



Skyline High School Reference Tables for Chemistry

Physical Constants and Conversions Factors

Name	Symbol	Value(s)	Units
Angstrom unit	Å	1×10^{-10} m	meter
Avogadro number	N_A	6.02214×10^{23} per mol	
Charge of electron	e	1.60×10^{-19} C	coulomb
Electron volt	eV	1.60×10^{-19} J	joule
Speed of light	c	3.00×10^8 m/s	meters/second
Planck's constant	h	6.63×10^{-34} J·s	joule-second
Universal gas constant	R	1.58×10^{-37} kcal·s	kilocalorie-second
		0.08206 atm·L/mol·K	atm·liter/mol·K
		1.98 cal/mol·K	cal/mol·K
		8.314 kPa·Liters/mol·K	kPa·Liters/mol·K
		62.36 torr·L/mol·K	torr·Liters/mol·K
Atomic mass unit	μ (amu)	1.66×10^{-24} g	gram
Volume standard, liter	L	1×10^3 cm ³ = 1 dm ³	cm ³ and dm ³
Standard pressure, 1 Atmosphere	atm	101.3 kPa 760 mm Hg or 760 torr	kiloPascals mm of Hg or torr
Heat equivalent, kilcal	kcal	4.18×10^3 J	joules

Physical Constants for water

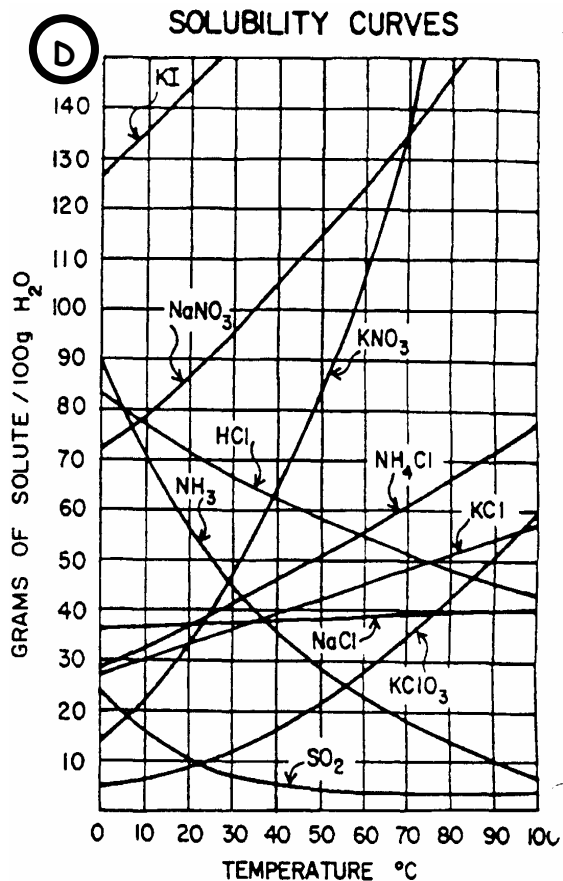
Molal freezing point depression.....	1.86°C/m
Molal boiling point elevation.....	0.52°C/m
Specific heat capacity of H ₂ O(l).....	1.000 cal/g°C..... 4.186 j/g°C
Specific heat capacity of H ₂ O(g).....	0.480 cal/g°C..... 2.010 j/g°C
Specific heat capacity of H ₂ O(s).....	0.502 cal/g°C..... 2.100 j/g°C
Heat of fusion.....	79.72 cal/g..... 333.5 j/g
Heat of vaporization.....	539.4 cal/g..... 2257 j/g

Standard Units

Symbol	Name	Quantity	Factor	Prefix	Symbol
m	meter	length	10^9	giga	G
kg	kilogram	mass	10^6	mega	M
Pa	pascal	pressure	10^3	kilo	k
K	kelvin	absolute temperature	10^{-1}	deci	d
mol	mole	amount of substance	10^{-2}	centi	c
J	joule	energy, work, quantity of heat	10^{-3}	milli	m
			10^{-6}	micro	μ
s	second	time	10^{-9}	nano	n
C	coulomb	quantity of electrical charge			
V	volt	electric potential potential difference			
L	liter	volume			

