Periodic Trends

city street home address

ion <u>increaing</u> size
anion cation

ionization increasing endothermic energy
(making cationic plasmas in the gas phase)
1X atom (g) + energy -------> 1cation (g) + 1 electron (g)

atom <u>increaing</u> size

electron affinity increasing exothermic energy
(making anionic plasmas in the gas phase)
1X atom (g) + 1 electron -------> 1 anion (g) + energy

metals (lasso in your metals**)**

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca		Ge	As	Se	Br	Kr
Rb	Sr		Sn	Sb	Te	I	Xe
Cs	Ba		Pb		Po	At	Rn
Fr	Ra						

nonmetals (lasso in your nonmetals**)**

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca		Ge	As	Se	Br	Kr
Rb	Sr		Sn	Sb	Te	I	Xe
Cs	Ba		Pb		Po	At	Rn
Fr	Ra						

electronegavtivity (making chemical bonds)

F O N Cl Br I S C H

covalent (only nonmetals)

ionic salt (cations and anions)

acids increasing acid strength

CH_4 NH_3 H_2O HF

HCl

HBr

HI

ICAO

ionic (give examples**)**	**covalent (**give examples**)**	**acid (**give examples**)**	**organic (**give examples**)**

Periodic Trends increasing trends

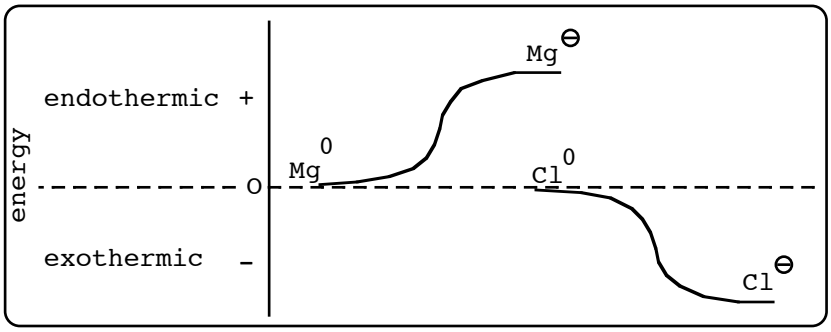
atomic size ↓ | electronegativity, EN ↗ | ionization energy ↗ | acidity ↓

Electron Affinity (EA)

$$1X_{(g)} + 1\ominus \rightarrow 1X^{-}_{(g)} + \text{energy released}$$

Electron affinity is the amount of energy released when an electron is accepted by an atom in the gaseous state

- EA measures the tendency to gain or retain electrons
- EA for nonmetals are generally negative in numerical value
- EA for metals are generally more positive in numerical value



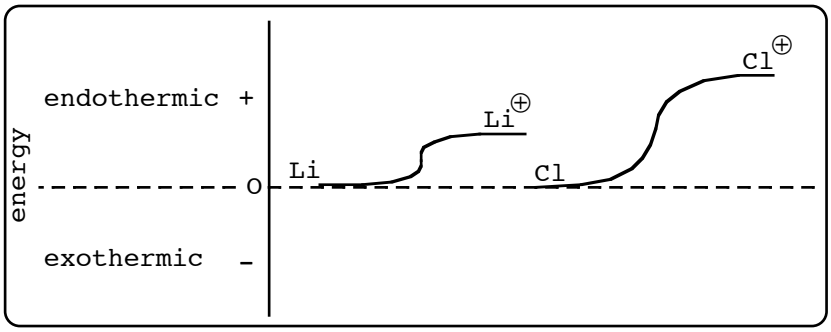
$$1X_{(g)} + 1\ominus \rightarrow 1X^{-}_{(g)} + \text{energy released exothermic}$$

Ionization Energy (IE)

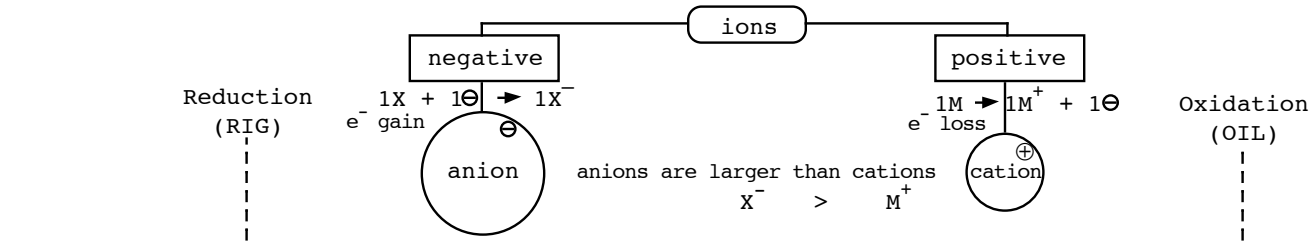
$$\text{energy absorbed} + 1X_{(g)} \rightarrow 1X^{+}_{(g)} + 1\ominus$$

