

- Page 1** Table of Contents
- Page 2** Periodic Table of the Elements
- Page 3** pH Scale
- Page 4** Alphabetical Listing of the Elements
- Page 5** Names, Formulae and Charges of Some Polyatomic Ions; Names and Formulae of Common Acids; Prefixes
- Page 6** Map of the Pacific Coast of North America
- Page 7** World Tectonic Plate Boundaries Map
- Page 8** Common Isotope Pairs Chart;
Radioactivity Symbols
- Page 9** Energy Formulae and Data
- Page 10** Units and Abbreviations

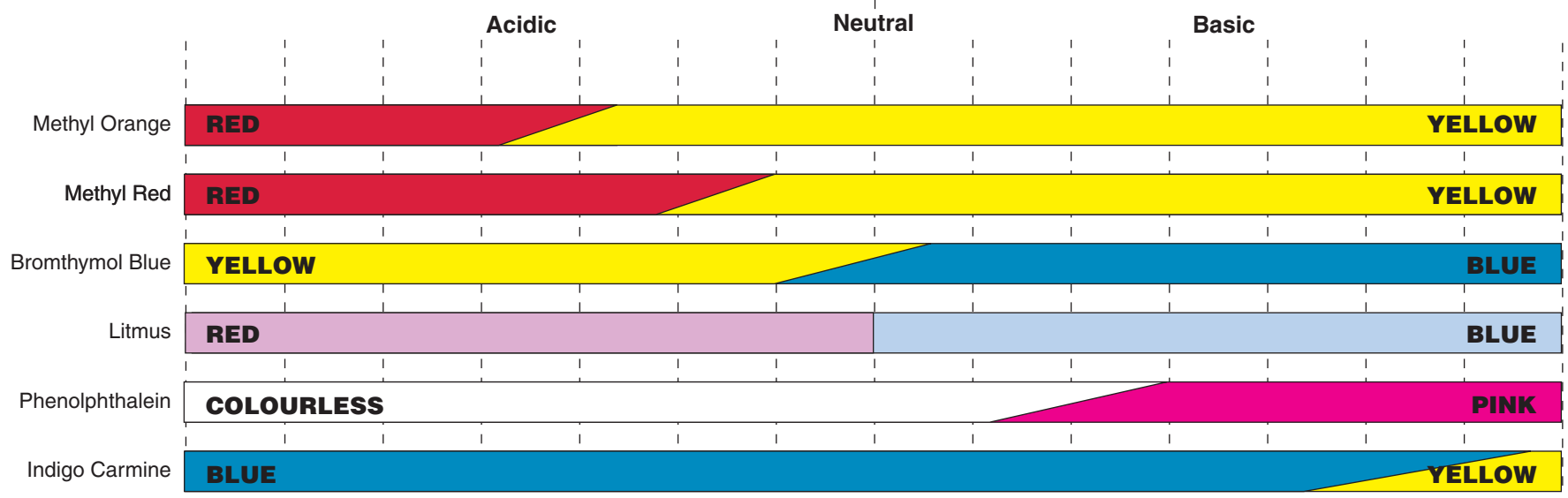
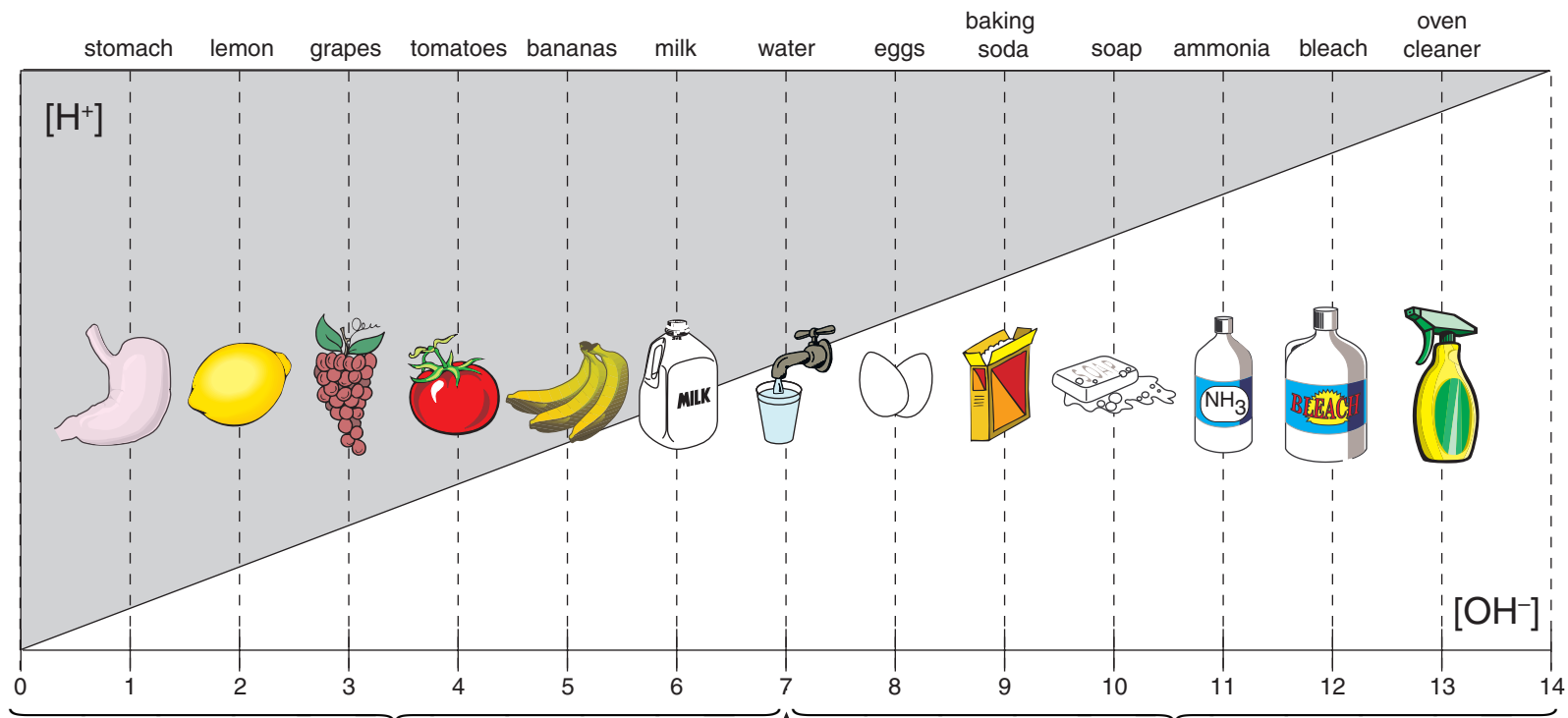
PERIODIC TABLE OF THE ELEMENTS