Names of the First 103 Elements

Element	Symbol	Atomic Number	Element	Symbol	Atomic Number
actinium	Ac	89	mercury	Hg	80
aluminum	Al	13	molybdenum	Mo	42
americium	Am	95	neodymium	Nd	60
antimony	Sb	51	neon	Ne	10
argon	Ar	18	neptunium	Np	93
arsenic	As	33	nickel	Ni	28
astatine	At	85	niobium	Nb	41
barium	Ba	56	nitrogen	N	7
berkelium	Bk	97	nobelium	No	102
beryllium	Be	4	osmium	Os	76
bismuth	Bi	83	oxygen	O	8
boron	B	5	palladium	Pd	46
bromine	Br	35	phosphorus	P	15
cadmium	Cd	48	platinum	Pt	78
cesium	Cs	55	plutonium	Pu	94
calcium	Ca	20	polonium	Po	84
californium	Cf	98	potassium	K	19
carbon	C	6	praseodymium	Pr	59
cerium	Ce	58	promethium	Pm	61
chlorine	Cl	17	protactinium	Pa	91
chromium	Cr	24	radium	Ra	88
cobalt	Co	27	radon	Rn	86
copper	Cu	29	rhenium	Re	75
curium	Cm	96	rhodium	Rh	45
darmstadtium	Ds	110	roentgenium	Rg	111
dysprosium	Dy	66	rubidium	Rb	37
einsteinium	Es	99	ruthenium	Ru	44
erbium	Er	68	samarium	Sm	62
europium	Eu	63	scandium	Sc	21
fermium	Fm	100	selenium	Se	34
fluorine	F	9	silicon	Si	14
francium	Fr	87	silver	Ag	47
gadolinium	Gd	64	sodium	Na	11
gallium	Ga	31	strontium	Sr	38
germanium	Ge	32	sulfur	S	16
gold	Au	79	tantalum	Ta	73
hafnium	Hf	72	technetium	Tc	43
helium	He	2	tellurium	Te	52
holmium	Ho	67	terbium	Tb	65
hydrogen	H	1	thallium	Tl	81
indium	In	49	thorium	Th	90
iodine	I	53	thulium	Tm	69
iridium	Ir	77	tin	Sn	50
iron	Fe	26	titanium	Ti	22
krypton	Kr	36	tungsten	W	74
lanthanum	La	57	uranium	U	92
lawrencium	Lr	103	vanadium	V	23
lead	Pb	82	xenon	Xe	54
lithium	Li	3	ytterbium	Yb	70
lutetium	Lu	71	yttrium	Y	39
magnesium	Mg	12	zinc	Zn	30
manganese	Mn	25	zirconium	Zr	40
mendelevium	Md	101			



E

Table of Solubilities in Water

	acetate	bromide	carbonate	chloride	chromate	hydroxide	iodide	nitrate	phosphate	sulfate	sulfide
i - nearly insoluble											
ss - slightly soluble											
s - soluble											
d - decomposes											
n - not isolated											
Aluminum	ss	s	n	s	n	i	s	s	i	s	d
Ammonium	s	s	s	s	s	s	s	s	s	s	s
Barium	s	s	i	s	i	s	s	s	i	i	s
Calcium	s	s	i	s	s	ss	s	s	i	ss	d
Copper (II)	s	s	i	s	i	i	n	s	i	s	i
Iron (II)	s	s	i	s	n	i	s	s	i	s	i
Iron (III)	s	s	n	s	i	i	n	s	i	ss	d
Lead	s	ss	i	ss	i	i	ss	s	i	i	i
Magnesium	s	s	i	s	s	i	s	s	i	s	d
Mercury (I)	ss	i	i	i	ss	n	i	s	i	ss	i
Mercury (II)	s	ss	i	s	ss	i	i	s	i	d	i
Potassium	s	s	s	s	s	s	s	s	s	s	s
Silver	ss	i	i	i	ss	n	i	s	i	ss	i
Sodium	s	s	s	s	s	s	s	s	s	s	s
Zinc	s	s	i	s	s	i	s	s	i	s	i

M

Solubility Products

Compound	K _{sp}
AgBr	5.0×10^{-13}
AgCl	1.8×10^{-10}
Ag ₂ CrO ₄	1.1×10^{-12}
AgI	8.3×10^{-17}
BaSO ₄	1.1×10^{-10}
Ca(OH) ₂	1.0×10^{-8}
CaSO ₄	9.1×10^{-6}
CuSO ₄	1.60
KClO ₄	1.05×10^{-2}
NaCl	3.72×10^1
NaOH	1.10×10^2
Li ₂ CO ₃	2.5×10^{-2}
LiF	1.84×10^{-3}
PbCl ₂	1.6×10^{-5}
PbCO ₃	7.4×10^{-14}
PbCrO ₄	2.8×10^{-13}
PbI ₂	7.1×10^{-9}
SrSO ₄	3.2×10^{-7}
ZnCO ₃	1.4×10^{-11}

