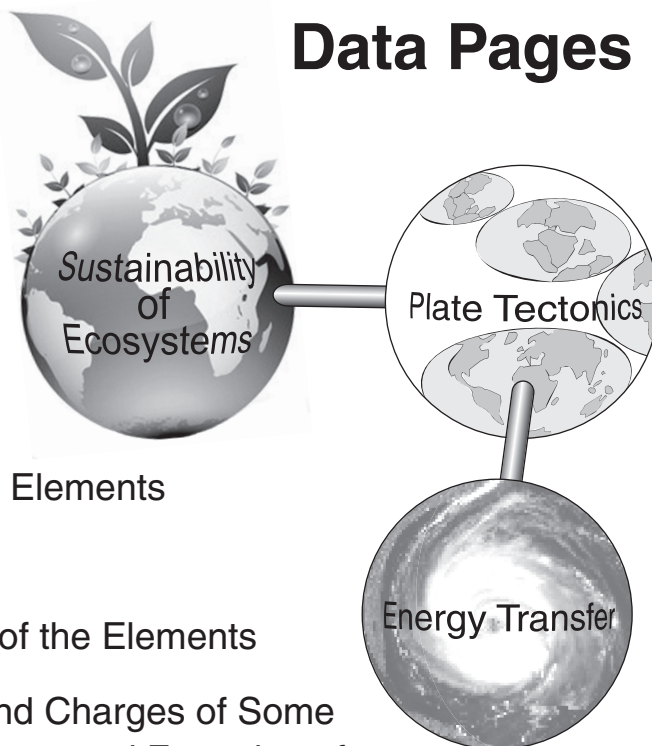
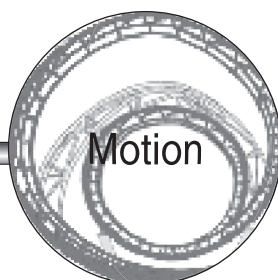
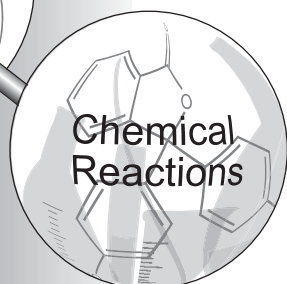
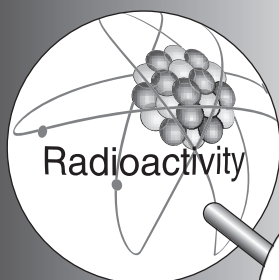


SCIENCE 10

Data Pages



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	The Carbon Cycle
Page 9	The Phosphorus Cycle
Page 10	Biomes of the World
Page 11	The Nitrogen Cycle
