

## NAMES, FORMULAE AND CHARGES OF SOME COMMON IONS

### Positive Ions

$\text{Al}^{3+}$ Aluminum	$\text{Li}^{+}$ Lithium
$\text{NH}_4^{+}$ Ammonium	$\text{Mg}^{2+}$ Magnesium
$\text{Ba}^{2+}$ Barium	$\text{Mn}^{2+}$ Manganese(II)
$\text{Ca}^{2+}$ Calcium	$\text{Mn}^{4+}$ Manganese(IV)
$\text{Cr}^{2+}$ Chromium(II)	$\text{Hg}_2^{2+}$ Mercury(I)
$\text{Cr}^{3+}$ Chromium(III)	$\text{Hg}^{2+}$ Mercury(II)
$\text{Cu}^{+}$ Copper(I)	$\text{K}^{+}$ Potassium
$\text{Cu}^{2+}$ Copper(II)	$\text{Ag}^{+}$ Silver
$\text{H}^{+}$ Hydrogen	$\text{Na}^{+}$ Sodium
$\text{Fe}^{2+}$ Iron(II)	$\text{Sn}^{2+}$ Tin(II)
$\text{Fe}^{3+}$ Iron(III)	$\text{Sn}^{4+}$ Tin(IV)
$\text{Pb}^{2+}$ Lead(II)	$\text{Zn}^{2+}$ Zinc
$\text{Pb}^{4+}$ Lead(IV)	

### Negative Ions

$\text{Br}^{-}$ Bromide	$\text{OH}^{-}$ Hydroxide
$\text{CO}_3^{2-}$ Carbonate	$\text{ClO}^{-}$ Hypochlorite
$\text{ClO}_3^{-}$ Chlorate	$\text{I}^{-}$ Iodide
$\text{Cl}^{-}$ Chloride	$\text{NO}_3^{-}$ Nitrate
$\text{ClO}_2^{-}$ Chlorite	$\text{NO}_2^{-}$ Nitrite
$\text{CrO}_4^{2-}$ Chromate	$\text{O}^{2-}$ Oxide
$\text{CN}^{-}$ Cyanide	$\text{ClO}_4^{-}$ Perchlorate
$\text{Cr}_2\text{O}_7^{2-}$ Dichromate	$\text{MnO}_4^{-}$ Permanganate
$\text{CH}_3\text{COO}^{-}$ Acetate	$\text{PO}_4^{3-}$ Phosphate
$\text{F}^{-}$ Fluoride	$\text{PO}_3^{3-}$ Phosphite
$\text{HCO}_3^{-}$ Hydrogen carbonate, bicarbonate	$\text{SO}_4^{2-}$ Sulphate
$\text{HSO}_4^{-}$ Hydrogen sulphate, bisulphate	$\text{S}^{2-}$ Sulphide
$\text{HS}^{-}$ Hydrogen sulphide, bisulphide	$\text{SO}_3^{2-}$ Sulphite
$\text{HSO}_3^{-}$ Hydrogen sulphite, bisulphite	