Solubility of Some Ionic Compounds in Water

(Soluble means more than 0.1 mole will dissolve per liter)

Negative Ions (anions)	Positive Ions (cations)	Compounds which are:
All	Alkali ions (Li ⁺ , Na ⁺ , K ⁺ , Rb ⁺ , Cs ⁺)	Soluble
All	Ammonium ion, NH ₄ ⁺	Soluble
Nitrate, NO ₃ ⁻	All	Soluble
Acetate, CH ₃ COO ⁻	All	Soluble
Chloride, Cl ⁻ Bromide, Br ⁻ Iodide, I ⁻	Ag ⁺ , Pb ²⁺ , Hg ₂ ²⁺ , Cu ⁺ All others	Not Soluble Soluble
Sulfate, SO ₄ ²⁻	Ba ²⁺ , Sr ²⁺ , Pb ²⁺ , Ca ²⁺ All others	Not Soluble Soluble
Sulfide, S ²⁻	Alkali ions, NH ₄ ⁺ , Be ²⁺ , Mg ²⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺ All others	Soluble Soluble Not Soluble
Hydroxide, OH ⁻	Alkali ions, NH ₄ ⁺ , Sr ²⁺ , Ba ²⁺ All Others	Soluble Not Soluble
Phosphate, PO ₄ ³⁻ Carbonate, CO ₃ ²⁻ Sulfite, SO ₃ ²⁻	Alkali ions, NH ₄ ⁺ All others	Soluble Not Soluble

POSITIVE IONS (CATIONS)

aluminum	Al ³⁺
ammonium	NH ₄ ⁺
barium	Ba ²⁺
cadmium	Cd ²⁺
calcium	Ca ²⁺
chromium(II), chromous	Cr ²⁺
chromium(III), chromic	Cr ³⁺
cobalt	Co ²⁺
copper(I), cuprous	Cu ⁺
copper(II), cupric	Cu ²⁺
hydrogen, hydronium	H ⁺ , H ₃ O ⁺
gold	Au ³⁺
iron(II), ferrous	Fe ²⁺
iron(III), ferric	Fe ³⁺
lead	Pb ²⁺
lithium	Li ⁺
magnesium	Mg ²⁺
manganese(II), manganous	Mn ²⁺
mercury(I), dimercury (I), mercurous	Hg ₂ ²⁺
mercury(II), mercuric	Hg ²⁺
nickel	Ni ²⁺
potassium	K ⁺
scandium	Sc ³⁺
silver	Ag ⁺
sodium	Na ⁺
strontium	Sr ²⁺
tin(II), stannous	Sn ²⁺
tin(IV), stannic	Sn ₄ ⁺
zinc	Zn ²⁺

F

NEGATIVE IONS (ANIONS)

acetate	CH ₃ COO ⁻
bromide	Br ⁻
bicarbonate, hydrogen carbonate	HCO ₃ ⁻
carbonate	CO ₃ ²⁻
chlorate	ClO ₃ ⁻
chloride	Cl ⁻
chlorite	ClO ₂ ⁻
chromate	CrO ₄ ²⁻
cyanide	CN ⁻
dichromate	Cr ₂ O ₇ ²⁻
fluoride	F ⁻
hydroxide	OH ⁻
hypochlorite	ClO ⁻
iodide	I ⁻
nitrate	NO ₃ ⁻
nitrite	NO ₂ ⁻
oxalate	C ₂ O ₄ ²⁻
hydrogen oxalate, binoxalate	HC ₂ O ₄ ⁻
perchlorate	ClO ₄ ⁻
permanganate	MnO ₄ ⁻
phosphate	PO ₄ ³⁻
monohydrogen phosphate	HPO ₄ ²⁻
dihydrogen phosphate	H ₂ PO ₄ ⁻
sulfate	SO ₄ ²⁻
hydrogen sulfate, bisulfate	HSO ₄ ⁻
sulfide	S ²⁻
hydrogen sulfide, bisulfide	HS ⁻
sulfite	SO ₃ ²⁻
hydrogen sulfite, bisulfite	HSO ₃ ⁻
thiocyanate	SCN ⁻
thiosulfate	S ₂ O ₃ ²⁻



Vapor Pressure of Water

°C	Torr	°C	Torr
0	4.6	26	25.2
5	6.5	27	26.7
10	9.2	28	28.3
15	12.8	29	30.0
16	13.6	30	31.8
17	14.5	40	55.3
18	15.5	50	92.5
19	16.5	60	149.4
20	17.5	70	233.7
21	18.7	80	355.1
22	19.8	90	525.8
23	21.1	100	760.0
24	22.4	105	906.1
25	23.8	110	1074.6

