

# Mr. Sloan's Wonderful Periodic Table

The legend denotes the physical state of the elements at exactly 100.00 kPa and 25°C (298.15 K).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																																																																													
<b>1</b> 1.01 2.2 1+ <b>H</b> hydrogen	<table border="1"> <tr><th colspan="3">Physical States</th></tr> <tr> <td>Solids</td> <td>Liquids</td> <td>Gases</td> </tr> </table>				Physical States			Solids	Liquids	Gases	<table border="1"> <tr><th colspan="6">Table of Common Polyatomic Ions</th></tr> <tr> <td>acetate (ethanoate)</td> <td>CH<sub>3</sub>COO<sup>-</sup></td> <td>*hydrogen carbonate</td> <td>HCO<sub>3</sub><sup>-</sup></td> <td>perchlorate</td> <td>ClO<sub>4</sub><sup>-</sup></td> </tr> <tr> <td>ammonium</td> <td>NH<sub>4</sub><sup>+</sup></td> <td>hydrogen oxalate</td> <td>HOOCOO<sup>-</sup></td> <td>permanganate</td> <td>MnO<sub>4</sub><sup>-</sup></td> </tr> <tr> <td>benzoate</td> <td>C<sub>6</sub>H<sub>5</sub>COO<sup>-</sup></td> <td>hydrogen phosphate</td> <td>HPO<sub>4</sub><sup>2-</sup></td> <td>peroxide</td> <td>O<sub>2</sub><sup>2-</sup></td> </tr> <tr> <td>borate</td> <td>BO<sub>3</sub><sup>3-</sup></td> <td>**hydrogen sulfate</td> <td>HSO<sub>4</sub><sup>-</sup></td> <td>persulfide</td> <td>S<sub>2</sub><sup>2-</sup></td> </tr> <tr> <td>carbide</td> <td>C<sub>2</sub><sup>2-</sup></td> <td>hydrogen sulfide</td> <td>HS<sup>-</sup></td> <td>phosphate</td> <td>PO<sub>4</sub><sup>3-</sup></td> </tr> <tr> <td>carbonate</td> <td>CO<sub>3</sub><sup>2-</sup></td> <td>hydrogen sulfite</td> <td>HSO<sub>3</sub><sup>-</sup></td> <td>silicate</td> <td>SiO<sub>3</sub><sup>2-</sup></td> </tr> <tr> <td>chlorate</td> <td>ClO<sub>3</sub><sup>-</sup></td> <td>hydroxide</td> <td>OH<sup>-</sup></td> <td>sulfate</td> <td>SO<sub>4</sub><sup>2-</sup></td> </tr> <tr> <td>chlorite</td> <td>ClO<sub>2</sub><sup>-</sup></td> <td>hypochlorite</td> <td>OCl<sup>-</sup> or ClO<sup>-</sup></td> <td>sulfite</td> <td>SO<sub>3</sub><sup>2-</sup></td> </tr> <tr> <td>chromate</td> <td>CrO<sub>4</sub><sup>2-</sup></td> <td>iodate</td> <td>IO<sub>3</sub><sup>-</sup></td> <td>thiocyanate</td> <td>SCN<sup>-</sup></td> </tr> <tr> <td>cyanide</td> <td>CN<sup>-</sup></td> <td>nitrate</td> <td>NO<sub>3</sub><sup>-</sup></td> <td>thiosulfate</td> <td>S<sub>2</sub>O<sub>3</sub><sup>2-</sup></td> </tr> <tr> <td>dichromate</td> <td>Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup></td> <td>nitrite</td> <td>NO<sub>2</sub><sup>-</sup></td> <td>*hydrogen carbonate = bicarbonate</td> <td></td> </tr> <tr> <td>dihydrogen