Page 12	Common Isotope Pairs Chart; Radioactivity Symbols; Units and Abbreviations; Equations of Motion



* These Science 10 Data Pages may be retained for classroom use. They **do not** need to be returned to the Ministry with the completed examinations.

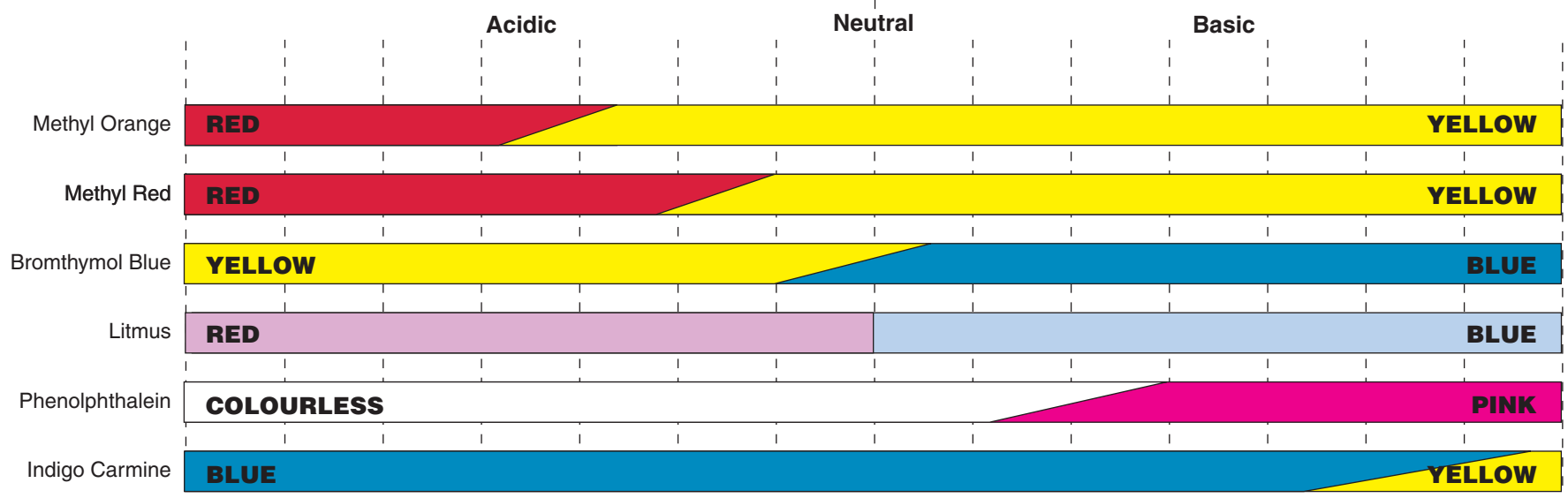
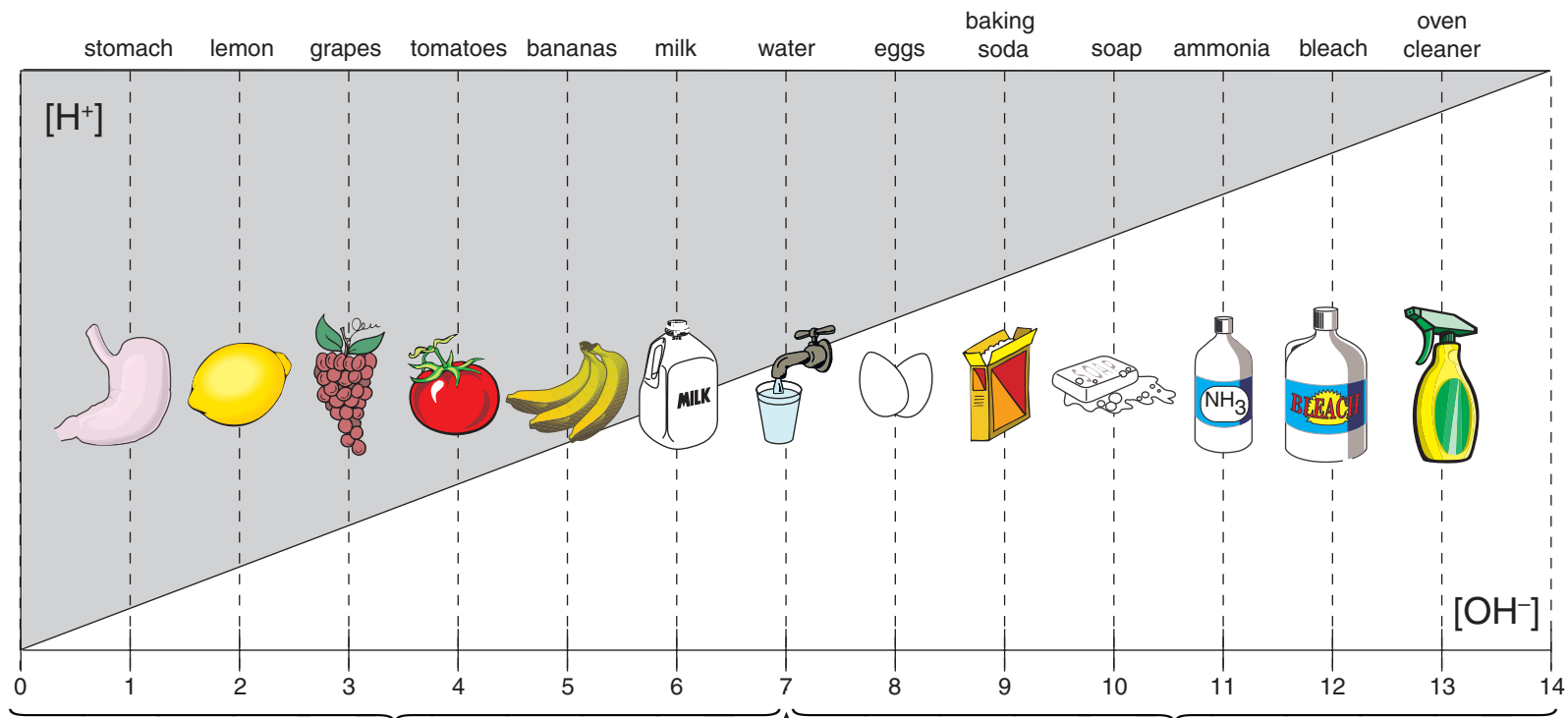
PERIODIC TABLE OF THE ELEMENTS

