Name: Key
Blk:____Date:

Chemistry 11
CORE NOTATION

An electron configuration belonging to an atom can be divided into two subsets:

1. The CORE electrons
2. The OUTTER electrons

The CORE of an atom is the set of electrons with the configuration of the nearest noble gas (He, Ne, Ar, Kr, Xe) that has an atomic number LESS than that of the atom being considered.

The OUTER consist of all electrons outside the core ...these are the electrons that participate in chemical reactions.

Electron configuration:
Al ($1s^2 2s^2 2p^6 3s^2 3p^1$)
Al ([Ne] $3s^2 3p^1$)

Core Notation:
Al ([Ne] $3s^2 3p^1$)

Writing a Core Notation:

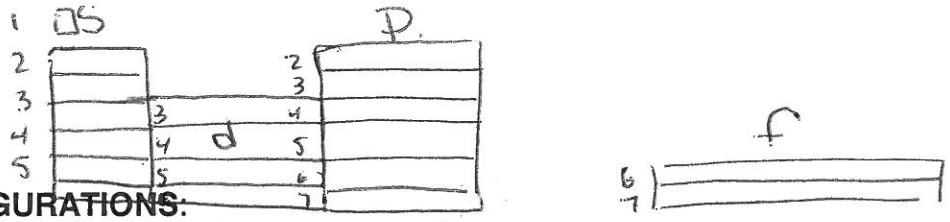
1. Write the elemental symbol followed by an open bracket
2. Look on the periodic table for the Nobel gas in the row above the atom of concern
3. Using Square brackets write the symbol of that Nobel gas (core)
4. Finish off the remainder of the configuration followed by a closed bracket

Electron Configuration	Core Notation
S ($1s^2 2s^2 2p^6 3s^2 3p^4$)	S ([Ne] $3s^2 3p^4$
Rb ($1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$)	Rb ([Kr] $5s^1$)
Kr ($1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$)	Kr ([Ar] $4s^2 3d^{10} 4p^6$)
Ru ($1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^6$)	Ru ([Kr] $5s^2 4d^6$)

IMPORTANT:
When asked to write a CORE NOTATION for a NOBLE GAS (as shown above, for Kr) you must always:

1. Write the core for the PREVIOUS nobel gas
2. Finish off with the left overs. !!!!

Now re-write all of yesterday's examples (a – o) in CORE NOTATION



ION CONFIGURATIONS:

Negative Ions: electrons are GAINED.
∴ add electrons to the last unfilled subshell of the neutral electron configuration

Ex: O^{2-} ?→ O ([He]$2s^2\ 2p^4$) + 2 é → O^{2-}([He]$2s^2\ 2p^6$)

P^{3-} ? → P([Ne]$3s^2\ 3p^3$) + 3e → P^{3-}([Ne]$3s^2\ 3p^6$)

Positive Ions: electrons are LOST.

1. Electrons with the largest n-value are removed first
2. if there are electrons in both the s- and p- orbitals the electrons in the p are removed first:

p- electrons before **s-electrons** before **d-electrons**

Ex: Sn^{2+} → Sn ([Kr] $5s^2\ 4d^{10}\ 5p^2$) – 2 é → Sn^{2+} ([Kr] $5s^2\ 4d^{10}$)

V^{2+} → V ([Ar] $4s^2\ 3d^3$) – 2 é → V^{2+} ([Ar] $3d^3$)

Sr^{2+} → Sr([Kr]$5s^2$) - 2e → Sr^{2+}([Ar]$4s^2\ 3d^{10}\ 4p^6$)

Write the ION CONFIGURATIONS for the following, using CORE NOTAION:

IMPT!

a. H^{1-} → H($1s^1$) + 1e → H^{1-}($1s^2$)
b. Sr^{2+} → Sr([Kr]$5s^2$) - 2e → Sr
c. Br^{1-}
d. N^{3+}
e. Ti^{2+}
f. N^{2-}
g. Mn^{2+}
h. Ge^{4+}
i. Fe^{3+}
j. Ge^{2+}
k. Ru^{3+}
l. Sb^{3+}

Valence Electrons: are the outer electrons that participate in the chemical reactions. They are classified as any electron that is not:

a. in the core
b. in a filled d, f or p subshell + sometimes "s" (if paired with a full "p" orbital)

S ([Ne] $3s^2\ 3p^4$) → has 6 valence electrons
Rb ([Kr] $4s^2\ 3d^{10}\ 4p^6\ 5s^1$) → has 1 valence electrons
Kr ([Ar] $4s^2\ 3d^{10}\ 4p^6$) → has Ø valence electrons
Ru ([Kr] $5s^2\ 4d^6$) → has 8 valence electrons

How man valence electrons do the following contain?

a. O = 6
b. P = 5
c. V = 5
d. Ca = 2
e. Xe = 0
f. Hg = 2
h. Cl^{1-} = 0
i. I^{5+} = 2
j. Xe^{2+} = 6
k. Zn^{2+} = 0
l. Ge^{4+} = 0
m. Tc^{4+} = 3