phosphate</td> <td>H<sub>2</sub>PO<sub>4</sub><sup>-</sup></td> <td>oxalate</td> <td>OOCOO<sup>2-</sup></td> <td>**hydrogen sulfate = bisulfate</td> <td></td> </tr> </table>						Table of Common Polyatomic Ions						acetate (ethanoate)	CH <sub>3</sub> COO <sup>-</sup>	*hydrogen carbonate	HCO <sub>3</sub> <sup>-</sup>	perchlorate	ClO <sub>4</sub> <sup>-</sup>	ammonium	NH <sub>4</sub> <sup>+</sup>	hydrogen oxalate	HOOCOO <sup>-</sup>	permanganate	MnO <sub>4</sub> <sup>-</sup>	benzoate	C <sub>6</sub> H <sub>5</sub> COO <sup>-</sup>	hydrogen phosphate	HPO <sub>4</sub> <sup>2-</sup>	peroxide	O <sub>2</sub> <sup>2-</sup>	borate	BO <sub>3</sub> <sup>3-</sup>	**hydrogen sulfate	HSO <sub>4</sub> <sup>-</sup>	persulfide	S <sub>2</sub> <sup>2-</sup>	carbide	C <sub>2</sub> <sup>2-</sup>	hydrogen sulfide	HS <sup>-</sup>	phosphate	PO <sub>4</sub> <sup>3-</sup>	carbonate	CO <sub>3</sub> <sup>2-</sup>	hydrogen sulfite	HSO <sub>3</sub> <sup>-</sup>	silicate	SiO <sub>3</sub> <sup>2-</sup>	chlorate	ClO <sub>3</sub> <sup>-</sup>	hydroxide	OH <sup>-</sup>	sulfate	SO <sub>4</sub> <sup>2-</sup>	chlorite	ClO <sub>2</sub> <sup>-</sup>	hypochlorite	OCl <sup>-</sup> or ClO <sup>-</sup>	sulfite	SO <sub>3</sub> <sup>2-</sup>	chromate	CrO <sub>4</sub> <sup>2-</sup>	iodate	IO <sub>3</sub> <sup>-</sup>	thiocyanate	SCN <sup>-</sup>	cyanide	CN <sup>-</sup>	nitrate	NO <sub>3</sub> <sup>-</sup>	thiosulfate	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup>	dichromate	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup>	nitrite	NO <sub>2</sub> <sup>-</sup>	*hydrogen carbonate = bicarbonate		dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	oxalate	OOCOO <sup>2-</sup>	**hydrogen sulfate = bisulfate		<table border="1"> <tr><th colspan="4">Legend for Different Groups of Elements</th></tr> <tr> <td>Alkali Metals</td> <td>Alkaline Earth Metals</td> <td>Metalloids</td> <td>Other Non-Metals</td> </tr> <tr> <td>Transitional Metals</td> <td>Post-transitional Metals</td> <td>Halogens</td> <td>Noble Gases</td> </tr> </table>		Legend for Different Groups of Elements				Alkali Metals	Alkaline Earth Metals	Metalloids	Other Non-Metals	Transitional Metals	Post-transitional Metals	Halogens	Noble Gases	<b>1</b> 1.01 2.2 1- <b>H</b> hydrogen	<b>2</b> 4.00 - - <b>He</b> helium