⑥ Heat of Formation Reactions, ΔH_f

Compound	Formation Reaction	ΔH_f (kJ)
AlCl ₃ (s)	Al(s) + 3/2 Cl ₂ (g) → AlCl ₃ (s) + 705.6 kJ	-705.6
Br ₂ (g)	Br ₂ (l) + 30.91 kJ → Br ₂ (g)	30.91
CH ₄ (g)	C(s) + 2H ₂ (g) → CH ₄ (g) + 74.86 kJ	-74.86
C ₂ H ₆ (g)	2C(s) + 3H ₂ (g) → C ₂ H ₆ (g) + 84.68 kJ	-84.68
C ₃ H ₈ (g)	3C(s) + 4H ₂ (g) → C ₃ H ₈ (g) + 103.85 kJ	-103.85
CH ₃ OH(l)	C(s) + 1/2 O ₂ (g) + 2H ₂ (g) → CH ₃ OH(l) + 238.5 kJ	-238.5
CO(g)	C(s) + 1/2 O ₂ (g) → CO(g) + 110.5 kJ	-110.5
CO ₂ (g)	C(s) + O ₂ (g) → CO ₂ (g) + 393.5 kJ	-393.5
CaO(s)	Ca(s) + 1/2 O ₂ (g) → CaO(s) + 635.1 kJ	-635.1
Ca(OH) ₂ (s)	Ca(s) + O ₂ (g) + H ₂ (g) → Ca(OH) ₂ (s) + 986.2 kJ	-986.2
Fe ₂ O ₃ (s)	2Fe(s) + 3/2 O ₂ (g) → Fe ₂ O ₃ (s) + 822.1 kJ	-822.1
H ₂ O(g)	H ₂ (g) + 1/2 O ₂ (g) → H ₂ O(g) + 241.8 KJ	-241.8
H ₂ O(l)	H ₂ (g) + 1/2 O ₂ (g) → H ₂ O(l) + 285.8 kJ	-285.8
H ₂ O ₂ (l)	H ₂ (g) + O ₂ (g) → H ₂ O ₂ (l) + 187.8 kJ	-187.8
HBr(g)	1/2 H ₂ (g) + 1/2 Br ₂ (g) → HBr(g) + 36.2 kJ	-36.2
HCl(g)	1/2 H ₂ (g) + 1/2 Cl ₂ (g) → HCl(g) + 92.31 kJ	-92.31
H ₂ S(g)	H ₂ (g) + S(s) → H ₂ S(g) + 20.1 kJ	-20.1
NH ₃ (g)	1/2 N ₂ (g) + 3/2 H ₂ (g) → NH ₃ (g) + 46.19 kJ	-46.19
NO(g)	1/2 N ₂ (g) + 1/2 O ₂ (g) + 90.37 kJ → NO(g)	90.37
NOCl(g)	1/2 N ₂ (g) + 1/2 O ₂ (g) + 1/2 Cl ₂ (g) + 52.6 kJ → NOCl(g)	52.6
NO ₂ (g)	1/2 N ₂ (g) + O ₂ (g) + 33.85 kJ → NO ₂ (g)	33.85
N ₂ O ₄ (g)	N ₂ (g) + 2O ₂ (g) + 9.66 kJ → N ₂ O ₄ (g)	9.66
NaBr(s)	Na(s) + 1/2 Br ₂ (g) → NaBr(s) + 361.4 kJ	-361.4
NaCl(s)	Na(s) + 1/2 Cl ₂ (g) → NaCl(s) + 407.0 kJ	-407.0
O ₃ (g)	3/2 O ₂ (g) + 142.2 kJ → O ₃ (g)	142.2
SO ₂ (g)	S(s) + O ₂ (g) → SO ₂ (g) + 296.8 kJ	-296.8
SO ₃ (g)	S(s) + 3/2 O ₂ (g) → SO ₃ (g) + 395.7 kJ	-395.7