METALS ←										→ NON-METALS																																							
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Atomic Number</td> <td>→</td> <td>22</td> <td>4+</td> <td>←</td> <td>Ion charge(s)</td> </tr> <tr> <td>Symbol</td> <td>→</td> <td>Ti</td> <td>3+</td> <td></td> <td></td> </tr> <tr> <td>Name</td> <td>→</td> <td colspan="3">Titanium</td> <td></td> </tr> <tr> <td>Atomic Mass</td> <td>→</td> <td>47.9</td> <td></td> <td></td> <td></td> </tr> </table>										Atomic Number	→	22	4+	←	Ion charge(s)	Symbol	→	Ti	3+			Name	→	Titanium				Atomic Mass	→	47.9				<table border="1" style="width: 100px; height: 100px;"> <tr><td style="text-align: center;">1 +</td></tr> <tr><td style="text-align: center;">H</td></tr> <tr><td style="text-align: center;">Hydrogen</td></tr> <tr><td style="text-align: center;">1.0</td></tr> </table>	1 +	H	Hydrogen	1.0	<table border="1" style="width: 100px; height: 100px;"> <tr><td style="text-align: center;">1 -</td></tr> <tr><td style="text-align: center;">H</td></tr> <tr><td style="text-align: center;">Hydrogen</td></tr> <tr><td style="text-align: center;">1.0</td></tr> </table>	1 -	H	Hydrogen	1.0	<table border="1" style="width: 100px; height: 100px;"> <tr><td style="text-align: center;">18</td></tr> <tr><td style="text-align: center;">2 0</td></tr> <tr><td style="text-align: center;">He</td></tr> <tr><td style="text-align: center;">Helium</td></tr> <tr><td style="text-align: center;">4.0</td></tr> </table>	18	2 0	He	Helium	4.0
Atomic Number	→	22	4+	←	Ion charge(s)																																												
Symbol	→	Ti	3+																																														
Name	→	Titanium																																															
Atomic Mass	→	47.9																																															
1 +																																																	
H																																																	
Hydrogen																																																	
1.0																																																	
1 -																																																	
H																																																	
Hydrogen																																																	
1.0																																																	
18																																																	
2 0																																																	
He																																																	
Helium																																																	
4.0																																																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																
3 +	4 2+	21 3+	22 4+ 3+	23 5+ 4+	24 3+ 2+	25 2+ 3+ 4+	26 3+ 2+	27 2+ 3+	28 2+ 3+	29 2+ 1+	30 2+	31 3+	32 4+	33 3-	34 2-	35 -	36 0																																
Li Lithium 6.9	Be Beryllium 9.0	Sc Scandium 45.0	Ti Titanium 47.9	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.8	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Ga Gallium 69.7	Ge Germanium 72.6	As Arsenic 74.9	Se Selenium 79.0	Br Bromine 79.9	Kr Krypton 83.8																																
11 +	12 2+	37 +	38 2+	39 3+	40 4+	41 3+ 5+	42 2+ 3+	43 7+	44 3+ 4+	45 3+ 4+	46 2+ 4+	47 +	48 2+	49 3+	50 4+ 2+	51 3+ 5+	52 2-	53 -	54 0																														
Na Sodium 23.0	Mg Magnesium 24.3	Rb Rubidium 85.5	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium (98)	Ru Ruthenium 101.1	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3																														
19 +	20 2+	55 +	56 2+	57 3+	72 4+	73 5+	74 6+	75 4+ 7+	76 3+ 4+	77 3+ 4+	78 4+ 2+	79 3+ 1+	80 2+ 1+	81 1+ 3+	82 2+ 4+	83 3+ 5+	84 2+ 4+	85 -	86 0																														
K Potassium 39.1	Ca Calcium 40.1	Cs Cesium 132.9	Ba Barium 137.3	La Lanthanum 138.9	Hf Hafnium 178.5	Ta Tantalum 180.9	W Tungsten 183.8	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	Hg Mercury 200.6	Tl Thallium 204.4	Pb Lead 207.2	Bi Bismuth 209.0	Po Polonium (209)	At Astatine (210)	Rn Radon (222)																														
87 +	88 2+	89 3+	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120																														
Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	Ds Darmstadtium (281)	Rg Roentgenium (272)	Uub Ununbium (285)	Uut Ununtrium (284)	Uuq Ununquadium (289)	Uup Ununpentium (288)	Uuh Ununhexium (292)	Uus Ununseptium (?)	Uuo Ununoctium (294)	Uuq Ununquadium (293)	Uup Ununpentium (294)	Uuh Ununhexium (295)																													
Alkali Metals		Alkaline Earth Metals																Halogens	Noble Gases																														
58 3+ 4+	59 3+ 4+	60 3+	61 3+	62 3+ 4+	63 3+ 2+	64 3+	65 3+ 4+	66 3+	67 3+	68 3+	69 3+ 2+	70 3+ 2+	71 3+																																				
Ce Cerium 140.1	Pr Praseodymium 140.9	Nd Neodymium 144.2	Pm Promethium (145)	Sm Samarium 150.4	Eu Europium 152.0	Gd Gadolinium 157.3	Tb Terbium 158.9	Dy Dysprosium 162.5	Ho Holmium 164.9	Er Erbium 167.3	Tm Thulium 168.9	Yb Ytterbium 173.0	Lu Lutetium 175.0																																				
90 4+	91 5+ 4+	92 6+ 4+ 5+	93 5+ 4+ 6+	94 4+ 6+ 5+	95 3+ 4+ 5+ 6+	96 3+	97 3+ 4+	98 3+	99 3+	100 3+	101 2+ 3+	102 2+ 3+	103 3+																																				
Th Thorium 232.0	Pa Protactinium 231.0	U Uranium 238.0	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)																																				