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<b>11</b> 22.99 0.9 1+ <b>Na</b> sodium	<b>12</b> 24.31 1.3 2+ <b>Mg</b> magnesium	<table border="1"> <tr><th colspan="2">ion charges - the 1st number is the most common ion, followed by other charges.</th></tr> <tr> <td>1st number</td> <td>most common ion</td> </tr> <tr> <td>2nd number</td> <td>other charges</td> </tr> </table>		ion charges - the 1st number is the most common ion, followed by other charges.		1st number	most common ion	2nd number	other charges	<b>13</b> 26.98 1.6 3+ <b>Al</b> aluminum	<b>14</b> 28.09 1.69 - <b>Si</b> silicon	<b>15</b> 30.97 2.2 3- <b>P</b> phosphorus	<b>16</b> 32.07 2.6 2- <b>S</b> sulfur	<b>17</b> 35.45 3.2 1- <b>Cl</b> chlorine	<b>18</b> 39.95 - - <b>Ar</b> argon																																																																																															
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<b>19</b> 39.10 0.8 1+ <b>K</b> potassium	<b>20</b> 40.08 1.0 2+ <b>Ca</b> calcium	<b>21</b> 44.96 1.4 3+ <b>Sc</b> scandium	<b>22</b> 47.87 1.5 4+, 3+ <b>Ti</b> titanium	<b>23</b> 50.94 1.6 5+, 4+ <b>V</b> vanadium	<b>24</b> 52.00 1.7 3+, 2+ <b>Cr</b> chromium	<b>25</b> 54.94 1.6 2+, 4+ <b>Mn</b> manganese	<b>26</b> 55.85 1.8 3+, 2+ <b>Fe</b> iron	<b>27</b> 58.93 1.9 2+, 3+ <b>Co</b> cobalt	<b>28</b> 58.69 1.9 2+, 3+ <b>Ni</b> nickel	<b>29</b> 63.55 1.9 2+, 1+ <b>Cu</b> copper	<b>30</b> 65.41 1.7 2+ <b>Zn</b> zinc	<b>31</b> 69.72 1.8 3+ <b>Ga</b> gallium	<b>32</b> 72.64 1.6 4+ <b>Ge</b> germanium	<b>33</b> 74.92 2.2 3- <b>As</b> arsenic	<b>34</b> 78.96 2.6 2- <b>Se</b> selenium	<b>35</b> 79.90 3.0 1- <b>Br</b> bromine	<b>36</b> 83.80 - - <b>Kr</b> krypton																																																																																													
<b>37</b> 85.47 0.8 1+ <b>Rb</b> rubidium	<b>38</b> 87.62 1.0 2+ <b>Sr</b> strontium	<b>39</b> 88.91 1.2 3+ <b>Y</b> yttrium	<b>40</b> 91.22 1.3 4+ <b>Zr</b> zirconium	<b>41</b> 92.91 1.6 5+, 3+ <b>Nb</b> niobium	<b>42</b> 95.94 2.2 6+ <b>Mo</b> molybdenum	<b>43</b> (98) 2.1 7+ <b>Tc</b> technetium	<b>44</b> 101.07 2.2 3+ <b>Ru</b> ruthenium	<b>45</b> 102.91 2.3 3+ <b>Rh</b> rhodium	<b>46</b> 106.42 2.2 2+, 3+ <b>Pd</b> palladium	<b>47</b> 107.87 1.9 1+ <b>Ag</b> silver	<b>48</b> 112.41 1.7 2+ <b>Cd</b> cadmium	<b>49</b> 114.82 1.8 3+ <b>In</b> Indium	<b>50</b> 118.71 2.0 4+, 2+ <b>Sn</b> tin	<b>51</b> 121.76 2.1 3+, 5+ <b>Sb</b> antimony	<b>52</b> 127.60 2.1 2- <b>Te</b> tellurium	<b>53</b> 126.90 2.7 1- <b>I</b> iodine	<b>54</b> 131.29 2.6 - <b>Xe</b> xenon																																																																																													