## ALPHABETICAL LISTING OF THE ELEMENTS

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

Element	Symbol	Atomic Number	Atomic Mass	Element	Symbol	Atomic Number	Atomic Mass
Actinium	Ac	89	(227)	Mercury	Hg	80	200.6
Aluminum	Al	13	27.0	Molybdenum	Mo	42	95.9
Americium	Am	95	(243)	Neodymium	Nd	60	144.2
Antimony	Sb	51	121.8	Neon	Ne	10	20.2
Argon	Ar	18	39.9	Neptunium	Np	93	(237)
Arsenic	As	33	74.9	Nickel	Ni	28	58.7
Astatine	At	85	(210)	Niobium	Nb	41	92.9
Barium	Ba	56	137.3	Nitrogen	N	7	14.0
Berkelium	Bk	97	(247)	Nobelium	No	102	(259)
Beryllium	Be	4	9.0	Osmium	Os	76	190.2
Bismuth	Bi	83	209.0	Oxygen	O	8	16.0
Boron	B	5	10.8	Palladium	Pd	46	106.4
Bromine	Br	35	79.9	Phosphorus	P	15	31.0
Cadmium	Cd	48	112.4	Platinum	Pt	78	195.1
Calcium	Ca	20	40.1	Plutonium	Pu	94	(244)
Californium	Cf	98	(251)	Polonium	Po	84	(209)
Carbon	C	6	12.0	Potassium	K	19	39.1
Cerium	Ce	58	140.1	Praseodymium	Pr	59	140.9
Cesium	Cs	55	132.9	Promethium	Pm	61	(145)
Chlorine	Cl	17	35.5	Protactinium	Pa	91	231.0
Chromium	Cr	24	52.0	Radium	Ra	88	(226)
Cobalt	Co	27	58.9	Radon	Rn	86	(222)
Copper	Cu	29	63.5	Rhenium	Re	75	186.2
Curium	Cm	96	(247)	Rhodium	Rh	45	102.9
Dubnium	Db	105	(262)	Rubidium	Rb	37	85.5
Dysprosium	Dy	66	162.5	Ruthenium	Ru	44	101.1
Einsteinium	Es	99	(252)	Rutherfordium	Rf	104	(261)
Erbium	Er	68	167.3	Samarium	Sm	62	150.4
Europium	Eu	63	152.0	Scandium	Sc	21	45.0
Fermium	Fm	100	(257)	Selenium	Se	34	79.0
Fluorine	F	9	19.0	Silicon	Si	14	28.1
Francium	Fr	87	(223)	Silver	Ag	47	107.9
Gadolinium	Gd	64	157.3	Sodium	Na	11	23.0
Gallium	Ga	31	69.7	Strontium	Sr	38	87.6
Germanium	Ge	32	72.6	Sulphur	S	16	32.1
Gold	Au	79	197.0	Tantalum	Ta	73	180.9
Hafnium	Hf	72	178.5	Technetium	Tc	43	(98)
Helium	He	2	4.0	Tellurium	Te	52	127.6
Holmium	Ho	67	164.9	Terbium	Tb	65	158.9
Hydrogen	H	1	1.0	Thallium	Tl	81	204.4
Indium	In	49	114.8	Thorium	Th	90	232.0
Iodine	I	53	126.9	Thulium	Tm	69	168.9
Iridium	Ir	77	192.2	Tin	Sn	50	118.7
Iron	Fe	26	55.8	Titanium	Ti	22	47.9
Krypton	Kr	36	83.8	Tungsten	W	74	183.8
Lanthanum	La	57	138.9	Uranium	U	92	238.0
Lawrencium	Lr	103	(262)	Vanadium	V	23	50.9
Lead	Pb	82	207.2	Xenon	Xe	54	131.3
Lithium	Li	3	6.9	Ytterbium	Yb	70	173.0
Lutetium	Lu	71	175.0	Yttrium	Y	39	88.9
Magnesium	Mg	12	24.3	Zinc	Zn	30	65.4
Manganese	Mn	25	54.9	Zirconium	Zr	40	91.2
Mendelevium	Md	101	(258)				