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"> <table border="1"> <tr><td>1 +</td></tr> <tr><td>H</td></tr> <tr><td>Hydrogen</td></tr> <tr><td>1.0</td></tr> </table> </div> <div style="text-align: center;"> <p>METALS ←</p> <p>→ NON-METALS</p> </div> <div style="border: 1px solid black; padding: 5px;"> <table border="1"> <tr><td>1 -</td></tr> <tr><td>H</td></tr> <tr><td>Hydrogen</td></tr> <tr><td>1.0</td></tr> </table> </div> <div style="border: 1px solid black; padding: 5px;"> <table border="1"> <tr><td>18</td></tr> <tr><td>He</td></tr> <tr><td>Helium</td></tr> <tr><td>4.0</td></tr> </table> </div> </div>										1 +	H	Hydrogen	1.0	1 -	H	Hydrogen	1.0	18	He	Helium	4.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
1 +																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Hydrogen																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1 -																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Hydrogen																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
He																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Helium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
4.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <table border="1"> <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> </div>										Atomic Number	→	22	4+	←	Ion charge(s)	Symbol	→	Ti	3+			Name	→	Titanium				Atomic Mass	→	47.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Atomic Number	→	22	4+	←	Ion charge(s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Symbol	→	Ti	3+																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Name	→	Titanium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Atomic Mass	→	47.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
<table border="1" style="width: 100%; text-align: center;"> <tr> <th>1</th><th>2</th><th colspan="10"></th><th>13</th><th>14</th><th>15</th><th>16</th><th>17</th><th>18</th> </tr> <tr> <td>3 +</td><td>4 2+</td><td colspan="10"></td><td>5</td><td>6</td><td>7 3-</td><td>8 2-</td><td>9 -</td><td>10 0</td> </tr> <tr> <td>Li</td><td>Be</td><td colspan="10"></td><td>B</td><td>C</td><td>N</td><td>O</td><td>F</td><td>Ne</td> </tr> <tr> <td>Lithium</td><td>Beryllium</td><td colspan="10"></td><td>Boron</td><td>Carbon</td><td>Nitrogen</td><td>Oxygen</td><td>Fluorine</td><td>Neon</td> </tr> <tr> <td>6.9</td><td>9.0</td><td colspan="10"></td><td>10.8</td><td>12.0</td><td>14.0</td><td>16.0</td><td>19.0</td><td>20.2</td> </tr> <tr> <td>11 +</td><td>12 2+</td><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><td>13 3+</td><td>14</td><td>15 3-</td><td>16 2-</td><td>17 -</td><td>18 0</td> </tr> <tr> <td>Na</td><td>Mg</td><td>Sc</td><td>Ti</td><td>V</td><td>Cr</td><td>Mn</td><td>Fe</td><td>Co</td><td>Ni</td><td>Cu</td><td>Zn</td><td>Ga</td><td>Si</td><td>P</td><td>S</td><td>Cl</td><td>Ar</td> </tr> <tr> <td>Sodium</td><td>Magnesium</td><td>Scandium</td><td>Titanium</td><td>Vanadium</td><td>Chromium</td><td>Manganese</td><td>Iron</td><td>Cobalt</td><td>Nickel</td><td>Copper</td><td>Zinc</td><td>Gallium</td><td>Silicon</td><td>Phosphorus</td><td>Sulfur</td><td>Chlorine</td><td>Argon</td> </tr> <tr> <td>23.0</td><td>24.3</td><td>45.0</td><td>47.9</td><td>50.9</td><td>52.0</td><td>54.9</td><td>55.8</td><td>58.9</td><td>58.7</td><td>63.5</td><td>65.4</td><td>69.7</td><td>28.1</td><td>31.0</td><td>32.1</td><td>35.5</td><td>39.9</td> </tr> <tr> <td>19 +</td><td>20 2+</td><td>21 3+</td><td>22 4+</td><td>23 5+</td><td>24 3+</td><td>25 2+</td><td>26 3+</td><td>27 2+</td><td>28 2+</td><td>29 2+</td><td>30 2+</td><td>31 3+</td><td>32 4+</td><td>33 3-</td><td>34 2-</td><td>35 -</td><td>36 0</td> </tr> <tr> <td>K</td><td>Ca</td><td>Sc</td><td>Ti</td><td>V</td><td>Cr</td><td>Mn</td><td>Fe</td><td>Co</td><td>Ni</td><td>Cu</td><td>Zn</td><td>Ga</td><td>Ge</td><td>As</td><td>Se</td><td>Br</td><td>Kr</td> </tr> <tr> <td>Potassium</td><td>Calcium</td><td>Scandium</td><td>Titanium</td><td>Vanadium</td><td>Chromium</td><td>Manganese</td><td>Iron</td><td>Cobalt</td><td>Nickel</td><td>Copper</td><td>Zinc</td><td>Gallium</td><td>Germanium</td><td>Arsenic</td><td>Selenium</td><td>Bromine</td><td>Krypton</td> </tr> <tr> <td>39.1</td><td>40.1</td><td>45.0</td><td>47.9</td><td>50.9</td><td>52.0</td><td>54.9</td><td>55.8</td><td>58.9</td><td>58.7</td><td>63.5</td><td>65.4</td><td>69.7</td><td>72.6</td><td>74.9</td><td>79.0</td><td>79.9</td><td>83.8</td> </tr> <tr> <td>37 +</td><td>38 2+</td><td>39 3+</td><td>40 4+</td><td>41 3+</td><td>42 2+</td><td>43 7+</td><td>44 3+</td><td>45 3+</td><td>46 2+</td><td>47 +</td><td>48 2+</td><td>49 3+</td><td>50 4+</td><td>51 3+</td><td>52 2-</td><td>53 -</td><td>54 0</td> </tr> <tr> <td>Rb</td><td>Sr</td><td>Y</td><td>Zr</td><td>Nb</td><td>Mo</td><td>Tc</td><td>Ru</td><td>Rh</td><td>Pd</td><td>Ag</td><td>Cd</td><td>In</td><td>Sn</td><td>Sb</td><td>Te</td><td>I</td><td>Xe</td> </tr> <tr> <td>Rubidium</td><td>Strontium</td><td>Yttrium</td><td>Zirconium</td><td>Niobium</td><td>Molybdenum</td><td>Technetium</td><td>Ruthenium</td><td>Rhodium</td><td>Palladium</td><td>Silver</td><td>Cadmium</td><td>Indium</td><td>Tin</td><td>Antimony</td><td>Tellurium</td><td>Iodine</td><td>Xenon</td> </tr> <tr> <td>85.5</td><td>87.6</td><td>88.9</td><td>91.2</td><td>92.9</td><td>95.9</td><td>(98)</td><td>101.1</td><td>102.9</td><td>106.4</td><td>107.9</td><td>112.4</td><td>114.8</td><td>118.7</td><td>121.8</td><td>127.6</td><td>126.9</td><td>131.3</td> </tr> <tr> <td>55 +</td><td>56 2+</td><td>57 3+</td><td>72 4+</td><td>73 5+</td><td>74 6+</td><td>75 4+</td><td>76 3+</td><td>77 3+</td><td>78 4+</td><td>79 3+</td><td>80 2+</td><td>81 1+</td><td>82 2+</td><td>83 3+</td><td>84 2+</td><td>85 -</td><td>86 