

Increasing atomic radius Decreasing Ionization Energy Decreasing Electron Affinity	Common Polyatomic Ions									
	ammonium	NH ₄ ⁺¹	perchlorate	ClO ₄ ⁻¹	hydrogen sulfate	HSO ₄ ⁻¹	sulfate	SO ₄ ⁻²	oxalate	C ₂ O ₄ ⁻²
	hydronium	H ₃ O ⁺¹	chlorate	ClO ₃ ⁻¹			sulfite	SO ₃ ⁻²	silicate	SiO ₃ ⁻²
	acetate	C ₂ H ₃ O ₂ ⁻¹	chlorite	ClO ₂ ⁻¹	permanganate	MnO ₄ ⁻¹	phthalate	C ₈ H ₄ O ₄ ⁻²	peroxide	O ₂ ⁻²
		CH ₃ COO ⁻¹	hypochlorite	ClO ⁻¹	periodate	IO ₄ ⁻¹	chromate	CrO ₄ ⁻²	tetraborate	B ₄ O ₇ ⁻²
	hydroxide	OH ⁻¹	nitrate	NO ₃ ⁻¹	hydrogen carbonate	HCO ₃ ⁻¹	dichromate	Cr ₂ O ₇ ⁻²	borate	BO ₃ ⁻³
	cyanide	CN ⁻¹	nitrite	NO ₂ ⁻¹			carbonate	CO ₃ ⁻²	arsenate	AsO ₄ ⁻³
	cyanate	OCN ⁻¹	bromate	BrO ₃ ⁻¹	dihydrogen phosphate	H ₂ PO ₄ ⁻¹	hydrogen phosphate	HPO ₄ ⁻²	phosphate	PO ₄ ⁻³
	thiocyanate	SCN ⁻¹	iodate	IO ₃ ⁻¹					orthosilicate	SiO ₄ ⁻⁴

Strong Acids
HCl: Hydrochloric
HBr: Hydrobromic acid
HI: Hydroiodic acid
H ₂ SO ₄ : Sulfuric acid
HNO ₃ : Nitric acid
HClO ₄ : Perchloric acid

Select Physical Constants

R: 8.314 J/mol K
8.314 L kPa/mol K
.082 L atm/mol K
h: 6.626×10^{-34} J s
c: 2.998×10^8 m/s
e- charge: -1.6×10^{-19} C
e- mass: 9.11×10^{-28} g
p+ mass: 1.67×10^{-24} g
n mass: 1.67×10^{-24} g

Select Weak Acids
HC ₂ H ₃ O ₂ : Acetic acid
H ₂ CO ₃ : Carbonic acid
H ₃ PO ₄ : Phosphoric acid
H ₂ C ₂ O ₄ : Oxalic acid

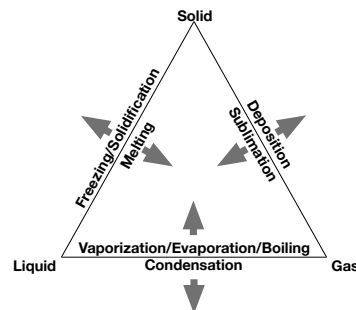
Activity Series

Lithium
Potassium
Barium
Calcium
Sodium
Magnesium
Aluminum
Manganese
Zinc
Chromium
Iron
Cobalt
Nickel
Tin
Lead
Hydrogen
Copper
Mercury
Silver
Platinum
Gold

of particles
6.02x10 ²³ moles

of grams
molar mass moles

Liters at STP
22.4 L moles



Important Equations

$\Delta G = \Delta H - T\Delta S$
 $\Delta G > 0$ non spont.
 $\Delta G < 0$ spont.
 $\Delta G = 0$ equilibrium
 $Q = mC\Delta T$

$pH = -\log [H^+]$
 $pOH = -\log [OH^-]$
 $pH + pOH = 14$
 $M_1V_1 = M_2V_2$
 $\Delta T_f = k_f m \text{ #particles}$
 $\Delta T_b = k_b m \text{ #particles}$

moles
M L

moles
m Kg

STP:

0 °C = 273K
1atm = 101.3 kPa
760 mm Hg
14.7 psi
760 torr

Solubility Rules

- Salts of ammonium and Group 1A are always soluble.
- All halogen salts are soluble except with Ag, Hg, and Pb. F⁻ is insoluble with Group 2A.
- Chlorates, perchlorates, nitrates, and acetates are soluble.
- Sulfates are soluble except with Ca, Sr, Ba, Hg, Pb²⁺, and Ag.
- Phosphates, oxalates, hydroxides, chromates, dichromates, sulfides, oxides, and carbonates are insoluble except with ammonium and Group 1A.
- Strong acids and bases are soluble.

Conversions

1 in = 2.54 cm
1 lb = 454 g
1 qt = .9463 L
1 km = .6214 mi
1 cal = 4.184 J

TRUCKS 1-10:

Rule #1 What you put in...you must get out.
Rule #2 What's the name of the game... How stable can you get.
Rule #2a What's the name of the game for energy... How low can you go.
Rule #2b What's the name of the game for entropy... Anarchy Now!
Rule #3 It's all about the electrons.
Rule #4 Once you get to moles you can go anywhere.
Rule #5 More collisions means a faster reaction, as long as they have the correct orientation and energy.
Rule #6 Pressure can be doubled three ways. Doubling the amount of gas, halving the volume, and doubling the temperature.
Rule #7 It's all about the protons, for Bronsted and Lowry, but for Lewis it's still all about the electrons.
Rule #8 If there is a temperature change, use the "Q" equation. If there is no temperature change, use stoichiometry.
Rule #9 Heat flows from hot objects to less hot objects. The hot object cools and the cold object warms. No temperature difference means no heat flow

Strong Bases	
LiOH	In conc. less than .01
NaOH	
KOH	Ca(OH) ₂
RbOH	Ba(OH) ₂
CsOH	Sr(OH) ₂

Water Constants

C (gas)= 2.02 J/g °C
C (liquid)= 4.18 J/g °C
C (solid)= 2.06 J/g °C
 $k_f = 1.86 \text{ } ^\circ\text{C}/m$
 $k_b = 0.51 \text{ } ^\circ\text{C}/m$
 $\Delta H_{fus} = 6.01 \text{ KJ/mol}$
 $\Delta H_{vap} = 40.7 \text{ KJ/mol}$

Common Organics
methane: CH ₄
ethane: C ₂ H ₆
propane: C ₃ H ₈
methanol: CH ₃ OH
ethanol: CH ₃ CH ₂ OH
acetic acid: CH ₃ COOH
benzene: C ₆ H ₆