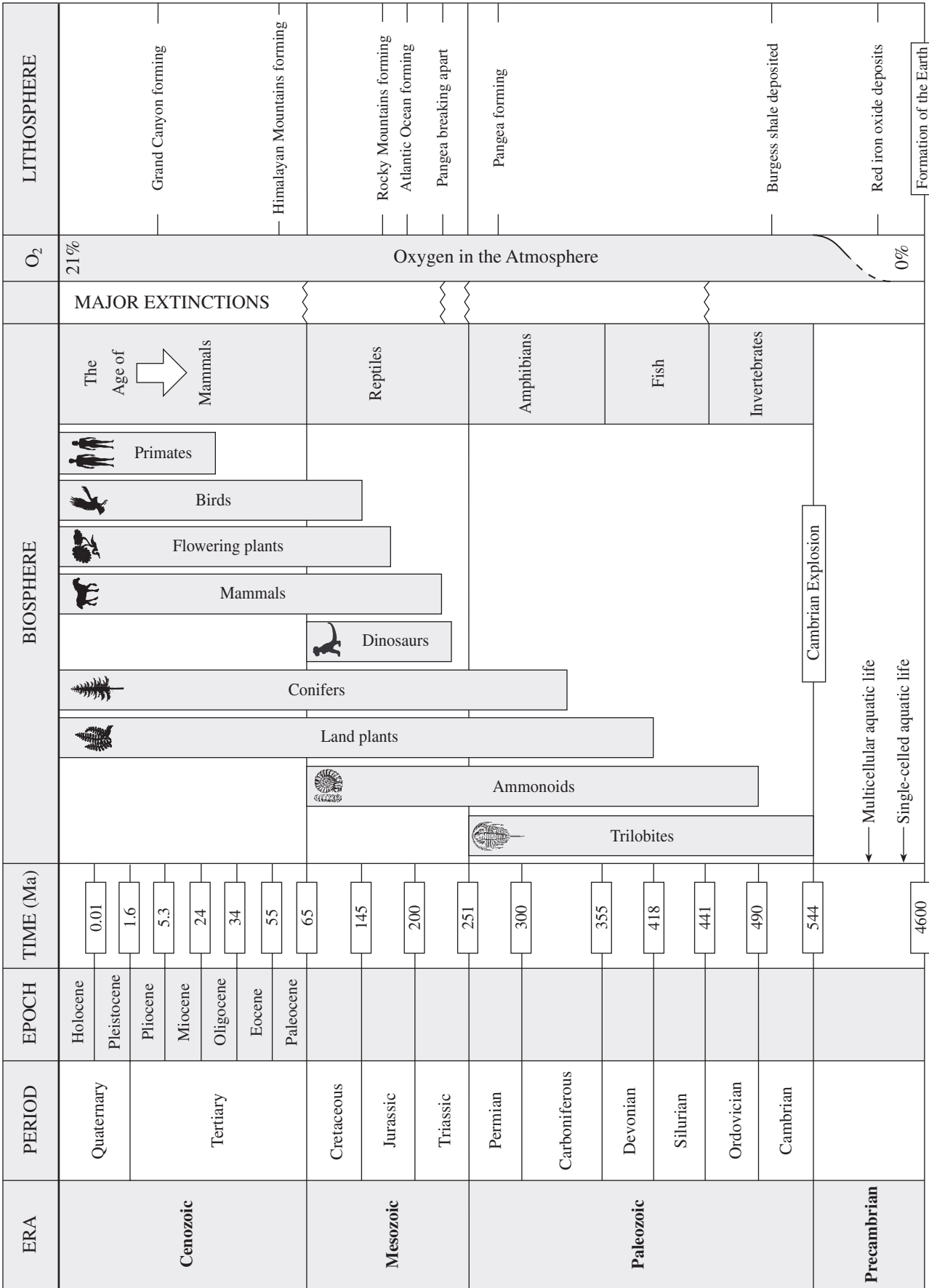
## UNITS AND ABBREVIATIONS

Quantity	Unit	Symbol
Distance (d)	metre	m
Voltage (V)	volt	V
Current (I)	ampere	A
Resistance (R)	ohm	$\Omega$
Power (P)	watt	W
Work (W)	joule	J
Force (F)	newton	N
Energy (E)	joule	J
Time (t)	second	s
Time (t)	minute	min
Time (t)	hour	h
Time (t)	year	a

## FORMULAE

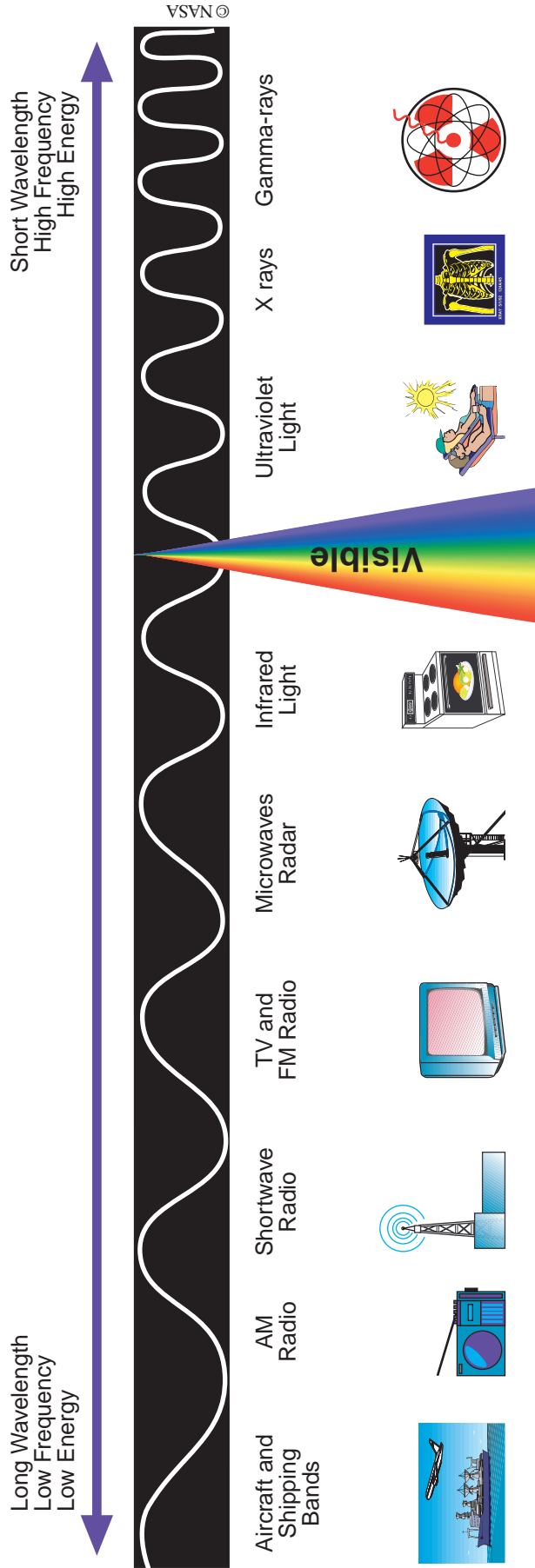
$V = IR$	$P = VI$	$E = Pt$
$R = \frac{V}{I}$	$I = \frac{P}{V}$	$P = \frac{E}{t}$
$I = \frac{V}{R}$	$V = \frac{P}{I}$	$t = \frac{E}{P}$

# GEOLOGICAL TIME SCALE



Dates according to *Geological Time Scale*, 1999. Geological Survey of Canada Open File 3040. It is recognized that there is some variation in the dates given in the literature.