Ionization energy is the energy required (absorbed) to remove an electron from an atom in the gaseous state

- IE energies are always postive in numerical value
- the smaller the IE, the more easily an electron can be removed
- IE is a measure of how strongly the electrons are held by the nucleus
- direction of increasing IE ↑
- francium has the lowest IE
- He has the highest IE



$$\text{energy absorbed endothermic} + 1X_{(g)} \rightarrow 1X^{\oplus}_{(g)} + 1\ominus$$



HOT gaseous ions
(making plasmas)

Electron Affinity (EA)

$1X_{(g)} + 1\ominus \rightarrow 1X^{\ominus}_{(g)}$ + energy released

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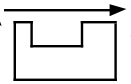
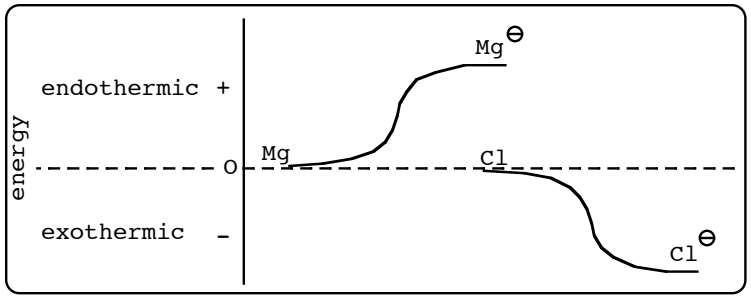


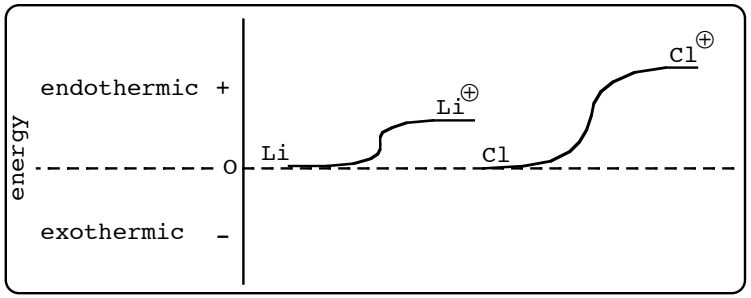
- He has the highest IE

energy released in a chemical process is exothermic energy (negative in numerical value)