I Heats of Reaction at 1 atm and 25°C

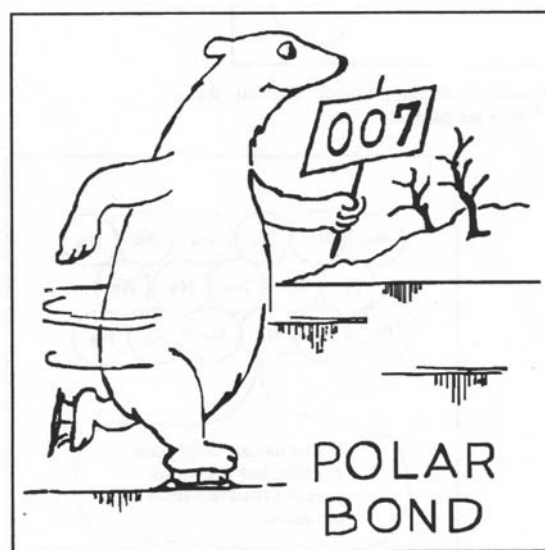
Reaction	ΔH (kcal)
$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$	-212.8
$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$	-530.6
$CH_3OH(l) + 3/2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$	-173.6
$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$	-669.9
$CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$	-67.7
$C_8H_{18}(l) + 25/2O_2(g) \rightarrow 8CO_2(g) + 9H_2O(l)$	-1302.7
$KNO_3(s) \xrightarrow{H_2O} K^+(aq) + NO_3^-(aq)$	+8.3
$NaOH(s) \xrightarrow{H_2O} Na^+(aq) + OH^-(aq)$	-10.6
$NH_4Cl(s) \xrightarrow{H_2O} NH_4^+(aq) + Cl^-(aq)$	+3.5
$NH_4NO_3(s) \xrightarrow{H_2O} NH_4^+(aq) + NO_3^-(aq)$	+6.1
$NaCl(s) \xrightarrow{H_2O} Na^+(aq) + Cl^-(aq)$	+0.9
$KClO_3(s) \xrightarrow{H_2O} K^+(aq) + ClO_3^-(aq)$	+9.9
$LiBr(s) \xrightarrow{H_2O} Li^+(aq) + Br^-(aq)$	1.7
$H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$	-13.8

J Table of Isotopes

Particle	Mass (amu)	Abundance
${}^0_{-1}e$	0.00055	---
1_1p	1.00728	---
1_0n	1.00867	---
1_1H	1.00782	99.995%
2_1H	2.01410	0.015%
3_1H	3.01605	---
3_2He	3.01603	.0001%
4_2He	4.00260	99.9999%
6_3Li	6.01512	7.42%
7_3Li	7.01600	92.58%
${}^{12}_6C$	12.00000	98.90%
${}^{13}_6C$	13.00336	1.10%
${}^{24}_{12}Mg$	23.98505	78.90%
${}^{25}_{12}Mg$	24.91584	10.00%
${}^{26}_{12}Mg$	25.98260	11.10%
${}^{35}_{17}Cl$	34.96885	57.77%
${}^{37}_{17}Cl$	36.96590	24.23%
${}^{63}_{29}Cu$	62.92980	67.17%
${}^{65}_{29}Cu$	64.92779	30.83%

K Ionization Energies and Electronegativities

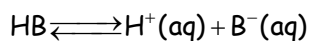
1								18
313	← First Ionization Energy (Kcal/mol of atoms)						567	
H	← Electronegativity (based on Fluorine = 4.0)						He	
2.2								
2	13	14	15	16	17			
125	215	191	260	336	314	402	497	
Li	Be	B	C	N	O	F	Ne	
1.0	1.5	2.0	2.6	3.1	3.5	4.0		
119	176	138	188	242	239	300	363	
Na	Mg	Al	Si	P	S	Cl	Ar	
0.9	1.2	1.5	1.9	2.2	2.6	3.2		
100	141	138	182	226	225	273	323	
K	Ca	Ga	Ge	As	Se	Br	Kr	
0.8	1.0	1.6	1.9	2.0	2.5	2.9		
96	131	133	169	199	208	241	280	
Rb	Sr	In	Sn	Sb	Te	I	Xe	
0.8	1.0	1.7	1.8	2.1	2.3	2.7		
90	120	141	171	168	194		248	
Cs	Ba	Tl	Pb	Bi	Po	At	Rn	
0.7	0.9	1.8	1.8	1.9	2.0	2.2		
Fr	Ra							
0.7	0.9							