0</td> </tr> <tr> <td>Cs</td><td>Ba</td><td>La</td><td>Hf</td><td>Ta</td><td>W</td><td>Re</td><td>Os</td><td>Ir</td><td>Pt</td><td>Au</td><td>Hg</td><td>Tl</td><td>Pb</td><td>Bi</td><td>Po</td><td>At</td><td>Rn</td> </tr> <tr> <td>Cesium</td><td>Barium</td><td>Lanthanum</td><td>Hafnium</td><td>Tantalum</td><td>Tungsten</td><td>Rhenium</td><td>Osmium</td><td>Iridium</td><td>Platinum</td><td>Gold</td><td>Mercury</td><td>Thallium</td><td>Lead</td><td>Bismuth</td><td>Polonium</td><td>Astatine</td><td>Radon</td> </tr> <tr> <td>132.9</td><td>137.3</td><td>138.9</td><td>178.5</td><td>180.9</td><td>183.8</td><td>186.2</td><td>190.2</td><td>192.2</td><td>195.1</td><td>197.0</td><td>200.6</td><td>204.4</td><td>207.2</td><td>209.0</td><td>(209)</td><td>(210)</td><td>(222)</td> </tr> <tr> <td>87 +</td><td>88 2+</td><td>89 3+</td><td>104</td><td>105</td><td>106</td><td>107</td><td>108</td><td>109</td><td>110</td><td>111</td><td>112</td><td>113</td><td>114</td><td>115</td><td>116</td><td>117</td><td>118</td> </tr> <tr> <td>Fr</td><td>Ra</td><td>Ac</td><td>Rf</td><td>Db</td><td>Sg</td><td>Bh</td><td>Hs</td><td>Mt</td><td>Ds</td><td>Rg</td><td>Uub</td><td>Uut</td><td>Uuq</td><td>Uup</td><td>Uuh</td><td>Uus</td><td>Uuo</td> </tr> <tr> <td>Francium</td><td>Radium</td><td>Actinium</td><td>Rutherfordium</td><td>Dubnium</td><td>Seaborgium</td><td>Bohrium</td><td>Hassium</td><td>Meitnerium</td><td>Darmstadtium</td><td>Roentgenium</td><td>Ununbium</td><td>Ununtrium</td><td>Ununquadium</td><td>Ununpentium</td><td>Ununhexium</td><td>Ununseptium</td><td>Ununoctium</td> </tr> <tr> <td>(223)</td><td>(226)</td><td>(227)</td><td>(261)</td><td>(262)</td><td>(263)</td><td>(262)</td><td>(265)</td><td>(266)</td><td>(281)</td><td>(272)</td><td>(285)</td><td>(284)</td><td>(289)</td><td>(288)</td><td>(292)</td><td>(?)</td><td>(294)</td> </tr> <tr> <td colspan="2">Alkali Metals</td><td colspan="2">Alkaline Earth Metals</td><td colspan="13"></td><td colspan="2">Halogens</td><td colspan="1">Noble Gases</td> </tr> <tr> <td colspan="18"> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>58 3+</td><td>59 3+</td><td>60 3+</td><td>61 3+</td><td>62 3+</td><td>63 3+</td><td>64 3+</td><td>65 3+</td><td>66 3+</td><td>67 3+</td><td>68 3+</td><td>69 3+</td><td>70 3+</td><td>71 3+</td> </tr> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Cerium</td><td>Praseodymium</td><td>Neodymium</td><td>Promethium</td><td>Samarium</td><td>Europium</td><td>Gadolinium</td><td>Terbium</td><td>Dysprosium</td><td>Holmium</td><td>Erbium</td><td>Thulium</td><td>Ytterbium</td><td>Lutetium</td> </tr> <tr> <td>140.1</td><td>140.9</td><td>144.2</td><td>(145)</td><td>150.4</td><td>152.0</td><td>157.3</td><td>158.9</td><td>162.5</td><td>164.9</td><td>167.3</td><td>168.9</td><td>173.0</td><td>175.0</td> </tr> <tr> <td>90 4+</td><td>91 5+</td><td>92 6+</td><td>93 5+</td><td>94 4+</td><td>95 3+</td><td>96 3+</td><td>97 3+</td><td>98 3+</td><td>99 3+</td><td>100 3+</td><td>101 2+</td><td>102 2+</td><td>103 3+</td> </tr> <tr> <td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> <tr> <td>Thorium</td><td>Protactinium</td><td>Uranium</td><td>Neptunium</td><td>Plutonium</td><td>Americium</td><td>Curium</td><td>Berkelium</td><td>Californium</td><td>Einsteinium</td><td>Fermium</td><td>Mendelevium</td><td>Nobelium</td><td>Lawrencium</td> </tr> <tr> <td>232.0</td><td>231.0</td><td>238.0</td><td>(237)</td><td>(244)</td><td>(243)</td><td>(247)</td><td>(247)</td><td>(251)</td><td>(252)</td><td>(257)</td><td>(258)</td><td>(259)</td><td>(262)</td> </tr> </table> </td> </tr> </table>										1	2											13	14	15	16	17	18	3 +	4 2+											5	6	7 3-	8 2-	9 -	10 0	Li	Be											B	C	N	O	F	Ne	Lithium	Beryllium											Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon	6.9	9.0											10.8	12.0	14.0	16.0	19.0	20.2	11 +	12 2+	3	4	5	6	7	8	9	10	11	12	13 3+	14	15 3-	16 2-	17 -	18 0	Na	Mg	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Si	P	S	Cl	Ar	Sodium	Magnesium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Silicon	Phosphorus	Sulfur	Chlorine	Argon	23.0	24.3	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.7	63.5	65.4	69.7	28.1	31.0	32.1	35.5	39.9	19 +	20 2+	21 3+	22 4+	23 5+	24 3+	25 2+	26 3+	27 2+	28 2+	29 2+	30 2+	31 3+	32 4+	33 3-	34 2-	35 -	36 0	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton	39.1	40.1	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.7	63.5	65.4	69.7	72.6	74.9	79.0	79.9	83.8	37 +	38 2+	39 3+	40 4+	41 3+	42 2+	43 7+	44 3+	45 3+	46 2+	47 +	48 2+	49 3+	50 4+	51 3+	52 2-	53 -	54 0	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon	85.5	87.6	88.9	91.2	92.9	95.9	(98)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3	55 +	56 2+	57 3+	72 4+	73 5+	74 6+	75 4+	76 3+	77 3+	78 4+	79 3+	80 2+	81 1+	82 2+	83 3+	84 2+	85 -	86 0	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	Cesium	Barium	Lanthanum	Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon	132.9	137.3	138.9	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)	87 +	88 2+	89 3+	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	Francium	Radium	Actinium	Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	Darmstadtium	Roentgenium	Ununbium	Ununtrium	Ununquadium	Ununpentium	Ununhexium	Ununseptium	Ununoctium	(223)	(226)	(227)	(261)	(262)	(263)	(262)	(265)	(266)	(281)	(272)	(285)	(284)	(289)	(288)	(292)	(?)	(294)	Alkali Metals		Alkaline Earth Metals															Halogens		Noble Gases	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>58 3+</td><td>59 3+</td><td>60 3+</td><td>61 3+</td><td>62 3+</td><td>63 3+</td><td>64 3+</td><td>65 3+</td><td>66 3+</td><td>67 3+</td><td>68 3+</td><td>69 3+</td><td>70 3+</td><td>71 3+</td> </tr> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Cerium</td><td>Praseodymium</td><td>Neodymium</td><td>Promethium</td><td>Samarium</td><td>Europium</td><td>Gadolinium</td><td>Terbium</td><td>Dysprosium</td><td>Holmium</td><td>Erbium</td><td>Thulium</td><td>Ytterbium</td><td>Lutetium</td> </tr> <tr> <td>140.1</td><td>140.9</td><td>144.2</td><td>(145)</td><td>150.4</td><td>152.0</td><td>157.3</td><td>158.9</td><td>162.5</td><td>164.9</td><td>167.3</td><td>168.9</td><td>173.0</td><td>175.0</td> </tr> <tr> <td>90 4+</td><td>91 5+</td><td>92 6+</td><td>93 5+</td><td>94 4+</td><td>95 3+</td><td>96 3+</td><td>97 3+</td><td>98 3+</td><td>99 3+</td><td>100 3+</td><td>101 2+</td><td>102 2+</td><td>103 3+</td> </tr> <tr> <td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> <tr> <td>Thorium</td><td>Protactinium</td><td>Uranium</td><td>Neptunium</td><td>Plutonium</td><td>Americium</td><td>Curium</td><td>Berkelium</td><td>Californium</td><td>Einsteinium</td><td>Fermium</td><td>Mendelevium</td><td>Nobelium</td><td>Lawrencium</td> </tr> <tr> <td>232.0</td><td>231.0</td><td>238.0</td><td>(237)</td><td>(244)</td><td>(243)</td><td>(247)</td><td>(247)</td><td>(251)</td><td>(252)</td><td>(257)</td><td>(258)</td><td>(259)</td><td>(262)</td> </tr> </table>																		58 3+	59 3+	60 3+	61 3+	62 3+	63 3+	64 3+	65 3+	66 3+	67 3+	68 3+	69 3+	70 3+	71 3+	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium	140.1	140.9	144.