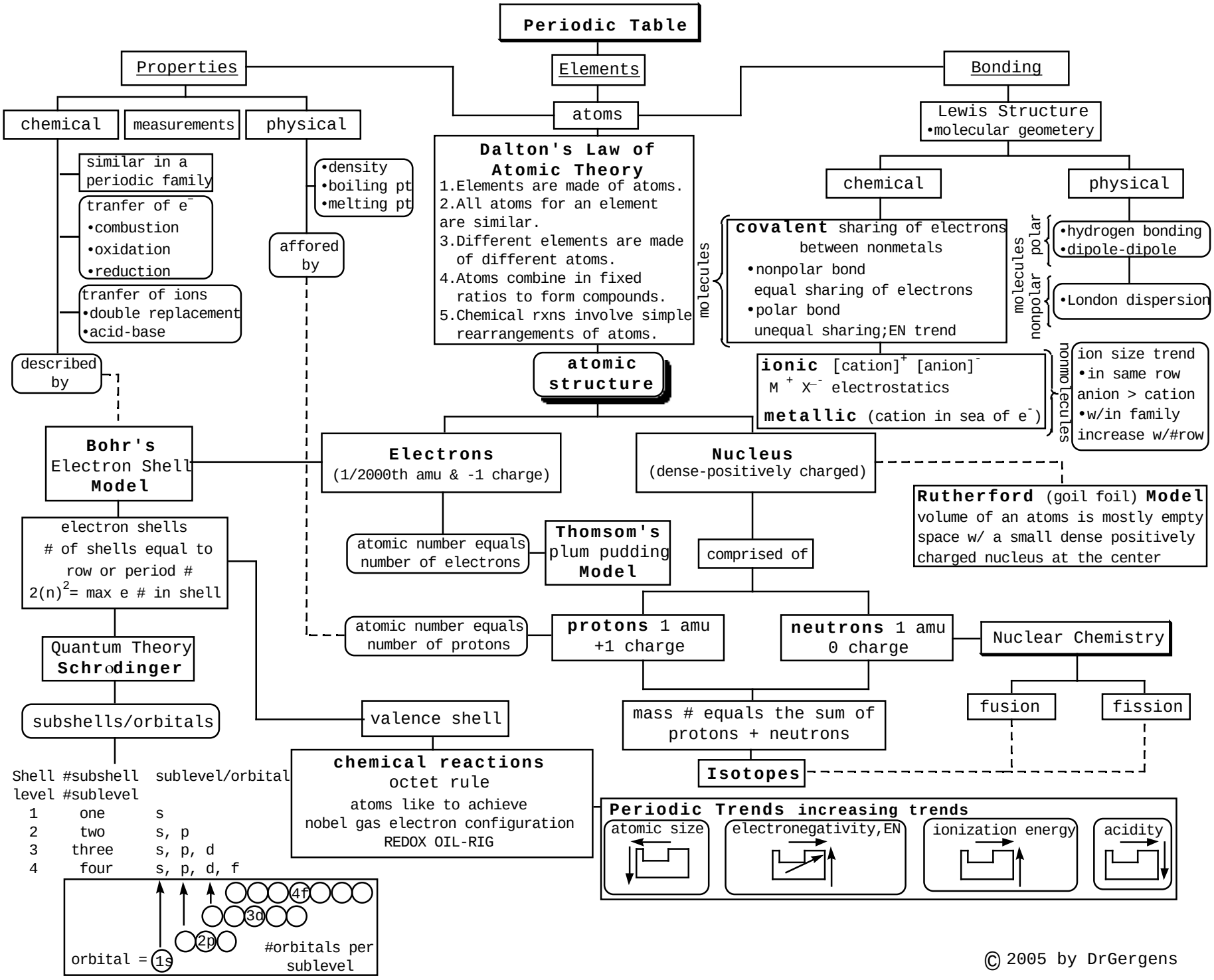
energy absorbed in a chemical process is endothermic energy (positive in numerical value)



$1X_{(g)} + 1\ominus \rightarrow 1X^{\ominus}_{(g)}$ + energy released exothermic



energy absorbed endothermic + $1X_{(g)} \rightarrow 1X^{\oplus}_{(g)} + 1\ominus$


Periodic Table
Properties
Elements
Bonding
chemical
measurements
physical
atoms
Lewis Structure
•molecular geometery
similar in a periodic family
tranfer of e⁻
•combustion
•oxidation
•reduction
tranfer of ions
•double replacement
•acid-base
•density
•boiling pt
•melting pt
affored by
described by
Dalton's Law of Atomic Theory
1.Elements are made of atoms.
2.All atoms for an element are similar.
3.Different elements are made of different atoms.
4.Atoms combine in fixed ratios to form compounds.
5.Chemical rxns involve simple rearrangements of atoms.
chemical
physical
molecules
covalent sharing of electrons between nonmetals
•nonpolar bond
equal sharing of electrons
•polar bond
unequal sharing;EN trend
molecules polar
molecules nonpolar
•hydrogen bonding
•dipole-dipole
•London dispersion
ionic [cation]+ [anion]-
M + X- electrostatics
metallic (cation in sea of e-)
nonmolecules
ion size trend
•in same row
anion > cation
•w/in family
increase w/#row
atomic structure
Bohr's Electron Shell Model
Electrons
(1/2000th amu & -1 charge)
Nucleus
(dense-positively charged)
Rutherford (goil foil) Model
volume of an atoms is mostly empty space w/ a small dense positively charged nucleus at the center
electron shells
# of shells equal to row or period #
2(n)2= max e # in shell
atomic number equals number of electrons
Thomsom's plum pudding Model
comprised of
Quantum Theory Schrodinger
atomic number equals number of protons
protons 1 amu
+1 charge
neutrons 1 amu
0 charge
Nuclear Chemistry
subshells/orbitals
valence shell
mass # equals the sum of protons + neutrons
fusion
fission
Isotopes
chemical reactions
octet rule
atoms like to achieve nobel gas electron configuration
REDOX OIL-RIG
Shell level #subshell #sublevel sublevel/orbital
1 one s
2 two s, p
3 three s, p, d
4 four s, p, d, f
Periodic Trends increasing trends
atomic size
electronegativity,EN
ionization energy
acidity
orbital =
1s
2p
3d
4f
#orbitals per sublevel
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