Relative Strengths of Acids in Aqueous Solutions at Room Temperature

All ions are aquated



$$K_A = \frac{[H^+][B^-]}{[HB]}$$

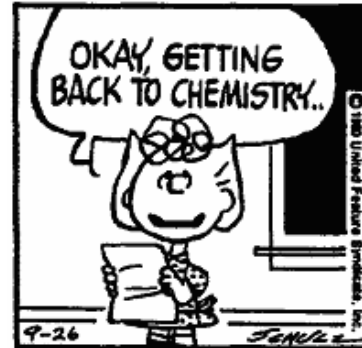
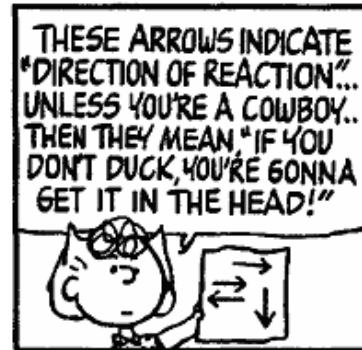
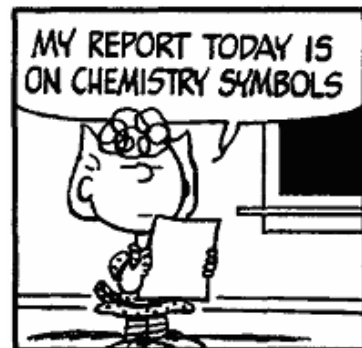
Acid	Strength	Reaction	K_a
perchloric acid	Very Strong	$HClO_4 \rightarrow H^+ + ClO_4^-$	Very large
hydroiodic acid		$HI \rightarrow H^+ + I^-$	Very large
hydrobromic acid		$HBr \rightarrow H^+ + Br^-$	Very large
hydrochloric acid		$HCl \rightarrow H^+ + Cl^-$	Very large
nitric acid		$HNO_3 \rightarrow H^+ + NO_3^-$	Very large
sulfuric acid	Strong	$H_2SO_4 \rightarrow H^+ + HSO_4^-$	Large
orange IV		$H(ind) \rightarrow H^+ + Ind^-$	$\sim 10^{-2}$
oxalic acid		$HOOC-COOH \rightarrow H^+ + HOOC-COO^-$	5.4×10^{-2}
sulfurous acid		$H_2SO_3 \rightarrow H^+ + HSO_3^-$	1.7×10^{-2}
hydrogen sulfate ion		$HSO_4^- \rightarrow H^+ + SO_4^{2-}$	1.3×10^{-2}
phosphoric acid	Weak	$H_3PO_4 \rightarrow H^+ + H_2PO_4^-$	7.1×10^{-3}
ferric ion		$Fe(H_2O)_6^{+3} \rightarrow H^+ + Fe(H_2O)_5(OH)^{+2}$	6×10^{-3}
hydrogen telluride		$H_2Te \rightarrow H^+ + HTe^-$	2.3×10^{-3}
citric acid		$H_3C_6H_5O_7 \rightarrow H^+ + H_2C_6H_5O_7^-$	7.4×10^{-4}
methyl orange		$H(ind) \rightarrow H^+ + Ind^-$	$\sim 10^{-4}$
hydrofluoric acid	Weaker	$HF \rightarrow H^+ + F^-$	6.7×10^{-4}
nitrous acid		$HNO_2 \rightarrow H^+ + NO_2^-$	5.1×10^{-4}
hydrogen selenide		$H_2Se \rightarrow H^+ + HSe^-$	1.7×10^{-4}
chromic ion		$Cr(H_2O)_6^{+3} \rightarrow H^+ + Cr(H_2O)_5(OH)^{+2}$	1×10^{-4}
benzoic acid		$C_6H_5COOH \rightarrow H^+ + C_6H_5COO^-$	6.6×10^{-5}
hydrogen oxalate ion	Weaker	$HOOC-COO^- \rightarrow H^+ + OOC-COO^{2-}$	5.4×10^{-5}
acetic acid		$CH_3COOH \rightarrow H^+ + CH_3COO^-$	1.8×10^{-5}
dihydrogen citrate		$H_2C_6H_5O_7^- \rightarrow H^+ + HC_6H_5O_7^{2-}$	1.7×10^{-5}
aluminum ion		$Al(H_2O)_6^{+3} \rightarrow H^+ + Al(H_2O)_5(OH)^{+2}$	1×10^{-5}
carbonic acid		$H_2CO_3 \rightarrow H^+ + HCO_3^-$	4.4×10^{-7}
hydrogen citrate	Weaker	$HC_6H_5O_7^{2-} \rightarrow H^+ + C_6H_5O_7^{3-}$	4.0×10^{-7}
hydrogen sulfide		$H_2S \rightarrow H^+ + HS^-$	1.0×10^{-7}
dihydrogen phosphate ion		$H_2PO_4^- \rightarrow H^+ + HPO_4^{2-}$	6.3×10^{-8}
hydrogen sulfite ion		$HSO_3^- \rightarrow H^+ + SO_3^{2-}$	6.2×10^{-8}
phenolphthalein		$H(ind) \rightarrow H^+ + Ind^-$	$\sim 10^{-9}$
alizarin yellow	Weaker	$H(ind) \rightarrow H^+ + Ind^-$	$\sim 10^{-10}$
ammonium ion		$NH_4^+ \rightarrow H^+ + NH_3$	5.7×10^{-10}
boric acid		$H_3BO_3 \rightarrow H^+ + H_2BO_3^-$	5.8×10^{-10}
hydrogen telluride ion		$HTe^- \rightarrow H^+ + Te^{2-}$	1×10^{-11}
hydrogen carbonate ion		$HCO_3^- \rightarrow H^+ + CO_3^{2-}$	4.7×10^{-11}
indigo carmine	Weaker	$H(ind) \rightarrow H^+ + Ind^-$	$\sim 10^{-12}$
hydrogen peroxide		$H_2O_2 \rightarrow H^+ + HO_2^-$	2.4×10^{-12}
monohydrogen phosphate ion		$HPO_4^{2-} \rightarrow H^+ + PO_4^{3-}$	4.4×10^{-13}
hydrogen sulfate ion		$HS^- \rightarrow H^+ + S^{2-}$	1.3×10^{-13}
water		$H_2O \rightarrow H^+ + OH^-$	1.8×10^{-16}
hydroxide ion	Very Weak	$OH^- \rightarrow H^+ + O^{2-}$	$< 10^{-36}$
ammonia		$NH_3 \rightarrow H^+ + NH_2^-$	very small

