Unit 4: The Periodic Table and Periodicity Name: _____

The Elements

Element names come from a variety of sources.

elements known to the ancients… Au, Ag, S, Sn, C

place names… Fr, Po, Ge, Ga, In, Eu, Am, Cf, Sc

famous people… Es, Fm, Md, No, Gd, Rf, Bh

foreign languages… W, Fe, Au, Ag, Pb, Sn, K

mythology-related names… Th, Pm, Ce, Ta, Ti, Pd, Ir

names related to element properties… Xe

Background on the Periodic Table

Dmitri Mendeleev: given credit for Periodic Table (~1870)

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Henry Moseley: put elements in order of increasing atomic number

Describing the Periodic Table

periodic law: the properties of elements repeat every so often

period:

group (family):

Regions of the Table

metals: left side of Table; form cations

properties:

nonmetals: right side of Table; form anions

properties:

metalloids (semimetals): "stair" between metals and nonmetals

properties:

Si and Ge →

alkali metals:

alkaline earth metals:

halogens:

noble gases:

lanthanides:

actinides:

coinage metals:

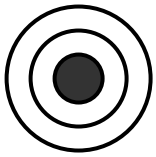
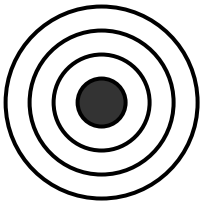
transition elements:

main block (representative) elements:

Same number of valence e^- =

Li Na

In any group, the element BELOW has one more occupied energy level than does the element ABOVE.

Li  Na 

The period that an element is in is the same as the energy level that its valence electrons are in.

Li → Na →

Periodicity → there are trends in properties of elements

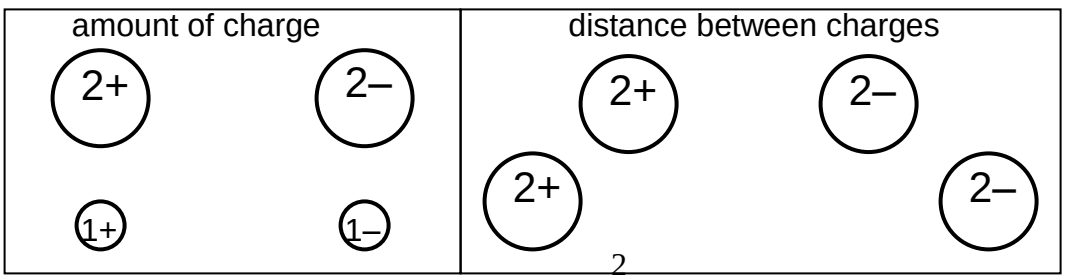
-- left-right AND up-down trends

atomic radius:

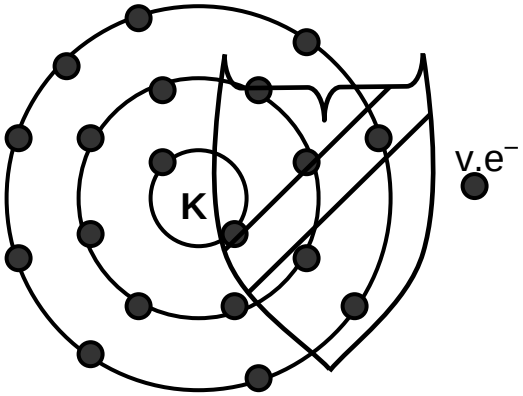
…

…

coulombic attraction: attraction between (+) and (–); depends on…



shielding effect: kernel e^- "shield" valence e^- from attractive force of the nucleus



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As we go ↓ , shielding effect…

ionic radius:

cations		anions	
Ca atom	Ca^{2+} ion	Cl atom	Cl^{1-} ion

ionization energy: the energy required to remove an e^- from an atom

$M + 1^{st}$ I.E. →

$M^{1+} + 2^{nd}$ I.E. →

$M^{2+} + 3^{rd}$ I.E. →

As we go ↓, 1^{st} I.E.…. As we go →, 1^{st} I.E….

electronegativity:

Linus Pauling quantified the electronegativity scale.

As we go ↓, electronegativity…

As we go →, electronegativity…