Name _____ Date _____ Class _____

18 Note-taking Worksheet

Properties of Atoms and the Periodic Table

Section 1 Structure of the Atom

A. _____ are abbreviated in scientific shorthand—first letter or two of element's name

B. _____—smallest piece of matter that still has the properties of the element

1. _____ have electrical charge of 1+.
2. _____ do not have an electrical charge.
3. _____ have electrical charge of 1-.
4. Protons and neutrons are in the _____ of an atom; electrons surround the nucleus.

C. Protons and neutrons are made up of smaller particles called _____.

1. Quarks are studied by colliding accelerated charged particles with protons, which leave tracks in a _____.
2. Six quarks are known to exist; the sixth is called the _____ quark.

D. Scientists use scaled-up _____ to represent atoms.

1. Early models of atoms used a solid _____.
2. Current _____ model shows electrons traveling in specific energy levels around a nucleus of protons and neutrons.

Section 2 Masses of Atoms

A. _____—composed mostly of the protons and neutrons in the nucleus

1. Unit of measurement for atomic particles is _____ (amu) which is one-twelfth the mass of a carbon atom containing six protons and six neutrons.
2. _____—the number of protons in an atom; number of protons also identifies the element
3. The sum of the number of protons and neutrons in the nucleus of an atom is the _____.

B. _____—atoms of the same element with different numbers of neutrons

1. Different isotopes have different _____.
2. Number of _____ is equal to mass number minus atomic number.
3. Name of _____ followed by mass number identifies the isotope.
4. _____ is the weighted-average mass of an element's isotopes.
5. Average atomic mass is closest to its most _____ isotope.

Meeting Individual Needs

Name _____ Date _____ Class _____

Note-taking Worksheet (continued)

Section 3 The Periodic Table

A. Elements are organized in the _____ by increasing atomic number.

1. In the late 1800's, Dmitri Medeleev devised the first periodic table based on _____.
2. In 1913, Henry G. J. Moseley arranged the elements by _____ rather than atomic mass.

B. Vertical columns in the periodic table are _____ of elements with similar properties.

1. Elements in the same group have the same number of _____ in their outer energy level.
2. Each of the seven energy levels can have a _____ number of electrons.
   a. Energy level one can contain at most _____ electrons.
   b. Energy level two can contain at most _____ electrons.
3. Each row in the periodic table ends when an outer energy level is _____.
4. _____ use the element symbol and dots to represent outer energy level electrons.

C. _____—horizontal rows of elements that contain increasing numbers of protons and electrons.

1. Elements are _____ as metals, nonmetals, or metalloids (semimetals).
2. Elements are _____ in laboratories all over the world.

D. The _____ elements exist all over the universe.

1. Hydrogen and helium are the _____ of other naturally occurring elements.
2. _____ spread heavier elements throughout the universe.

Meeting Individual Needs

Name Date Class

20 Note-taking Worksheet

Elements and Their Properties

Section 1 Metals

A. Properties of _____

1. _____ heat and electricity
2. _____—reflect light well
3. _____—can be hammered or rolled into sheets
4. _____—can be drawn into wires
5. _____ _____—combine with nonmetals by losing electrons
6. _____—positively charged metallic ions are surrounded by a cloud of electrons; ions are in sliding layers and electrons are weakly held; readily form ionic bonds with nonmetals

B. The _____ Metals—softer and more reactive than other metals

1. Highly _____ with oxygen and water; don't occur naturally as elemental forms
2. Combine readily with other elements due to _____ electron in outer energy level
3. _____ uses
   a. Human health—_____, _____, and _____ compounds
   b. Photocells—some depend on _____ or _____
   c. Francium—a _____ **element** which breaks down giving off particles and energy

C. The _____ Metals—not found naturally in elemental form; _____ electrons in outer energy level

1. Applications—_____ and magnesium found in fireworks; _____ in vehicles, ladders, and bats; _____ in statues and countertops
2. Human body—_____ in bones; _____ in disease diagnoses; radium formerly used in cancer treatment

