Table 1: constants, equations and conversion factors

Avogadro's number	$6.022 \times 10^{23}\ mol^{-1}$
Atomic mass constant	$1\ amu = 1.660538 \times 10^{-27}\ kg$
Molar gas constant	$0.08205746\ L\ atm\ K^{-1}\ mole^{-1}$ $8.314\ J\ mol^{-1}\ K^{-1}$
Specific heat capacity of water	$C = 4.18\ kJ\ kg^{-1}\ °C^{-1}$
Pressure	760 mm Hg = 760 torr = 1 atm = 101,325 Pa
Speed of light in a vacuum	$c = 3.00 \times 10^{8}\ m\ s^{-1}$
Room Temperature	23 °C
Standard Temp and Pressure (gas law problems)	0 °C and 1 atm
Boltzmann Distribution Constant	$1.38 \times 10^{-23}\ J/K$
Faraday's constant	96,485 C/mol of electrons
Pressure conversions factors	1 atm = 760 torr = 760 mm Hg = 101,326 Pa =14.696 psi
Joule	$kg\ m^2\ s^{-2}$
Energy conversion	1 Cal (kcal) =1000 cal = 4184 J
	1 volt = $1\ J\ °C^{-1}$

Redox Rules (in order: if two conflict then go with the top rule)

1. An atom in its elemental form Ox#=0
2. A monoatomic ion Ox#=charge on ion
3. Sum of the oxidation numbers for a molecule is equal to the charge on that molecule or polyatomic ion
4. When in compounds, metals have a positive oxidation state
   a) Grp 1A Ox # +1
   b) Grp 2A Ox # +2
5. Nonmetals
   a) Fluorine -1
   b) Hydrogen +1
   c) Oxygen -2
   d) Group 7A -1
   e) Group 6A -2
   f) Group 5A - 3

Table 2: solubility of ionic compounds

Compounds Containing the Following Ions Are Generally Soluble	Exceptions
Li^+, Na^+, K^+, and NH_4^+	None
NO_3^- and $C_2H_3O_2^-$	None
Cl^-, Br^-, and I^-	When these ions pair with Ag^+, Hg_2^{2+}, or Pb^{2+}, the resulting compounds are insoluble.
SO_4^{2-}	When SO_4^{2-} pairs with Sr^{2+}, Ba^{2+}, Pb^{2+}, Ag^+, or Ca^{2+}, the resulting compound is insoluble.
Compounds Containing the Following Ions Are Generally Insoluble	**Exceptions**
OH^- and S^{2-}	When these ions pair with Li^+, Na^+, K^+, or NH_4^+, the resulting compounds are soluble.
	When S^{2-} pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the resulting compound is soluble.
	When OH^- pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the resulting compound is slightly soluble.
CO_3^{2-} and PO_4^{3-}	When these ions pair with Li^+, Na^+, K^+, or NH_4^+, the resulting compounds are soluble.

Table 3: metric system

10^n	Prefix	Symbol
10^{24}	yotta-	Y
10^{21}	zetta-	Z
10^{18}	exa-	E
10^{15}	peta-	P
10^{12}	tera-	T
10^{9}	giga-	G
10^{6}	mega-	M
10^{3}	kilo-	k
10^{2}	hecto-	h
10^{1}	deca-	da
10^{0}	*(none)*	*(none)*
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli-	m
10^{-6}	micro-	μ
10^{-9}	nano-	n
10^{-12}	pico-	p
10^{-15}	femto-	f
10^{-18}	atto-	a
10^{-21}	zepto-	z
10^{-24}	yocto-	y

Table 4: Common polyatomic ions

ion	name	ion	name
NH_4^+	ammonium	CO_3^{2-}	carbonate
NO_2^-	nitrite	HCO_3^-	hydrogen carbonate
NO_3^-	nitrate	ClO^-	hypochlorite
SO_3^{2-}	sulfite	ClO_2^-	chlorite
SO_4^{2-}	sulfate	ClO_3^-	chlorate
HSO_4^-	hydrogen sulfate	ClO_4^-	perchlorate
OH^-	hydroxide	$C_2H_3O_2^-$	acetate
CN^-	cyanide	MnO_4^-	permanganate
PO_4^{3-}	phosphate	$Cr_2O_7^{2-}$	dichromate
HPO_4^{2-}	hydrogen phosphate	CrO_4^{2-}	chromate
$H_2PO_4^-$	dihydrogen phosphate	O_2^{2-}	peroxide

