Fundamentals of Anatomy and Physiology, 11e **(Martini)**
Chapter 2 The Chemical Level of Organization
Multiple Choice Questions
The smallest stable units of matter are
atoms.
molecules.
protons.
neutrons.
electrons.
Answer: A
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
The "atomic number" of an atom is determined by the number of_____it has.
electrons
protons
neutrons
protons + neutrons
protons + electrons
Answer: B
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
The "atomic weight" of an atom reflects the average number of
protons.
neutrons.
electrons.
protons + neutrons.
protons + neutrons + electrons.
Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
One mole of any element has the same
mass.
weight.
number of atoms.
number of electrons.
All of the answers are correct.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
2
Anatomy and physiology TB.
The nucleus of an atom consists of
electrons.
protons.
neutrons.
protons + neutrons.
protons + electrons.

Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Isotopes of an element differ in the number of
protons in the nucleus.
electrons in the nucleus.
neutrons in the nucleus.
electron clouds.
electrons in energy shells.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
The innermost electron shell in an atom holds up to_____electrons.
1
2
4
6
8 Answer:
B
Learning Outcome: 2-1
Bloom's Taxonomy: Understanding
Radioisotopes have unstable
ions.
nuclei.
isotopes.
electron clouds.
protons.
Answer: B
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
3
Anatomy and physiology TB.
By weight, which element is the most plentiful in the human body?
sulfur
sodium
oxygen
potassium
carbon
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Which of these lists contains only trace elements?
sulfur, chlorine, oxygen
selenium, hydrogen, calcium
boron, oxygen, carbon
silicon, fluorine, tin
cobalt, calcium, sodium

Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Helium (HE) has an atomic number of 2. It is chemically stable because it
is neutral in electrical charge.
readily ionizes to react with other atoms.
has a full outer electron shell.
will form a covalent bond with another He atom.
lacks electrons, thus the He atom is stable.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Applying
Which element commonly has only a proton as its nucleus?
helium
neon
argon
hydrogen
carbon
Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Understanding
4
Anatomy and physiology TB.
By weight, which element is the second most abundant in the human body?
oxygen
carbon
hydrogen
nitrogen
calcium
Answer: B
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
In any given molecule, the sum of the atomic weights of its component atoms is called
molecular mass.
molecular weight.
atomic mass.
atomic weight.
chemical mass.
Answer: B
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Given the following approximate values, calculate the molecular weight for NaCl.
Atomic number for Na: 11, Atomic weight for Na: 23 g/mol, Atomic number for Cl: 17,Atomic weight for Cl: 35 g/mol, Boiling point for Cl: -34 °C
11 g/mol
28 g/mol
34 g/mol

40 g/mol
58 g/mol
Answer: E
Learning Outcome: 2-1
Bloom's Taxonomy: Analyzing
If an isotope of oxygen has 8 protons, 10 neutrons, and 8 electrons, its mass number isA)
26.
B) 16.
C) 18.
8.
E) 12.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Analyzing
5
Anatomy and physiology TB.
If an element is composed of atoms with an atomic number of 6 and a mass number of 14, then a non-isotopic atom of this element contains
6 protons.
8 electrons.
8 neutrons.
6 protons and 8 electrons.
6 protons and 8 neurons.
Answer: E
Learning Outcome: 2-1
Bloom's Taxonomy: Analyzing
A(n)_____is a pure substance composed of atoms of only one kind.
element
macromolecule
ion
isotope
compound
Answer: B
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
The center of an atom is called the
core.
hub.
middle point.
nucleus.
focus.
Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Electrons whirl around the center of the atom at high speed, forming a(n)
spiral.
figure 8.

cylinder.
electron cloud.
helix.
Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
6
Anatomy and physiology TB.
Electrons in an atom occupy an orderly series of electron shells or
energy levels.
electron clouds.
energy circles.
electron lanes.
energy fields.
Answer: A
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
The actual mass of an atom is known as its
chemical weight.
atomic weight.
atomic mass.
chemical mass.
chemical force.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Atoms of the same element whose nuclei contain the same number of protons, but different numbers of neutrons, are called
isotonics.
heterotopes.
isotopes.
homotopes.
heterotonics.
Answer: C
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
Theof a radioactive substance is the time required for 50 percent of a givenamount of radioisotope to decay.
decay-point
mid-life
deterioration point
half-life
entropy
Answer: D
Learning Outcome: 2-1
Bloom's Taxonomy: Remembering
7

Anatomy and physiology TB.
The molecule NO is known as
nitric oxide.
noxious oxide.
noxious oxygen.
nitric oxygen.
nitrous oxide.
Answer: A
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
The molecule CO2 is known as
carbonized oxygen.
carbonated oxygen.
carbon monoxide.
carbon oxide.
carbon dioxide.
Answer: E
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
The molecule H2 is known as
hydrohydrogen.
hydrogen.
hydroxide.
helium.
semi-water.
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
When electrons are transferred from one atom to another, and the two atoms unite as a resultof the opposite charges, a(n)_____is formed.
ion
molecule
hydrogen bond
ionic bond
covalent bond
Answer: D
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
8
Anatomy and physiology TB.
Magnesium atoms have two electrons in the outermost shell. As a result, you would expect magnesium to form ions with a charge of
A) +1.
B) +2.
C) -1.
D) -2.
either +2 or -2.

Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
Which of the following statements about hydrogen bonds is **false**?
Hydrogen bonds are strong attractive forces between hydrogen atoms and negatively charged atoms.
Hydrogen bonds can occur within a single molecule.
Hydrogen bonds can form between neighboring molecules.
Hydrogen bonds are important for holding large molecules together.
Hydrogen bonds are responsible for many of the properties of water.
Answer: A
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
The molecule O2 is known as
oxide.
oxygen.
organic.
oxate.
a salt.
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
H2O is an example of a(n)
ionic formula.
glucose molecule.
compound.
ion.
covalent formula.
Answer: C
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
9
Anatomy and physiology TB.
Which of the following is **not** a cation?
Na+
Cl-
K+
Ca2+
Mg2+
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
A dust particle floating on a water surface illustrates
surface tension.
chemical tension.
static electricity.
heat capacity.

hydrophilic attraction.
Answer: A
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
In an aqueous solution, cations are attracted toward
sodium.
salt.
buffers.
anions.
hydrogen ions.
Answer: D
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
In an aqueous solution, sodium ions would move toward
a negative terminal.
a positive terminal.
a pH terminal.
an organic terminal.
the bottom.
Answer: A
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
10
Anatomy and physiology TB.
The chemical behavior of an atom is determined by the
number of protons.
number of neutrons.
outermost electron shell.
size of the atom.
mass of the nucleus.
Answer: C
Learning Outcome: 2-2
Bloom's Taxonomy: Understanding
Ions with a + charge are called
cations.
anions.
radicals.
positrons.
isotopes.
Answer: A
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
When atoms complete their outer electron shell by sharing electrons, they form
ionic bonds.
covalent bonds.
hydrogen bonds.
anions.

cations.
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
Ionic bonds are formed when
atoms share electrons.
an electron or electrons are completely transferred from one atom to another.
a pair of electrons is shared unequally by two atoms.
hydrogen forms bonds with negatively charged atoms.
two or more atoms lose electrons at the same time.
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
11
Anatomy and physiology TB.
If a pair of electrons is unequally shared between two atoms, a(n)_____bond occurs.
single covalent
double covalent
triple covalent
polar covalent
hydrogen
Answer: D
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
Elements that have atoms with full outer shells of electrons
will form many compounds.
will normally form anions.
will normally form cations.
frequently form hydrogen bonds.
are inert gases.
Answer: E
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
Ions in an ionic molecule are held together due to
the sharing of electrons.
the attraction of opposite electrical charges.
each electron orbiting all of the ions in the molecule.
the presence of water molecules.
the attraction of similar charges of the ions' protons.
Answer: B
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
Sodium (NA) has an atomic number of 11. How many electrons are in the outer electron shell of a neutral sodium atom?
1
2
3

4
8 Answer:
A
Learning Outcome: 2-2
Bloom's Taxonomy: Analyzing
12
Anatomy and physiology TB.
Oxygen (atomic number 8) requires how many **additional** electrons to fill its outer electron shell?
1
2
4
6
8 Answer:
B
Learning Outcome: 2-2
Bloom's Taxonomy: Analyzing
The formula for methane gas is CH4. What does the formula 4CH4 represent?
a molecule with 4 carbon atoms
a molecule with 4 carbon atoms and 16 hydrogen atoms
4 molecules, each containing a carbon and a hydrogen atom
4 molecules, each containing a carbon atom and 4 hydrogen atoms
an inorganic compound with ionic bonds
Answer: D
Learning Outcome: 2-2
Bloom's Taxonomy: Applying
In an ionic bond, the electron donor is the_____, whereas the electron acceptor is the _____.
acid; base
salt; ion
anion; cation
base; acid
cation; anion
Answer: E
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
In a molecule of nitrogen, three pairs of electrons are shared by two nitrogen atoms. The typeof bond that is formed is an example of a_____ bond.
single trivalent
double divalent
triple covalent
polar covalent
hydrogen
Answer: C
Learning Outcome: 2-2
Bloom's Taxonomy: Remembering
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