<b>55</b> 132.91 0.8 1+ <b>Cs</b> cesium	<b>56</b> 137.33 0.9 2+ <b>Ba</b> barium	<b>57-71</b>	<b>72</b> 178.49 1.3 4+ <b>Hf</b> hafnium	<b>73</b> 180.95 1.5 5+ <b>Ta</b> tantalum	<b>74</b> 183.84 1.7 6+ <b>W</b> tungsten	<b>75</b> 186.21 1.9 7+ <b>Re</b> rhenium	<b>76</b> 190.23 2.2 4+ <b>Os</b> osmium	<b>77</b> 192.22 1.8 4+ <b>Ir</b> iridium	<b>78</b> 195.08 2.2 4+, 2+ <b>Pt</b> platinum	<b>79</b> 196.97 2.4 3+, 1+ <b>Au</b> gold	<b>80</b> 200.59 1.9 2+, 1+ <b>Hg</b> mercury	<b>81</b> 204.38 1.8 1+, 3+ <b>Tl</b> thallium	<b>82</b> 207.2 1.8 2+, 4+ <b>Pb</b> lead	<b>83</b> 208.98 1.9 3+, 5+ <b>Bi</b> bismuth	<b>84</b> (209) 2.0 2+, 4+ <b>Po</b> polonium	<b>85</b> (210) 2.2 - <b>At</b> astatine	<b>86</b> (222) - - <b>Rn</b> radon																																																																																													
<b>87</b> (223) 0.7 1+ <b>Fr</b> francium	<b>88</b> (226) 0.9 2+ <b>Ra</b> radium	<b>89-103</b>	<b>104</b> (261) 4+ <b>Rf</b> rutherfordium	<b>105</b> (262) <b>Db</b> dubnium	<b>106</b> (266) <b>Sg</b> seaborgium	<b>107</b> (264) <b>Bh</b> bohrium	<b>108</b> (277) <b>Hs</b> hassium	<b>109</b> (268) <b>Mt</b> meitnerium	<b>110</b> (271) <b>Ds</b> darmstadtium	<b>111</b> (272) <b>Rg</b> roentgenium																																																																																																				

Lanthanides

<b>57</b> 138.91 1.1 3+ <b>La</b> lanthanum	<b>58</b> 140.12 1.1 3+ <b>Ce</b> cerium	<b>59</b> 140.91 1.1 3+ <b>Pr</b> praseodymium	<b>60</b> 144.24 1.1 3+ <b>Nd</b> neodymium	<b>61</b> (145) - 3+ <b>Pm</b> promethium	<b>62</b> 150.36 1.2 3+, 2+ <b>Sm</b> samarium	<b>63</b> 151.96 - 3+, 2+ <b>Eu</b> europium	<b>64</b> 157.25 1.2 3+ <b>Gd</b> gadolinium	<b>65</b> 158.93 - 3+ <b>Tb</b> terbium	<b>66</b> 162.50 1.2 3+ <b>Dy</b> dysprosium	<b>67</b> 164.93 1.2 3+ <b>Ho</b> holmium	<b>68</b> 167.26 1.2 3+ <b>Er</b> erbium	<b>69</b> 168.93 1.3 3+ <b>Tm</b> thulium	<b>70</b> 173.04 - 3+, 2+ <b>Yb</b> ytterbium	<b>71</b> 174.97 1.0 3+ <b>Lu</b> lutetium
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Actinides

<b>89</b> (227) 1.1 3+ <b>Ac</b> actinium	<b>90</b> 232.04 1.3 4+ <b>Th</b> thorium	<b>91</b> 231.04 1.5 5+, 4+ <b>Pa</b> protactinium	<b>92</b> 238.03 1.7 6+, 4+ <b>U</b> uranium	<b>93</b> (237) 1.3 5+ <b>Np</b> neptunium	<b>94</b> (244) 1.3 4+, 6+ <b>Pu</b> plutonium	<b>95</b> (243) - 3+, 4+ <b>Am</b> americium	<b>96</b> (247) - 3+ <b>Cm</b> curium	<b>97</b> (247) - 3+, 4+ <b>Bk</b> berkelium	<b>98</b> (251) - 3+ <b>Cf</b> californium	<b>99</b> (252) - 3+ <b>Es</b> einsteinium	<b>100</b> (257) - 3+ <b>Fm</b> fermium	<b>101</b> (258) - 2+, 3+ <b>Md</b> mendelevium	<b>102</b> (259) - 2+, 3+ <b>No</b> nobelium	<b>103</b> (262) 1.5 3+ <b>Lr</b> lawrencium
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# Mr. Sloan's Wonderful Periodic Table

Selected SI Prefixes		
Prefix	Exponential Symbol	Value
tera	T	10 <sup>12</sup>