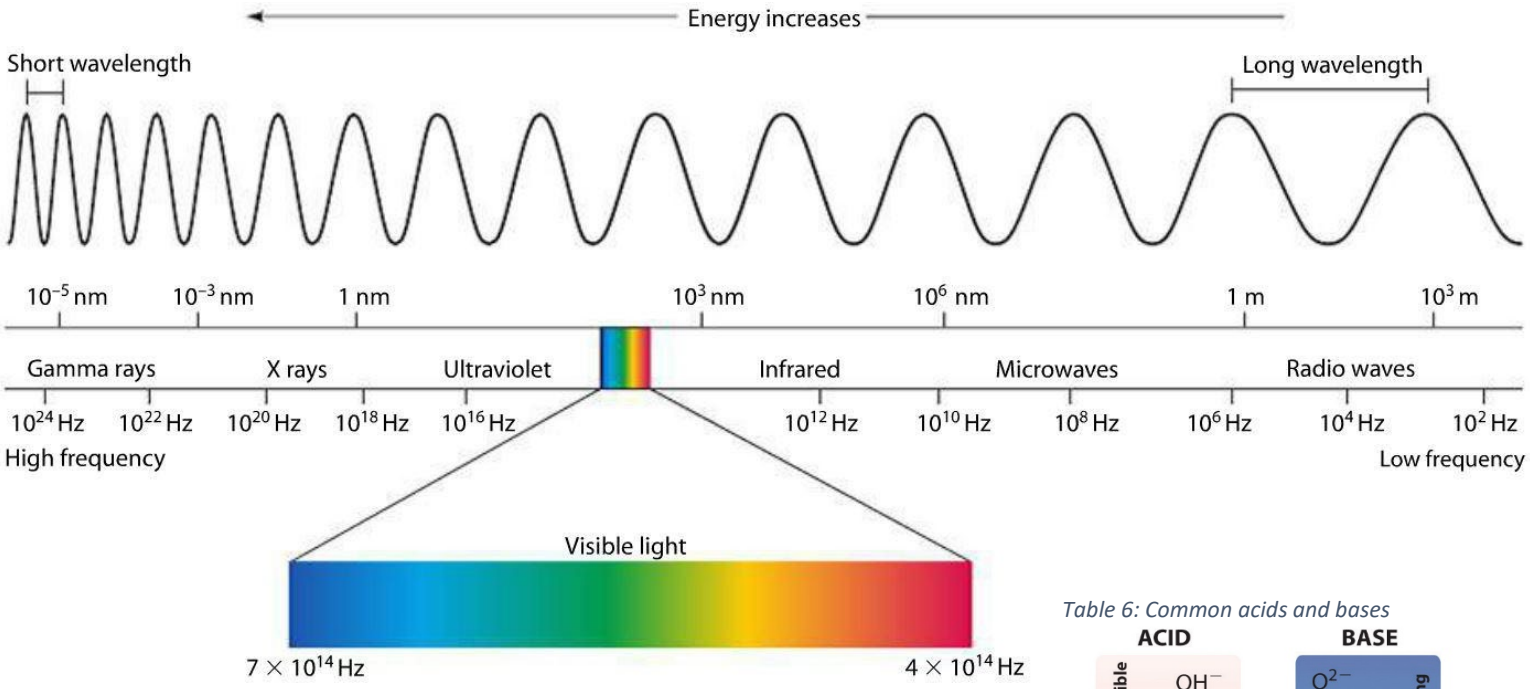
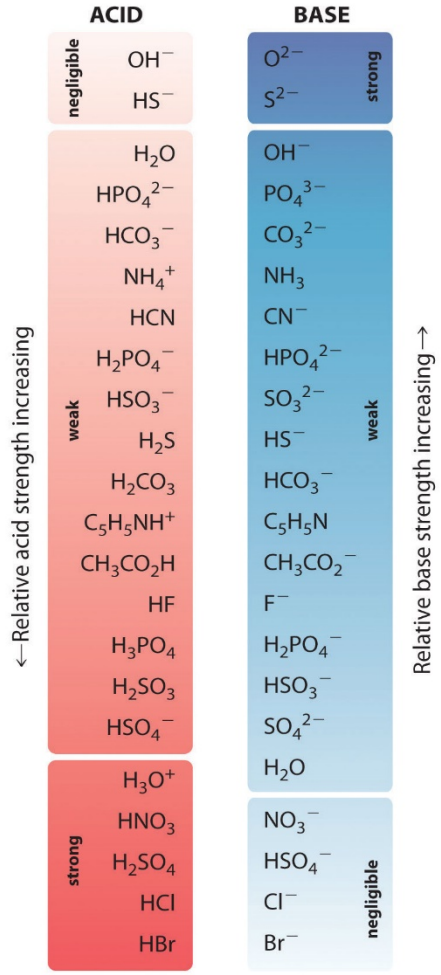


Figure 1: The Electromagnetic Spectrum

Table 5: Selected Tabulated Half Cell Potentials at 25 C in water

Reduction half reaction	E° (V)
$Br_2(l) + 2\ e^- \rightarrow 2\ Br^-(aq)$	+ 1.09
$O_2\ (g) + 2H^+\ (aq) + 2\ e^- \rightarrow H_2O_2\ (aq)$	+ 0.70
$I_2(s) + 2\ e^- \rightarrow 2\ I^-(aq)$	+0.54
$Fe^{3+}\ (aq) + 3e^- \rightarrow Fe\ (s)$	-0.036
$2H^+\ (aq) + 2\ e^- \rightarrow H_2\ (g)$	0
$Al^{3+} + 3e^- \rightarrow Al$	-1.66
$Mg^{2+} + 2e^- \rightarrow Mg\ (s)$	-2.37
$Na^+(aq) + e^- \rightarrow Na(s)$	-2.71
$K^+(aq) + e^- \rightarrow K(s)$	-2.93
$Li^+(aq) + e^- \rightarrow Li\ (s)$	-3.04

Table 6: Common acids and bases



Handy Equations:

$t_{1/2} = \frac{[A]_0}{2k}$ $\quad [A]_t = -kt + [A]_0$

$t_{1/2} = \frac{0.693}{k}$ $\quad \ln[A]_t = -kt + \ln[A]_0$

$t_{1/2} = \frac{1}{k[A]_0}$ $\quad \frac{1}{[A]_t} = kt + \frac{1}{[A]_0}$

$$\ln k = -\frac{E_a}{R}\left(\frac{1}{T}\right) + \ln A$$

$$\Delta E = R_H \frac{1}{n_i^2} - \frac{1}{n_f^2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$K_p = K_c(RT)^{\Delta n}$

$E^o_{reduction} = - E^o_{oxidation}$

$\Delta G^o = -nF\ E^o_{cell}$

$\Delta G^o = -RT \ln K$

$E^o_{cell} = (0.0592\ V/n) \log K$

$E_{cell} = E^o_{cell} - (0.0592\ V/n) \log Q$