D. _____ **Elements** –they often occur in nature as uncombined elements

1. Typically form colored compounds—_____ found in rubies and emeralds

Meeting Individual Needs

Note-taking Worksheet (continued)

2. Iron _____—iron, cobalt, and nickel
   a. _____—most widely used of all metals and main ingredient in _____; abundant in Earth's crust
   b. _____ and nickel—used in some steels
   c. _____ used to coat other metals
3. Copper, silver, gold—_____ metals since once were commonly used in coins
   a. _____—used in electric wiring because it is a superior electricity conductor
   b. _____—used in photographic film and paper; jewelry
   c. _____—used in jewelry
4. Zinc, cadmium, mercury—group _____ on periodic table
   a. Zinc and _____—often used to coat or plate other metals
   b. _____—only room temperature liquid metal; used in thermometers and batteries

E. The _____ Metals—seem disconnected from the rest of periodic tables
1. The _____—include _____, cerium, praseodymium, amarium, europium, gadolinium, and terbium
2. The _____—all are radioactive and _____; _____ is the best known.

Section 2 Nonmetals

A. Properties of _____—usually gases or _____ solids at room temperature; are not malleable or _____; usually poor _____ of heat and electricity; usually not lustrous
1. _____ compounds—form when nonmetals gain _____ from metals and become _____ ions
2. _____ compounds—form when nonmetals share electrons with other _____

B. _____—most common element in universe
1. A _____—two atoms of the same element in _____ bond
2. Highly _____ element found mostly on Earth as part of water compound

C. The _____—include bromine, iodine, _____, _____, and astatine
1. A _____ forms when a halogen gains one electron from a metal.

Note-taking Worksheet (continued)

2. Use of halogens
   a. _____—disinfectant and bleach
   b. _____—dyes in cosmetics
   c. _____—hormone regulation
3. _____—a solid changes directly into a gas without first becoming a liquid

D. The _____—exist as isolated, stable atoms
1. _____—used in blimps and balloons
2. Neon, _____, and _____—used in lights

Section 3 Mixed Groups

A. Properties of _____—form ionic and covalent bonds; have some metallic and some nonmetallic properties; partial conduction gives them _____ characteristics.

B. The _____—named for the first element in Group 13
1. _____—used in water softening products, antiseptics, and fuels
2. _____—abundant in Earth's crust; used in cans, foil wrap, pans, building materials, and aircraft

C. The _____ Group—four electrons in outer energy level
1. _____—found in coal, oil, natural gas, and foods
2. Silicon occurs as an **allotrope**—same element with different molecular structures
   a. _____ found in sand, rocks, and soil
   b. The main component in _____, which conduct electricity under certain conditions
3. _____—also used in semiconductors
4. _____—used to coat other metals
5. _____—toxic, so no longer used in paint
6. Diamonds, graphite, and buckminsterfullerene are all _____ of carbon.

D. The _____ Group—five electrons in outer energy level; tend to form covalent bonds
1. _____—used to make nitrates and ammonia
2. _____—used in water softeners, fertilizers, match heads, fine china
3. _____ and _____ used with other metals to lower their melting points

Meeting Individual Needs

Note-taking Worksheet (continued)

E. The _____ Group or Group 16

1. _____—makes up 20% of air, is used by living things in respiration, and provides protection from Sun's radiation
2. _____—used to form sulfides for pigment in paint
3. _____—used in photocopiers and multivitamins
4. _____ and _____ are also oxygen group elements.

F. _____ Elements—scientists create elements not usually found on _____; synthetic elements usually disintegrate quickly.

1. Uranium can be made into _____ which forms plutonium when it disintegrates.
2. Plutonium can be changed into _____, which is used in _____ detectors.
3. _____ **elements** have more than _____ protons and are synthetic and unstable.
   a. The study of synthesized elements helps scientists to understand the _____ holding the _____ together.
   b. Element 114 lasted for _____ seconds.
   c. It combined 114 protons with _____ neutrons.
   d. It broke apart due to enormous _____ between the protons.