Based on mass of C-12 at 12.00.

Any value in parentheses is the mass of the most stable or best known isotope for elements which do not occur naturally.

pH SCALE



ALPHABETICAL LISTING OF THE ELEMENTS

Element	Symbol	Atomic Number	Element	Symbol	Atomic Number
Actinium	Ac	89	Mendelevium	Md	101
Aluminium	Al	13	Mercury	Hg	80
Americium	Am	95	Molybdenum	Mo	42
Antimony	Sb	51	Neodymium	Nd	60
Argon	Ar	18	Neon	Ne	10
Arsenic	As	33	Neptunium	Np	93
Astatine	At	85	Nickel	Ni	28
Barium	Ba	56	Niobium	Nb	41
Berkelium	Bk	97	Nitrogen	N	7
Beryllium	Be	4	Nobelium	No	102
Bismuth	Bi	83	Osmium	Os	76
Bohrium	Bh	107	Oxygen	O	8
Boron	B	5	Palladium	Pd	46
Bromine	Br	35	Phosphorus	P	15
Cadmium	Cd	48	Platinum	Pt	78
Calcium	Ca	20	Plutonium	Pu	94
Californium	Cf	98	Polonium	Po	84
Carbon	C	6	Potassium	K	19
Cerium	Ce	58	Praseodymium	Pr	59
Cesium	Cs	55	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
Dubnium	Db	105	Rubidium	Rb	37
Dysprosium	Dy	66	Ruthenium	Ru	44
Einsteinium	Es	99	Rutherfordium	Rf	104
Erbium	Er	68	Samarium	Sm	62
Europium	Eu	63	Scandium	Sc	21
Fermium	Fm	100	Seaborgium	Sg	106
Fluorine	F	9	Selenium	Se	34
Francium	Fr	87	Silicon	Si	14
Gadolinium	Gd	64	Silver	Ag	47
Gallium	Ga	31	Sodium	Na	11
Germanium	Ge	32	Strontium	Sr	38
Gold	Au	79	Sulfur	S	16
Hafnium	Hf	72	Tantalum	Ta	73
Hassium	Hs	108	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
Meitnerium	Mt	109			

NAMES, FORMULAE AND CHARGES OF SOME POLYATOMIC IONS

Positive Ions	Negative Ions
NH_4^+ Ammonium	CH_3COO^- Acetate
	CO_3^{2-} Carbonate
	ClO_3^- Chlorate
	ClO_2^- Chlorite
	CrO_4^{2-} Chromate
	CN^- Cyanide
	$\text{Cr}_2\text{O}_7^{2-}$ Dichromate
	HCO_3^- Hydrogen carbonate, bicarbonate
	HSO_4^- Hydrogen sulfate, bisulfate
	HS^- Hydrogen sulfide, bisulfide
	HSO_3^- Hydrogen sulfite, bisulfite
	OH^- Hydroxide
	ClO^- Hypochlorite
	NO_3^- Nitrate
	NO_2^- Nitrite
	$\text{C}_2\text{O}_4^{2-}$ Oxalate
	ClO_4^- Perchlorate
	MnO_4^- Permanganate
	PO_4^{3-} Phosphate
	PO_3^{3-} Phosphite
	SO_4^{2-} Sulfate
	SO_3^{2-} Sulfite

