $Al(NO_2)_3$?
    a. 6
    b. 15
    c. 18
    d. 9
    e. 21

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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54. The correct name for FeO is
    a. iron oxide
    b. iron(II) oxide
    c. iron(III) oxide
    d. iron monoxide
    e. iron(I) oxide

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
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55. The correct name for Ca^{2+} is

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a. calcium
b. calcium(II) ion
c. calcium ion
d. calcium(I) ion
e. monocalcium ion

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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56. The correct name for V^{2+} is

a. vanadide
b. vanadite ion
c. vanadium(II) ion
d. vanadium(VI) ion
e. divanadium ion

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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57. The correct name for N^{3-} is

a. nitride ion
b. nitrogen ion
c. nitrogen(III) ion
d. nitro(III) ion
e. nitrite

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ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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58. What is the subscript of rubidium in the formula of rubidium sulfate?
    a. 2
    b. 3
    c. 0
    d. 4
    e. 1

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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59. The formula for calcium bisulfate is
    a. $Ca(SO_4)_2$
    b. CaS_2
    c. $Ca(HSO_4)_2$
    d. Ca_2HSO_4
    e. Ca_2S

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8

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QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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60. The formula for calcium hydrogen phosphate is

a. $CaHPO_4$
b. $Ca(HPO_4)_2$
c. CaH_2PO_4
d. Ca_2HPO_4
e. $Ca_2H_2PO_4$

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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61. Which of the following is *incorrectly* named?

a. $Pb(NO_3)_2$, lead(II) nitrate
b. NH_4ClO_4, ammonium perchlorate
c. PO_4^{3-}, phosphate ion
d. $Mg(OH)_2$, magnesium hydroxide
e. NO^{3-}, nitrite ion

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound

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| nomenclature of simple compound
OTHER: Conceptual
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62. Which of the following is *incorrectly* named?

a. SO_4^{2-}, sulfate ion
b. $S_2O_3^{2-}$, thiosulfate ion
c. PO_4^{3-}, phosphate ion
d. ClO_3^-, chlorite ion
e. CN^-, cyanide ion

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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63. All of the following are in aqueous solution. Which is *incorrectly* named?

a. H_2SO_4, sulfuric acid
b. H_2CO_3, carbonic acid
c. H_3PO_4, phosphoric acid
d. HCN, cyanic acid
e. HCl, hydrochloric acid

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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64. All of the following are in aqueous solution. Which is *incorrectly* named?

a. $HC_2H_3O_2$, acetic acid
b. HBr, bromic acid
c. H_2SO_3, sulfurous acid
d. HNO_2, nitrous acid
e. $HClO_3$, chloric acid

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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65. Which of the following pairs is *incorrect?*

a. NH_4Br, ammonium bromide
b. K_2CO_3, potassium carbonate
c. $BaPO_4$, barium phosphate
d. CuCl, copper(I) chloride
e. MnO_2, manganese(IV) oxide

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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66. Which of the following name(s) is(are) correct?

1. sulfide, S^{2-}

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2. ammonium chloride, NH_4Cl
3. acetic acid, $HC_2H_3O_2$
4. barium oxide, BaO
    a. all
    b. none
    c. 1, 2
    d. 3, 4
    e. 1, 3, 4

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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67. Which metals form cations with varying positive charges?
    a. transition metals
    b. Group 1 metals
    c. Group 2 metals
    d. Group 3 metals
    e. metalloids

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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68. Three samples of a solid substance composed of elements A and Z were prepared. The first contained 4.31 g A and 7.70 g Z. The second sample was 35.9% A and 64.1% Z. It was observed that 0.718 g A reacted with Z to form 2.00 g of the third sample. Show that these data illustrate the law of definite composition.

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ANSWER: Sample (1): ratio of masses (Z/A) = 7.70/4.13 = 1.785
Sample (2): ratio of masses (Z/A) = 64.1/35.9 = 1.785
Sample (3): ratio of masses (Z/A) = (2.00-0.718)/0.718 = 1.785
These three samples thus illustrate that a given compound always contains the same proportion of elements by mass.
See Sec. 2.2 of Zumdahl, *Chemistry*.

POINTS: 1

DIFFICULTY: Moderate

REFERENCES: 2.2

QUESTION TYPE: Subjective Short Answer

HAS VARIABLES: False

KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry

OTHER: Conceptual

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69. Explain how Dalton’s atomic theory accounts for:
a) the law of conservation of mass
b) the law of definite composition
c) the law of multiple proportion

ANSWER: (a) Chemical reactions involve only reorganization of the atoms.
(b) A given compound always has the same relative numbers and types of atoms.
(c) Since, according to Dalton, atoms of a given element are identical and a given compound always has the same relative numbers and types of atoms, the observation of different mass ratio combinations of the same elements to give different compounds supports the law of multiple proportion.
See Sec. 2.3 of Zumdahl, *Chemistry*.