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0	90 4+	91 5+	92 6+	93 5+	94 4+	95 3+	96 3+	97 3+	98 3+	99 3+	100 3+	101 2+	102 2+	103 3+	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium	232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(262)
1	2											13	14	15	16	17	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
3 +	4 2+											5	6	7 3-	8 2-	9 -	10 0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Li	Be											B	C	N	O	F	Ne																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Lithium	Beryllium											Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
6.9	9.0											10.8	12.0	14.0	16.0	19.0	20.2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
11 +	12 2+	3	4	5	6	7	8	9	10	11	12	13 3+	14	15 3-	16 2-	17 -	18 0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Na	Mg	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Si	P	S	Cl	Ar																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Sodium	Magnesium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Silicon	Phosphorus	Sulfur	Chlorine	Argon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
23.0	24.3	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.7	63.5	65.4	69.7	28.1	31.0	32.1	35.5	39.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
19 +	20 2+	21 3+	22 4+	23 5+	24 3+	25 2+	26 3+	27 2+	28 2+	29 2+	30 2+	31 3+	32 4+	33 3-	34 2-	35 -	36 0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
39.1	40.1	45.0	47.9	50.9	52.0	54.9	55.8	58.9	58.7	63.5	65.4	69.7	72.6	74.9	79.0	79.9	83.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
37 +	38 2+	39 3+	40 4+	41 3+	42 2+	43 7+	44 3+	45 3+	46 2+	47 +	48 2+	49 3+	50 4+	51 3+	52 2-	53 -	54 0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
85.5	87.6	88.9	91.2	92.9	95.9	(98)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
55 +	56 2+	57 3+	72 4+	73 5+	74 6+	75 4+	76 3+	77 3+	78 4+	79 3+	80 2+	81 1+	82 2+	83 3+	84 2+	85 -	86 0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Cesium	Barium	Lanthanum	Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
132.9	137.3	138.9	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
87 +	88 2+	89 3+	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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Francium	Radium	Actinium	Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	Darmstadtium	Roentgenium	Ununbium	Ununtrium	Ununquadium	Ununpentium	Ununhexium	Ununseptium	Ununoctium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
(223)	(226)	(227)	(261)	(262)	(263)	(262)	(265)	(266)	(281)	(272)	(285)	(284)	(289)	(288)	(292)	(?)	(294)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Alkali Metals		Alkaline Earth Metals															Halogens		Noble Gases																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>58 3+</td><td>59 3+</td><td>60 3+</td><td>61 3+</td><td>62 3+</td><td>63 3+</td><td>64 3+</td><td>65 3+</td><td>66 3+</td><td>67 3+</td><td>68 3+</td><td>69 3+</td><td>70 3+</td><td>71 3+</td> </tr> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Cerium</td><td>Praseodymium</td><td>Neodymium</td><td>Promethium</td><td>Samarium</td><td>Europium</td><td>Gadolinium</td><td>Terbium</td><td>Dysprosium</td><td>Holmium</td><td>Erbium</td><td>Thulium</td><td>Ytterbium</td><td>Lutetium</td> </tr> <tr> <td>140.1</td><td>140.9</td><td>144.2</td><td>(145)</td><td>150.4</td><td>152.0</td><td>157.3</td><td>158.9</td><td>162.5</td><td>164.9</td><td>167.3</td><td>168.9</td><td>173.0</td><td>175.0</td> </tr> <tr> <td>90 4+</td><td>91 5+</td><td>92 6+</td><td>93 5+</td><td>94 4+</td><td>95 3+</td><td>96 3+</td><td>97 3+</td><td>98 3+</td><td>99 3+</td><td>100 3+</td><td>101 2+</td><td>102 2+</td><td>103 3+</td> </tr> <tr> <td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> <tr> <td>Thorium</td><td>Protactinium</td><td>Uranium</td><td>Neptunium</td><td>Plutonium</td><td>Americium</td><td>Curium</td><td>Berkelium</td><td>Californium</td><td>Einsteinium</td><td>Fermium</td><td>Mendelevium</td><td>Nobelium</td><td>Lawrencium</td> </tr> <tr> <td>232.0</td><td>231.0</td><td>238.0</td><td>(237)</td><td>(244)</td><td>(243)</td><td>(247)</td><td>(247)</td><td>(251)</td><td>(252)</td><td>(257)</td><td>(258)</td><td>(259)</td><td>(262)</td> </tr> </table>																		58 3+	59 3+	60 3+	61 3+	62 3+	63 3+	64 3+	65 3+	66 3+	67 3+	68 3+	69 3+	70 3+	71 3+	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium	140.1	140.9	144.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0	90 4+	91 5+	92 6+	93 5+	94 4+	95 3+	96 3+	97 3+	98 3+	99 3+	100 3+	101 2+	102 2+	103 3+	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium	232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(262)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
58 3+	59 3+	60 3+	61 3+	62 3+	63 3+	64 3+	65 3+	66 3+	67 3+	68 3+	69 3+	70 3+	71 3+																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
140.1	140.9	144.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
90 4+	91 5+	92 6+	93 5+	94 4+	95 3+	96 3+	97 3+	98 3+	99 3+	100 3+	101 2+	102 2+	103 3+																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(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
	ClO_4^- Perchlorate
	MnO_4^- Permanganate
	PO_4^{3-} Phosphate
	PO_3^{3-} Phosphite
	SO_4^{2-} Sulfate
	SO_3^{2-} Sulfite