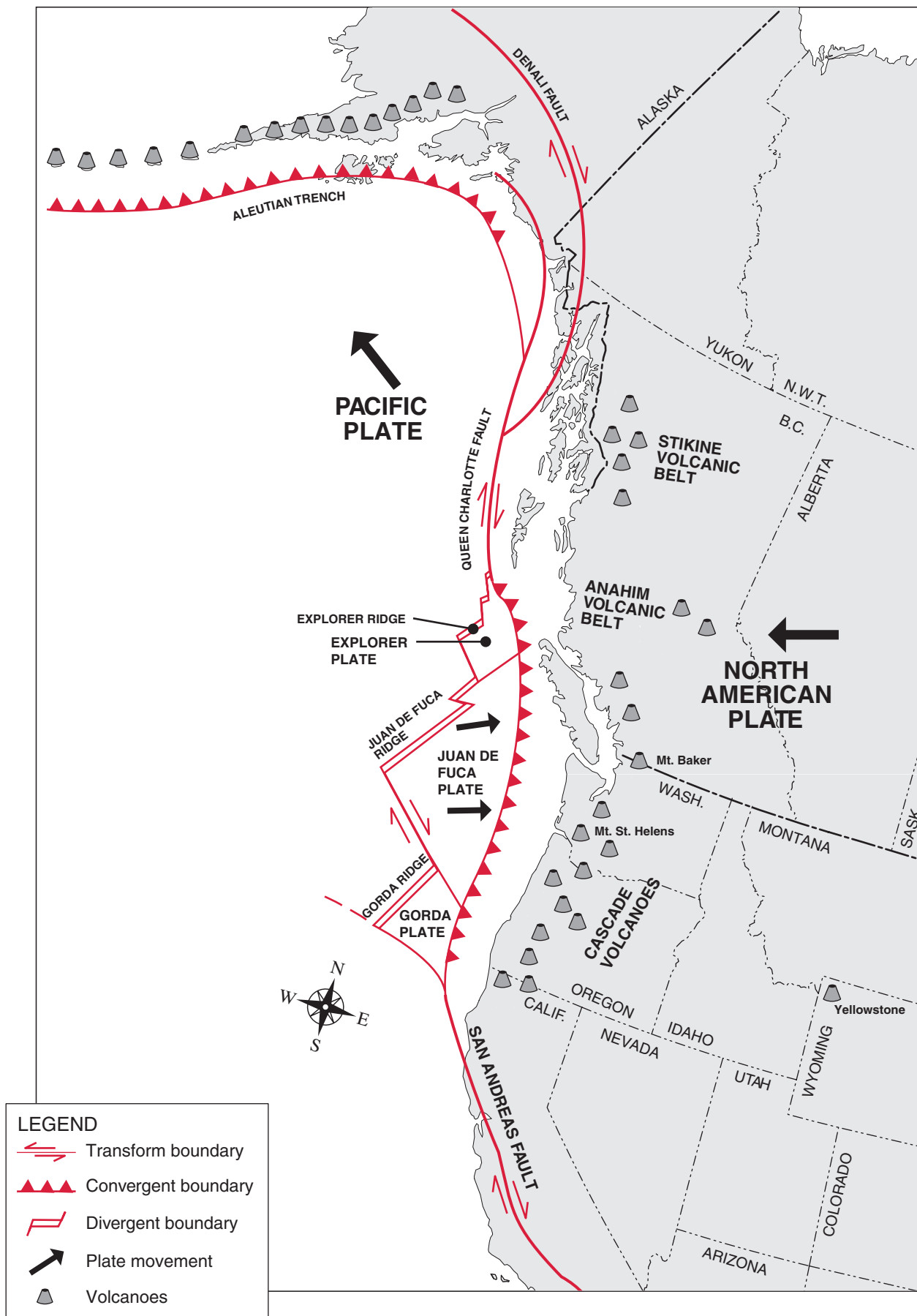
NAMES AND FORMULAE OF COMMON ACIDS

Hydrochloric acid	HCl
Sulfuric acid	H_2SO_4
Nitric acid	HNO_3
Acetic acid	HCH_3COO

