4.1 Atomic Theory and Bonding

An _____ is the smallest particle of an element that still has the properties of that element

50 million atoms, lined up end to end = _____

An atom = _____(s) + _____(s) + _____ (s)

Atoms join together to form _____.

A _____ is a pure substance that is composed of two or

more _____combined in a specific way.

Oxygen and hydrogen are_____; H_2O is a _____.

A _____ change occurs when the arrangement of atoms in compounds changes to form new compounds.

Atoms are made up of smaller particles called subatomic particles.

Table 4.1 Subatomic Particles

Name	Symbol	Electric Charge	Location in the Atom	Relative Mass
Proton	p	1+	Nucleus	1836
Neutron	n	0	Nucleus	1837
Electron	e	1−	Surrounding the nucleus	1

The _____ is at the centre of an atom. The nucleus is

composed of _____ and _____.

Electrons exist in the _____surrounding the_____.

# of protons = # of electrons in every _____

_____ charge = charge on the nucleus = # of protons

Atomic number = # of _____= # of _____

In the periodic table elements are listed in order by their

_____.

_____ are on the left (the transition metals range from

group 3 to group 12), _____ are on the right, and the

_____ form a “staircase” toward the right side.

Rows of elements (across) are called _____. All elements

in a _____have their electrons in the same general area around their nucleus.

Columns of elements are called_____, or_____.

All elements in a _____have similar properties and bond with other elements in similar ways.

- Group 1 = _____
- Group 2 = _____
- Group 17 = _____
- Group 18 = _____

Atoms gain and lose electrons to form _____. The atoms become electrically charged particles called_____.

Metals _____ electrons and become positive ions (_____).

Some metals (_____) lose electrons in different ways.

For example, _____

Non-metals _____ electrons and become negative ions (_____)

Atoms gain and lose electrons in an attempt to have the same number of _____ _____ (electrons farthest from the nucleus) as the nearest _____ in the periodic table.

_____ diagrams show how many electrons appear in each electron shell around an atom. Electrons in the outermost shell are called_____.

Think of the shells as being 3-D like spheres, not 2-D like circles.

(example Sodium)

Electrons appear in shells in a very predictable manner. There is a maximum of ____ electrons in the first shell, _____ in the 2nd shell, and _____ in the 3rd shell.

The _____ number = the number of shells in the atom. Except for the transition elements, the last digit of the

_____ number = the number of electrons in the valence shell.

When two atoms get close together, their valence electrons interact. If the valence electrons can combine to form a low-

energy bond, a _____ is formed.

Each atom in the compound attempts to have the _____ number of valence electrons as the nearest noble gas.

_____ may lose electrons and _____ may gain

electrons (_____bond), or atoms may _____

electrons (_____bond).

_____ bonds form when electrons are transferred from

positive ions to negative ions. _____ bonds form when electrons are shared between two non-metals.

Electrons _____ with their atom but _____with other shells.

Ionic bonds are formed between positive ions and negative ions.

Generally, this is a _____ (+) and a _____ (-) ion.

For example, _____ and _____form an ionic

bond in the compound _____

_____ diagrams illustrate chemical bonding by showing

only an atom's _____electrons and the chemical symbol.

_____ representing electrons are placed around the element symbols at the points of the compass (north, east, south, and west). Electron dots are placed singly until the fifth electron is reached then they are paired.

Lewis diagrams can be used to represent _____and _____ bonds.

For _____ ions, one electron dot is removed from the valence shell for each positive charge.

For _____ ions, one electron dot is added to each valence shell for each negative charge.

Square _____ are placed around each ion to indicate transfer of electrons.

Lewis diagrams can also represent _____ bonds. Like Bohr diagrams, valence electrons are drawn to show sharing of electrons.

The shared pairs of electrons are usually drawn as a_____.

Diatomic molecules, like_____, are also easy to draw as Lewis diagrams.