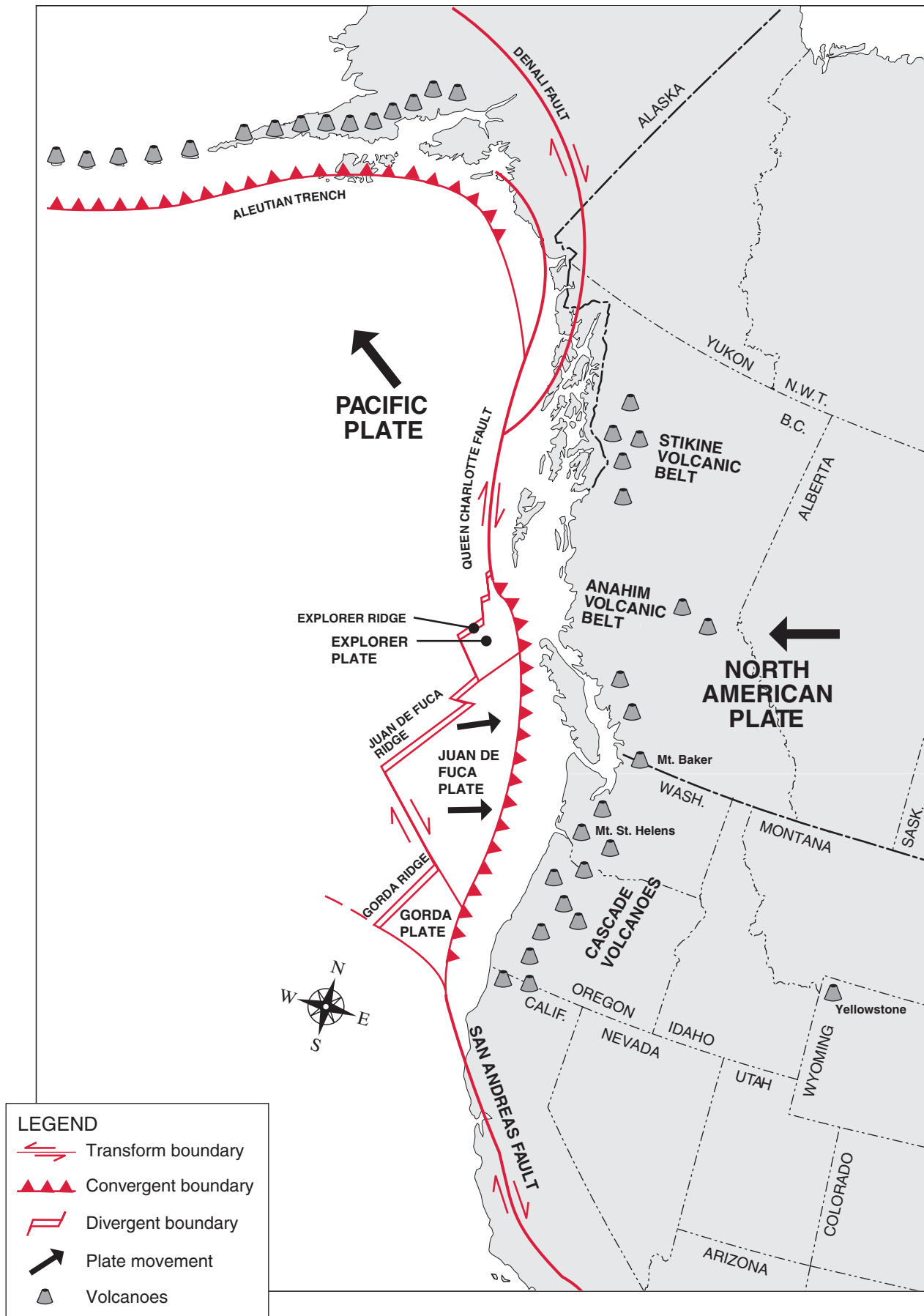
NAMES AND FORMULAE OF COMMON ACIDS

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

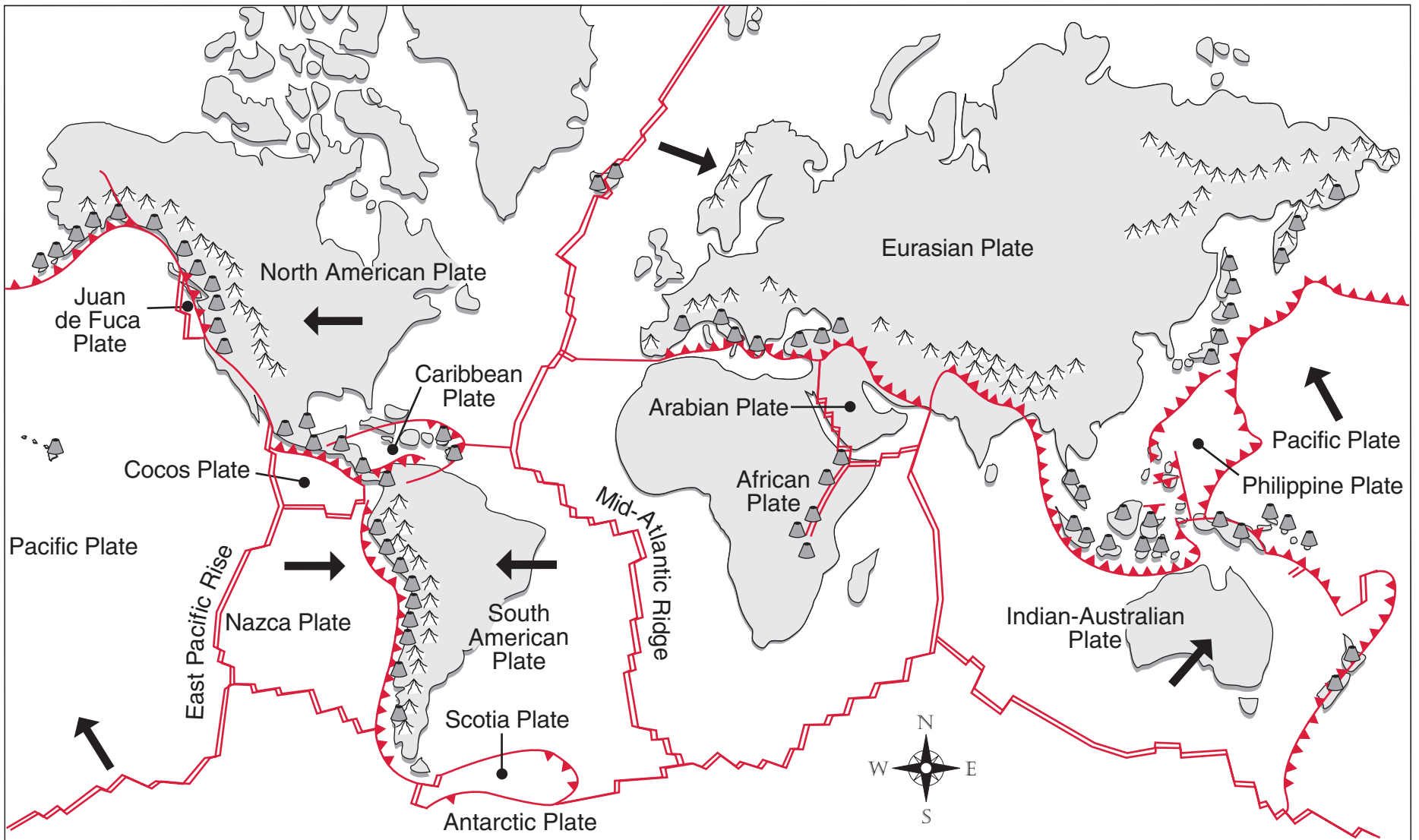
PREFIXES

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