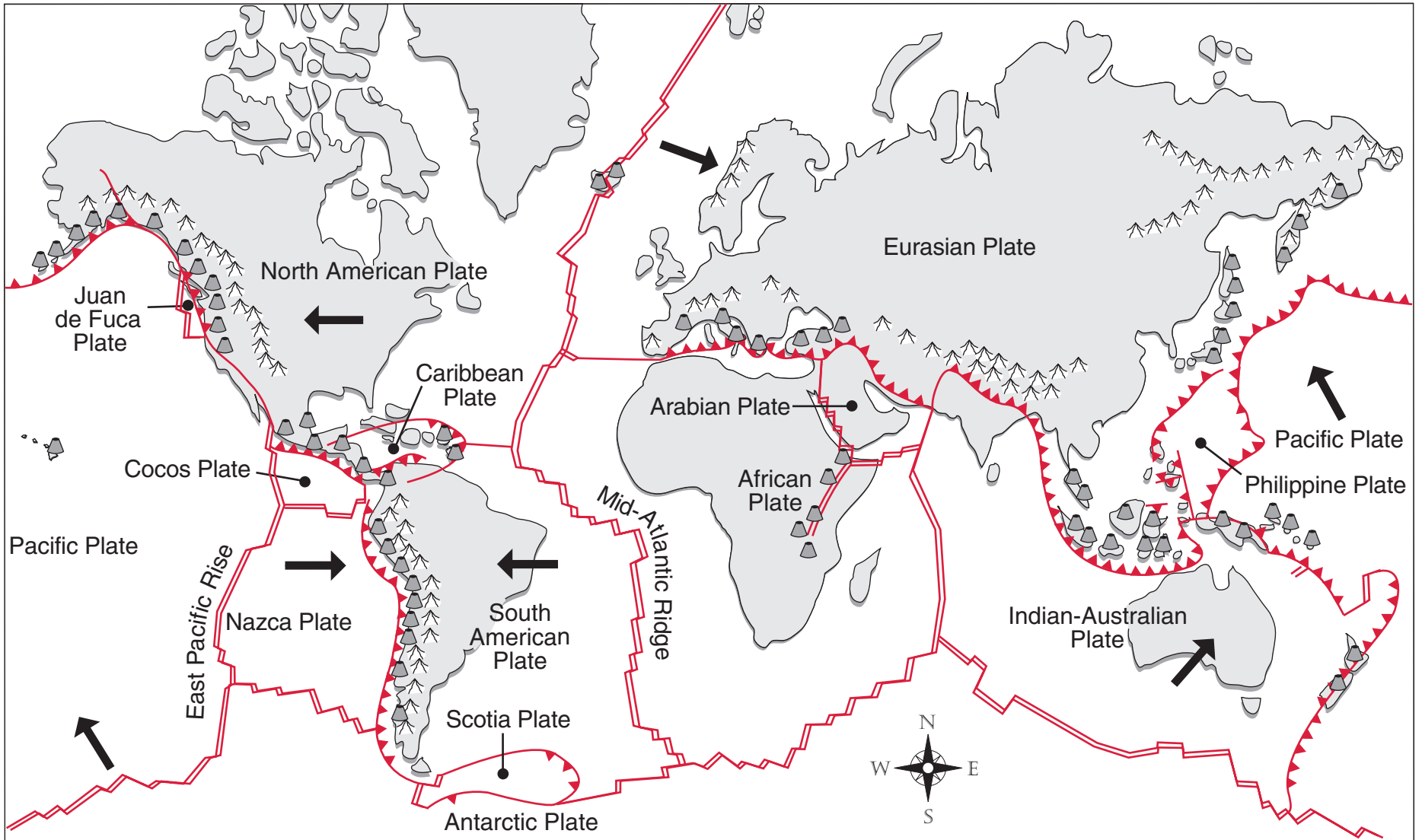
PREFIXES

1	mono
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

MAP OF THE PACIFIC COAST OF NORTH AMERICA



WORLD TECTONIC PLATE BOUNDARIES MAP



- Divergent boundary
- Convergent boundary
- Transform boundary
- Mountains
- Plate movement relative to the African Plate
- Volcanoes

COMMON ISOTOPE PAIRS CHART

Isotope		Half-life of Parent (years)
<i>Parent</i>	<i>Daughter</i>	
Carbon-14	Nitrogen-14	5730
Uranium-235	Lead-207	710 million
Potassium-40	Argon-40	1.3 billion
Uranium-238	Lead-206	4.5 billion
Thorium-235	Lead-208	14 billion
Rubidium-87	Strontium-87	47 billion

RADIOACTIVITY SYMBOLS

${}^4_2\alpha, {}^4_2\text{He}$	${}^0_{-1}\beta, {}^0_{-1}e$	${}^0_0\gamma$
1_0n	${}^1_1p, {}^1_1\text{H}$	

ENERGY FORMULAE

KINETIC ENERGY

$$E_k = \frac{1}{2}mv^2 \qquad v = \sqrt{\frac{2E_k}{m}} \qquad m = \frac{2E_k}{v^2}$$

POTENTIAL ENERGY

$$E_p = mgh \qquad m = \frac{E_p}{gh} \qquad h = \frac{E_p}{mg} \qquad g = \frac{E_p}{mh}$$

THERMAL ENERGY

$$\Delta E_h = mC\Delta t \qquad m = \frac{\Delta E_h}{C\Delta t} \qquad C = \frac{\Delta E_h}{m\Delta t} \qquad \Delta t = \frac{\Delta E_h}{mC}$$

$$\Delta t = t_f - t_i$$

CONSERVATION OF ENERGY

$$E_t = E'_t$$

DATA

Gravitational field strength on Earth: $g = 9.80 \text{ N/kg}$

Specific Heat Capacity of liquid water: $C = 4180 \text{ J/kg}^\circ\text{C}$

UNITS AND ABBREVIATIONS

Quantity	Formula Symbol	Unit	Unit Symbol
energy	E	joules	J
mass	m	kilogram	kg
gravitational field strength	g	newtons per kilogram	N/kg
height	h	meters	m
velocity	v	meters per second	m/s
specific heat capacity	C	joules per kilogram per degree celcius	J/kg°C
temperature	T	degrees celcius	°C