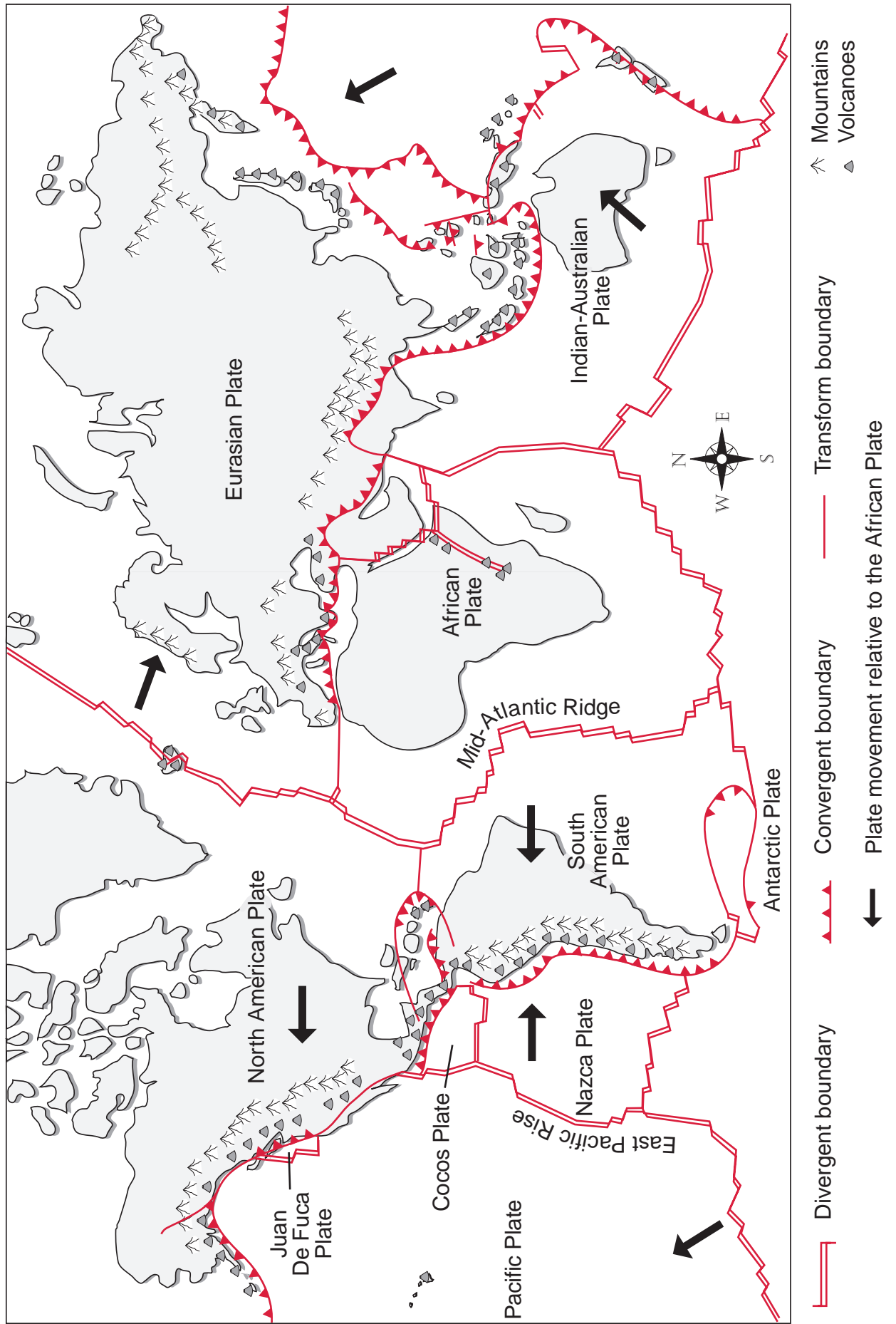
# THE ELECTROMAGNETIC SPECTRUM



## COMMON ISOTOPE PAIRS CHART

Isotope	Effective Dating Range (years)	
	Parent	Daughter
Uranium-238	Lead-206	1 million to 4.5 billion
Potassium-40	Argon-40	10 000 to 3 billion
Carbon-14	Nitrogen-14	up to 50 000

TECTONIC PLATE BOUNDARIES MAP



# MAP OF THE PACIFIC COAST OF NORTH AMERICA