POINTS: 1

DIFFICULTY: Moderate

REFERENCES: 2.3

QUESTION TYPE: Subjective Short Answer

HAS VARIABLES: False

KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry

OTHER: Conceptual

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70. Complete the following table.

Symbol	# Protons	# Neutrons	# Electrons	Net Charge
206Pb				
	31	38		3+

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	52	75	54	
Mn^{2+}		30		2+

ANSWER:

Symbol	# Protons	# Neutrons	# Electrons	Net Charge
^{206}Pb	82	124	82	0
Ga^{3+}	31	38	28	3+
Te^{2-}	52	75	54	2-
Mn^{2+}	25	29	23	2+

POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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71. Complete the following table.

Symbol	$^{69}Ga^{3+}$	
Number of protons		34
Number of neutrons		46
Number of electrons		
Atomic number		
Mass number		
Net charge		2–

ANSWER:

Symbol	$^{69}Ga^{3+}$	$^{80}Se^{2-}$
Number of protons	31	34
Number of neutrons	38	46
Number of electrons	28	36
Atomic number	31	34
Mass number	69	80

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Net charge	+3	2–

POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.5
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | nuclear structure
OTHER: Conceptual
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72. Arsenopyrite is a mineral containing As, Fe, and S. Classify each element as metal, nonmetal, or metalloid.
ANSWER: As = metalloid, Fe = metal, S = nonmetal
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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73. Write the symbol for each of the following elements.
a) silver _____
b) calcium _____
c) iodine _____
d) copper _____
e) phosphorus _____
ANSWER: a) Ag, b) Ca, c) I, d) Cu, e) P
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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74. Write the names of the following compounds:

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a) $FeSO_4$ _____
b) $NaC_2H_3O_2$ _____
c) KNO_2 _____
d) $Ca(OH)_2$ _____
e) $NiCO_3$ _____

ANSWER: a) iron(II) sulfate
b) sodium acetate
c) potassium nitrite
d) calcium hydroxide
e) nickel(II) carbonate

POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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75. Write the chemical formulas for the following compounds or ions.
a) nitrate ion _____
b) aluminum oxide _____
c) ammonium ion _____
d) perchloric acid _____
e) copper(II) bromide _____

ANSWER: a) NO_3^- b) Al_2O_3 c) NH_4^+ d) $HClO_4$ e) $CuBr_2$
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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76. How many atoms (total) are there in one formula unit of $Ca_3(PO_4)_2$?
ANSWER: 13
POINTS: 1

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DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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Name the following compounds:

77. $Al_2(SO_4)_3$
ANSWER: aluminum sulfate
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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78. NH_4NO_3
ANSWER: ammonium nitrate
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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79. NaH
ANSWER: sodium hydride

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POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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80. $K_2Cr_2O_7$
ANSWER: potassium dichromate
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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81. CCl_4
ANSWER: carbon tetrachloride
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: binary molecular compound | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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82. AgCl

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ANSWER: silver chloride
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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83. $CaSO_4$
ANSWER: calcium sulfate
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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84. HNO_2
ANSWER: nitrous acid
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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85. N_2O_3

ANSWER: dinitrogen trioxide
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: binary molecular compound | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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86. SnI_2

ANSWER: tin(II) iodide
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-1
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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Write the formula for:

87. sodium thiosulfate

ANSWER: $Na_2S_2O_3$
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual

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88. iron(III) oxide
ANSWER: Fe_2O_3
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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89. dichlorine heptoxide
ANSWER: Cl_2O_7
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | molecular substance
OTHER: Conceptual
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90. cobalt(II) chloride
ANSWER: $CoCl_2$
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance

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OTHER: Conceptual
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91. aluminum hydroxide
ANSWER: $Al(OH)_3$
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: chemical formula | chemical substance | Chemistry | early atomic theory | general chemistry | ionic substance
OTHER: Conceptual
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92. sulfurous acid
ANSWER: H_2SO_3
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER: Conceptual
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93. nitric acid
ANSWER: HNO_3
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
PREFACE NAME: Ref 2-2
KEYWORDS: acid | chemical substance | Chemistry | early atomic theory | general chemistry |

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	nomenclature of simple compound
OTHER:	Conceptual
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94. phosphoric acid