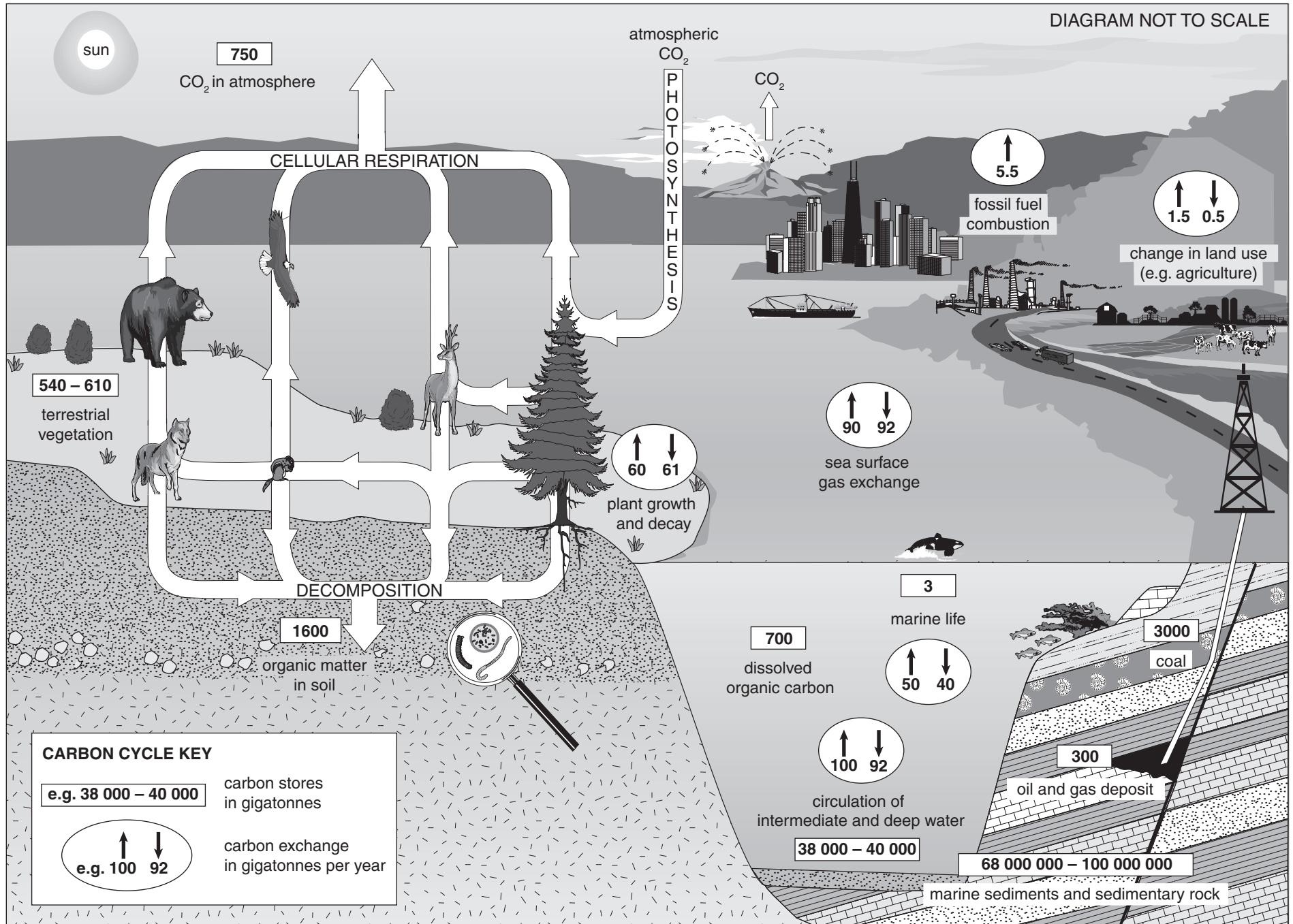


WORLD TECTONIC PLATE BOUNDARIES MAP



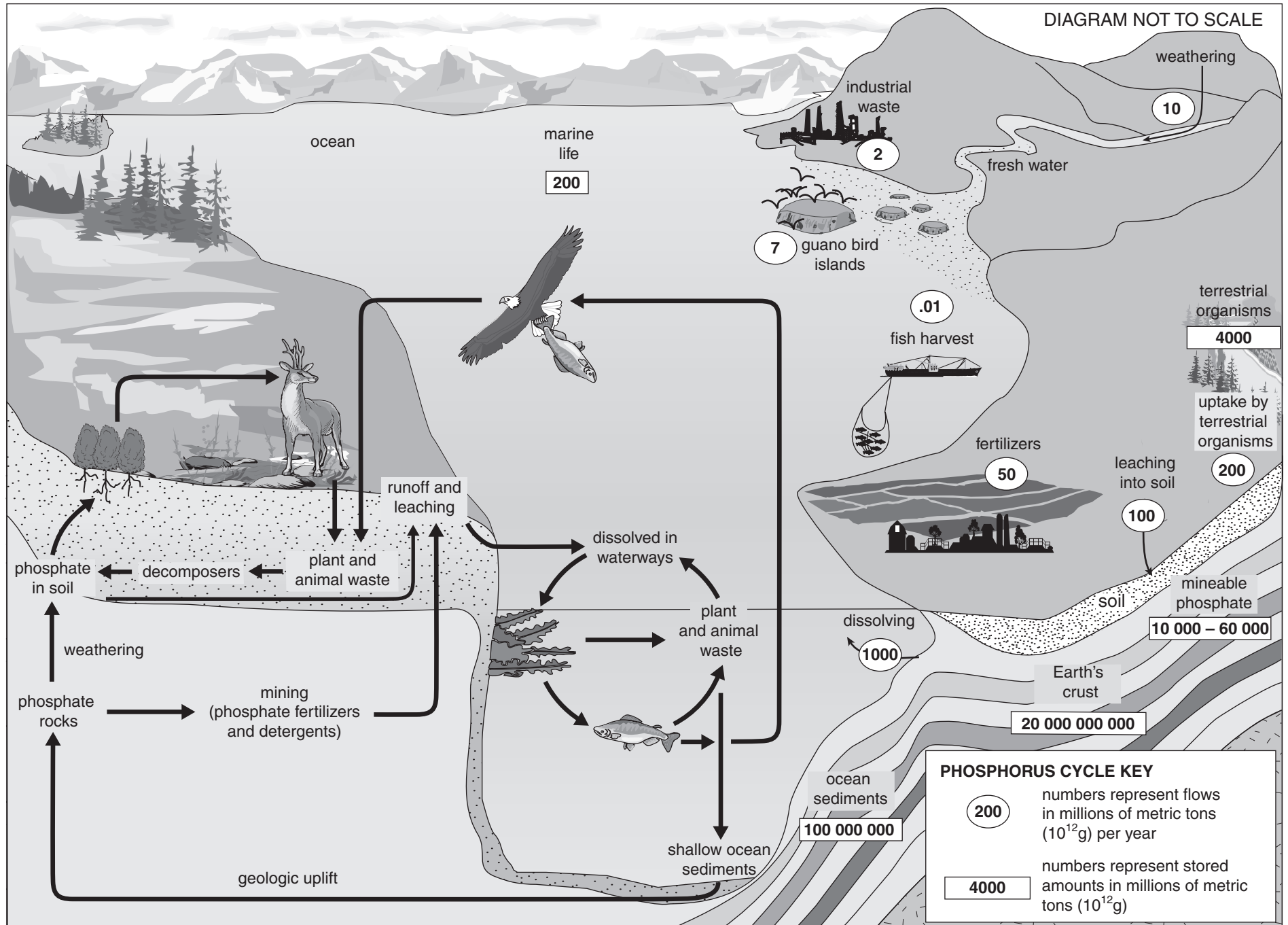
- Divergent boundary
- Convergent boundary
- Transform boundary
- Mountains
- Plate movement relative to the African Plate
- Volcanoes