Standard Reduction Potentials for Half Reactions

Ionic concentrations, 1M in water at 25°C



	Reduced Chemical		Oxidized Chemical	volts	
Very Strong Oxidizing Agents ↑	$F_2(g)$	$+ 2e^- \rightarrow$	$2F^-$	+2.87	Very Weak Reducing Agents ↓
	$H_2O_2 + 2H^+$	$+ 2e^- \rightarrow$	$2H_2O$	+1.77	
	$4H^+ + SO_4^{2-} + PbO_2$	$+ 2e^- \rightarrow$	$PbSO_4 + 2H_2O$	+1.68	
	$MnO_4^- + 8H^+$	$+ 5e^- \rightarrow$	$Mn^{2+} + 4H_2O$	+1.52	
	Au^{3+}	$+ 3e^- \rightarrow$	Au	+1.50	
	Cl_2	$+ 2e^- \rightarrow$	$2Cl^-$	+1.36	
	$Cr_2O_7^{2-} + 14H^+$	$+ 6e^- \rightarrow$	$2Cr^{3+} + 7H_2O$	+1.33	
	$MnO_2 + 4H^+$	$+ 2e^- \rightarrow$	$Mn^{2+} + 2H_2O$	+1.28	
	$O_2(g) + 4H^+$	$+ 4e^- \rightarrow$	$2H_2O$	+1.23	
	$Br_2(l)$	$+ 2e^- \rightarrow$	$2Br^-$	+1.06	
	$AuCl_4^-$	$+ 3e^- \rightarrow$	$Au + 4Cl^-$	+1.00	
	$NO_3^- + 4H^+$	$+ 3e^- \rightarrow$	$NO + 2H_2O$	+0.96	
	$ClO^- + H_2O$	$+ 2e^- \rightarrow$	$Cl^- + 2OH^-$	+0.90	
	Ag^+	$+ e^- \rightarrow$	Ag	+0.80	
	Hg_2^{2+}	$+ 2e^- \rightarrow$	$2Hg(l)$	+0.79	
	Hg^{2+}	$+ 2e^- \rightarrow$	$Hg(l)$	+0.78	
	$NO_3^- + 2H^+$	$+ e^- \rightarrow$	$NO_{2(g)} + H_2O$	+0.78	
	Fe^{3+}	$+ e^- \rightarrow$	Fe^{2+}	+0.77	
	$O_2(g) + 2H^+$	$+ 2e^- \rightarrow$	H_2O_2	+0.68	
$I_2(s)$	$+ 2e^- \rightarrow$	$2I^-$	+0.53		
Cu^{2+}	$+ 2e^- \rightarrow$	Cu	+0.34		
$SO_4^{2-} + 4H^+$	$+ 2e^- \rightarrow$	$SO_{2(g)} + 2H_2O$	+0.17		
Cu^{2+}	$+ e^- \rightarrow$	Cu^+	+0.15		
Sn^{4+}	$+ 2e^- \rightarrow$	Sn^{2+}	+0.15		
$2H^+$	$+ 2e^- \rightarrow$	H_2	-0.00		
Fe^{3+}	$+ 3e^- \rightarrow$	Fe	-0.04		
Pb^{2+}	$+ 2e^- \rightarrow$	Pb	-0.13		
Sn^{2+}	$+ 2e^- \rightarrow$	Sn	-0.14		
Ni^{2+}	$+ 2e^- \rightarrow$	Ni	-0.25		
Co^{2+}	$+ 2e^- \rightarrow$	Co	-0.28		
$PbSO_4$	$+ 2e^- \rightarrow$	$Pb + SO_4^{2-}$	-0.36		
$1/8Se_8 + 2H^+$	$+ 2e^- \rightarrow$	H_2Se	-0.40		
Cr^{3+}	$+ 1e^- \rightarrow$	Cr^{2+}	-0.41		
Fe^{2+}	$+ 2e^- \rightarrow$	Fe	-0.44		
Ag_2S	$+ 2e^- \rightarrow$	$2Ag + S^{2-}$	-0.69		
Cr^{3+}	$+ 3e^- \rightarrow$	Cr	-0.74		
Zn^{2+}	$+ 2e^- \rightarrow$	Zn	-0.76		
$2H_2O(l)$	$+ 2e^- \rightarrow$	$H_2(g) + 2OH^-$	-0.83		
Mn^{2+}	$+ 2e^- \rightarrow$	Mn	-1.18		
Al^{3+}	$+ 3e^- \rightarrow$	Al	-1.66		
Mg^{2+}	$+ 2e^- \rightarrow$	Mg	-2.37		
Na^+	$+ e^- \rightarrow$	Na	-2.71		
Ca^{2+}	$+ 2e^- \rightarrow$	Ca	-2.87		
Sr^{2+}	$+ 2e^- \rightarrow$	Sr	-2.89		
Ba^{2+}	$+ 2e^- \rightarrow$	Ba	-2.90		
Cs^+	$+ e^- \rightarrow$	Cs	-2.92		
K^+	$+ 2e^- \rightarrow$	K	-2.92		
Rb^+	$+ e^- \rightarrow$	Rb	-2.92		
Li^+	$+ e^- \rightarrow$	Li	-3.00	Very Strong Reducing Agents	