ANSWER:	H_3PO_4
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	2.8
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
PREFACE NAME:	Ref 2-2
KEYWORDS:	acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER:	Conceptual
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95. acetic acid

ANSWER:	CH_3COOH
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	2.8
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
PREFACE NAME:	Ref 2-2
KEYWORDS:	acid | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
OTHER:	Conceptual
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96. phosphorus trichloride

ANSWER:	PCl_3
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	2.8
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
PREFACE NAME:	Ref 2-2

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KEYWORDS: binary molecular compound | chemical substance | Chemistry | early atomic theory | general chemistry | nomenclature of simple compound
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97. Which of these statements is a consequence (follows from) the Law of Definite Proportion?

a. All samples of chlorine contain ^{35}Cl and ^{37}Cl in the same (definite) ratio.
b. The mass of oxygen that is combined with a fixed mass of nitrogen in each of the binary nitrogen oxides can be expressed as a ratio of small whole numbers.
c. The atomic masses of all of the elements in the periodic table have fixed values.
d. The % lead by mass in the compound galena is the same for all pure samples obtained from any source.
e. None of these is correct

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general chemistry
OTHER: Conceptual
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98. Which of these statements is a consequence (follows from) the Law of Multiple Proportions?

a. All samples of chlorine contain ^{35}Cl and ^{37}Cl in the same (definite) ratio.
b. The mass of oxygen that is combined with a fixed mass of nitrogen in each of the binary nitrogen oxides can be expressed as a ratio of small whole numbers.
c. The atomic masses of all of the elements in the periodic table have fixed values.
d. The % lead by mass in the compound galena is the same for all pure samples obtained from any source.
e. None of these is correct

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.2
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | Dalton's atomic theory | early atomic theory | general

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chemistry
OTHER: Conceptual
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99. Which of the following elements does NOT have a symbol taken from a LATIN name for the element or one of its compounds?

a. iron
b. copper
c. sodium
d. potassium
e. titanium

ANSWER: e
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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100. Which of the following statements is FALSE?

a. sulfur does not conduct electricity
b. gold is malleable
c. germanium is a metal
d. silicon is a metalloid
e. hydrogen is a non-metal

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.7
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | periodic table
OTHER: Conceptual
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101. Which of the following ions is NOT likely to form from the appropriate atom?

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a. C^{4+}
b. As^{3-}
c. Mg^{2+}
d. Ti^{4+}
e. Na^{+}

ANSWER: a
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: Chemistry | early atomic theory | general chemistry | group | periodic table
OTHER: Conceptual
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102. How many protons, neutrons and electrons, in that order are present in the anion formed by one atom of ^{125}I?

a. 53, 74, 54
b. 52, 72, 53
c. 54, 72, 53
d. 53, 72, 54
e. 54, 74, 54

ANSWER: d
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope | periodic table
OTHER: Conceptual
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103. How many protons, neutrons and electrons, in that order are present in the anion formed by one atom of ^{79}Se?

a. 34, 34, 45
b. 34, 45, 34
c. 32, 45, 34

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d. 34, 45, 36

e. 36, 45, 36

ANSWER: d
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope | periodic table
OTHER: Conceptual
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104. Which statement is INCORRECT?

a. An atom of ^{60}Zn has an equal number of protons and neutrons

b. An atom of ^{50}Mn has an equal number of electrons and neutrons

c. An atom of ^{18}O has an equal number of protons and neutrons

d. An atom of ^{41}K has an equal number of protons and electrons

e. An atom of ^{238}U contains 146 neutrons.

ANSWER: c
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: 2.5
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope
OTHER: Conceptual
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105. Which of the following atoms, isotopes or ions contains 23 protons, 18 electrons and 27 neutrons?

a. $^{45}Co^{5+}$

b. ^{50}Kr

c. $^{50}V^{5+}$

d. $^{41}Kr^{5-}$

e. $^{50}V^{5-}$

ANSWER: c
POINTS: 1

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DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: atomic theory of matter | Chemistry | early atomic theory | general chemistry | isotope | periodic table
OTHER: Conceptual
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106. Which of the following compounds is incorrectly named?

a. $Mg(OH)_2$ is magnesium dihydroxide
b. CaO is calcium oxide
c. NH_4NO_3 is ammonium nitrate
d. K_3PO_4 is potassium phosphate
e. $MgSO_3$ is magnesium sulfite

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.8
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
KEYWORDS: chemical substance | Chemistry | early atomic theory | general chemistry | ionic compound | nomenclature of simple compound
OTHER: Conceptual
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