THE CARBON CYCLE



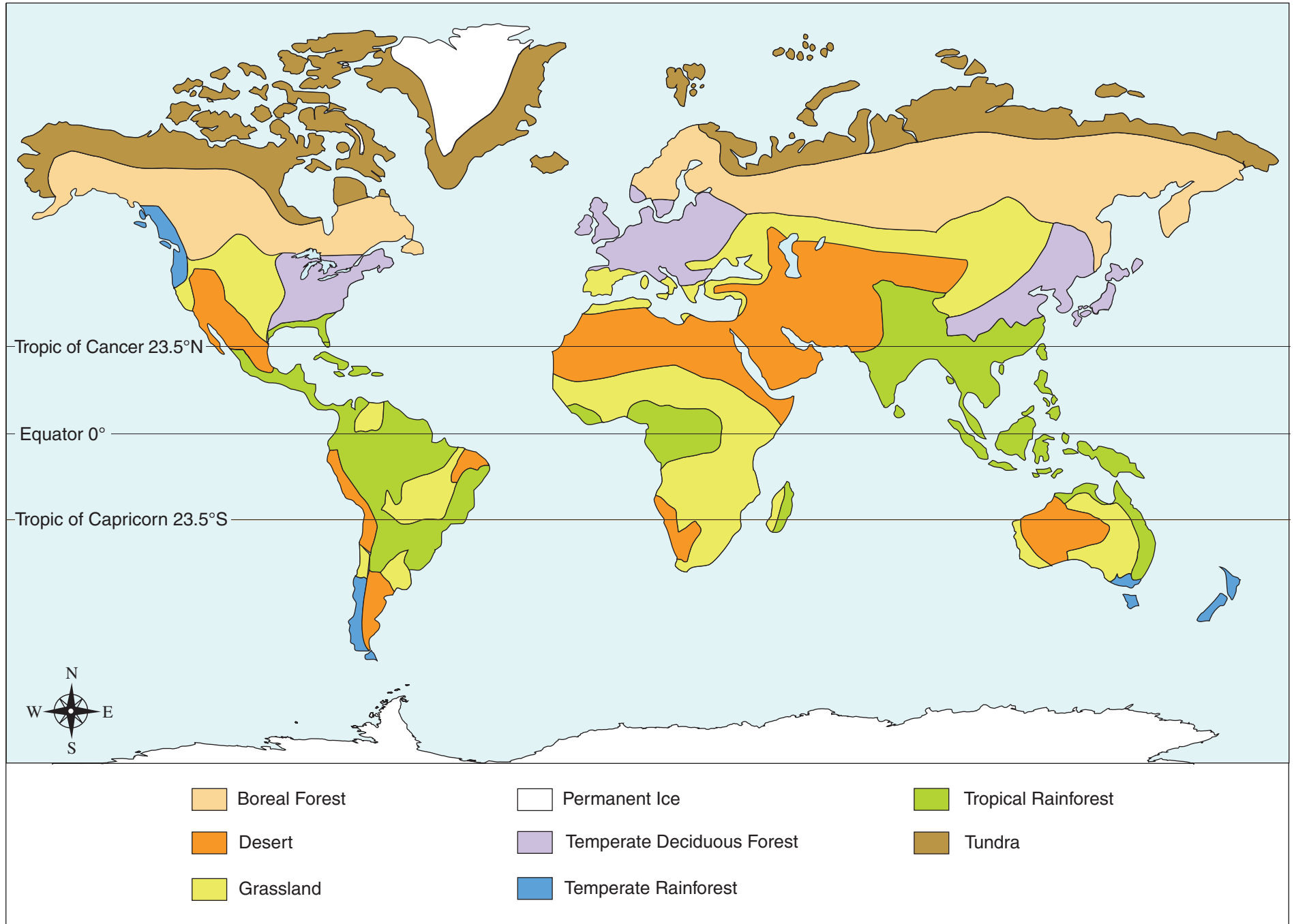
Different sources will provide varying information.

THE PHOSPHORUS CYCLE



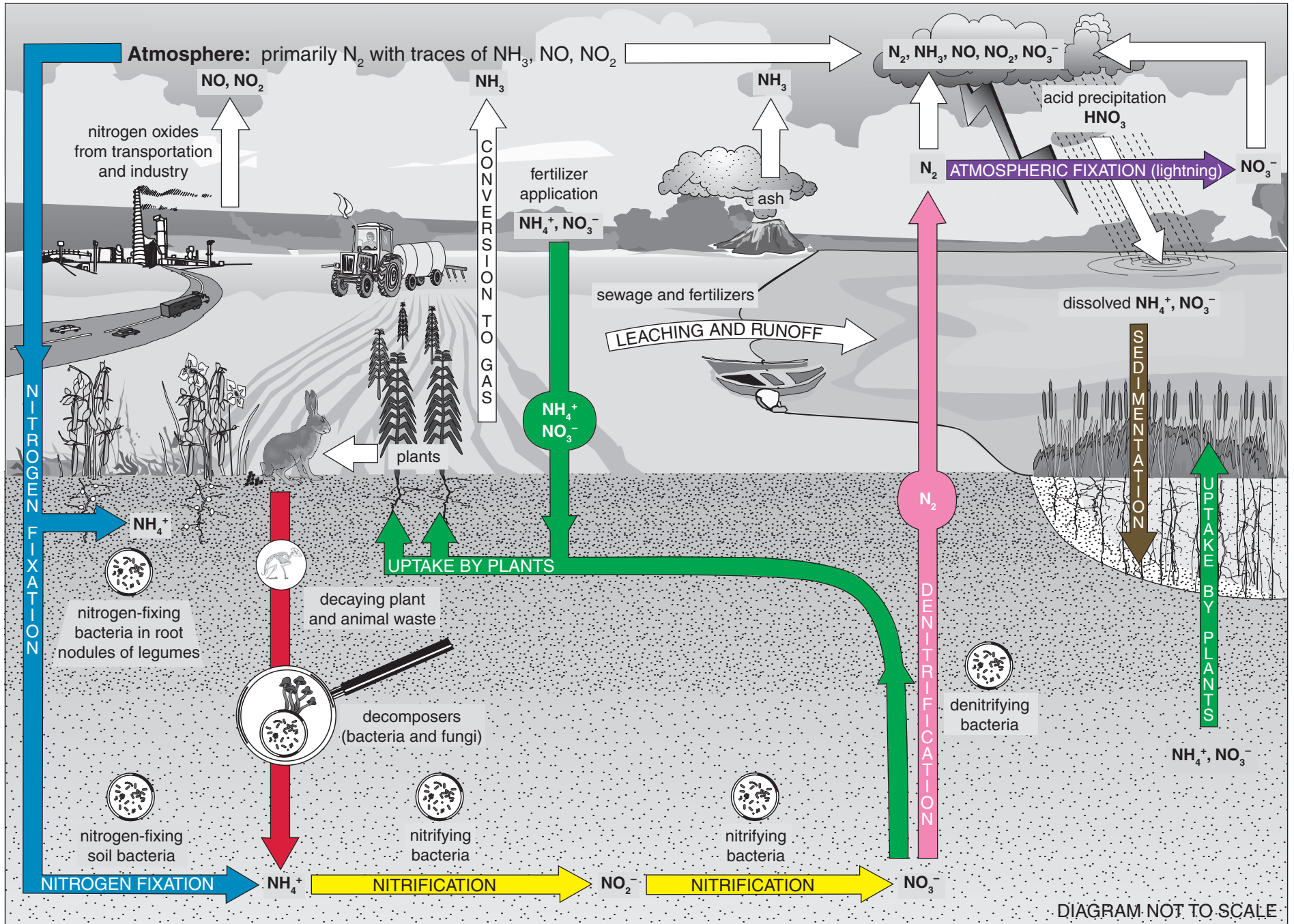
Different sources will provide varying information.

BIOMES OF THE WORLD



Different sources will provide varying information.

THE NITROGEN CYCLE



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	${}^1_1p, {}^1_1\text{H}$	

UNITS AND ABBREVIATIONS

Quantity	Unit	Symbol
distance (d)	metre	m
time (t)	second	s
	minute	min
	hour	h
	year	a

EQUATIONS OF MOTION

$v_{av} = \frac{\Delta d}{\Delta t}$	$a = \frac{\Delta v}{\Delta t}$	$\Delta v = v_f - v_i$
$\Delta d = v_{av} \Delta t$	$\Delta v = a \Delta t$	$v_i = v_f - \Delta v$
$\Delta t = \frac{\Delta d}{v_{av}}$	$\Delta t = \frac{\Delta v}{a}$	$v_f = v_i + \Delta v$