Selected Oxidation Numbers

(Created 2/9/06)

1																		2																																	
H																		He																																	
3																		5		6		7		8		9		10																							
Li																		B		C		N		O		F		Ne																							
11																		13		14		15		16		17		18																							
Na																		Al		Si		P		S		Cl		Ar																							
19																		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36	
K																		Ca		Sc		Ti		V		Cr		Mn		Fe		Co		Ni		Cu		Zn		Ga		Ge		As		Se		Br		Kr	
37																		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54	
Rb																		Sr		Y		Zr		Nb		Mo		Tc		Ru		Rh		Pd		Ag		Cd		In		Sn		Sb		Te		I		Xe	
55																		56		57		72		73		74		75		76		77		78		79		80		81		82		83		84		85		86	
Cs																		Ba		La		Hf		Ta		W		Re		Os		Ir		Pt		Au		Hg		Tl		Pb		Bi		Po		At		Rn	
87																		88		89		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118	
Fr																		Ra		Ac		Rf		Db		Sg		Bh		Hs		Mt		Ds		Rg		Uub		Uut		Uuq		Uup		Uuh		Uus		Uuo	
58																		59		60		61		62		63		64		65		66		67		68		69		70		71									
Ce																		Pr		Nd		Pm		Sm		Eu		Gd		Tb		Dy		Ho		Er		Tm		Yb		Lu									
90																		91		92		93		94		95		96		97		98		99		100		101		102		103									
Th																		Pa		U		Np		Pu		Am		Cm		Bk		Cf		Es		Fm		Md		No		Lr									

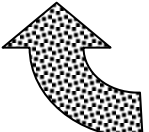
← Oxidation Number(s)

Periodic Table

For General Chem

Skyline H.S.

(Created 9/23/05)

													13	14	15	16	17	18
1 H 1.008																	2 He 4.00	
3 Li 6.94	4 Be 9.01											5 B 10.8	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.0	10 Ne 20.2	
11 Na 23.0	12 Mg 24.3	3	4	5	6	7	8	9	10	11	12	13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 39.9	
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8	
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.6	52 Te 127.8	53 I 126.9	54 Xe 131.3	
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (271)	111 Rg (272)	112 Uub (277)	113 Uut (282)	114 Uuq (285)	115 Uup	116 Uuh	117 Uus	118 Uuo	
																		
		58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (147)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
		90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (249)	98 Cf (251)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (254)	103 Lr (257)			