giga	G	10 <sup>9</sup>
mega	M	10 <sup>6</sup>
kilo	K	10 <sup>3</sup>
milli	m	10
micro	μ	10 <sup>-6</sup>
nano	n	10 <sup>-9</sup>
pico	p	10 <sup>-12</sup>

Solubility of Some Common Ionic Compounds in Water at 298.15 K								
Ion	H <sup>+</sup> Na <sup>+</sup> , K <sup>+</sup> NH <sub>4</sub> <sup>+</sup> , NO <sub>3</sub> <sup>-</sup> ClO <sub>3</sub> <sup>-</sup> , ClO <sub>4</sub> <sup>-</sup> CH <sub>3</sub> COO <sup>-</sup>	F <sup>-</sup>	Cl <sup>-</sup> Br <sup>-</sup> I <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	CO <sub>3</sub> <sup>2-</sup> PO <sub>4</sub> <sup>3-</sup> SO <sub>3</sub> <sup>2-</sup>	IO <sub>3</sub> <sup>-</sup> OOCOO <sup>2-</sup>	S <sup>2-</sup>	OH <sup>-</sup>
Solubility greater than or equal to 0.1 mol/L (very soluble)	most	most	most	most	H <sup>+</sup> Na <sup>+</sup> K <sup>+</sup> NH <sub>4</sub> <sup>+</sup>	H <sup>+</sup> Na <sup>+</sup> K <sup>+</sup> NH <sub>4</sub> <sup>+</sup> Li <sup>+</sup> Ni <sup>2+</sup> Zn <sup>2+</sup> Co(IO <sub>3</sub> ) <sub>2</sub> Fe <sub>2</sub> (OOCOO) <sub>3</sub>	H <sup>+</sup> Na <sup>+</sup> K <sup>+</sup> NH <sub>4</sub> <sup>+</sup> Li <sup>+</sup> Mg <sup>2+</sup> Ca <sup>2+</sup>	H <sup>+</sup> Na <sup>+</sup> K <sup>+</sup> NH <sub>4</sub> <sup>+</sup> Li <sup>+</sup> Sr <sup>2+</sup> Ca <sup>2+</sup> Ba <sup>2+</sup>
Solubility less than 0.1 mol/L (slightly soluble)	RbClO <sub>4</sub> CsClO <sub>4</sub> AgCH <sub>3</sub> COO Hg <sub>2</sub> (CH <sub>3</sub> COO) <sub>2</sub>	Li <sup>+</sup> Mg <sup>2+</sup> Ca <sup>2+</sup> Sr <sup>2+</sup> Ba <sup>2+</sup> Fe <sup>2+</sup> Hg <sub>2</sub> <sup>2+</sup> Pb <sup>2+</sup>	Cu <sup>+</sup> Ag <sup>+</sup> Hg <sub>2</sub> <sup>2+</sup> Hg <sup>2+</sup> Pb <sup>2+</sup>	Ca <sup>2+</sup> Sr <sup>2+</sup> Ba <sup>2+</sup> Ag <sup>+</sup> Hg <sub>2</sub> <sup>2+</sup> Pb <sup>2+</sup>	most  <b>Exceptions:</b> Li <sub>2</sub> CO <sub>3</sub> is soluble	most  <b>Exceptions:</b> Co(IO <sub>3</sub> ) <sub>2</sub> Fe <sub>2</sub> (C <sub>2</sub> O <sub>4</sub> ) <sub>3</sub> are soluble	most	most

Common Molecular Names	
water	H <sub>2</sub> O(l)
hydrogen peroxide	H <sub>2</sub> O <sub>2</sub> (l)
hydrogen sulfide	H <sub>2</sub> S(g)
glucose	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> (s)
sucrose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub> (s)
ammonia	NH <sub>3</sub> (g)
hydrazine	N <sub>2</sub> H <sub>4</sub> (l)
methane	CH <sub>4</sub> (g)
ethane	C <sub>2</sub> H <sub>6</sub> (g)
propane	C <sub>3</sub> H <sub>8</sub> (g)
butane	C <sub>4</sub> H <sub>10</sub> (g)
pentane	C <sub>5</sub> H <sub>12</sub> (l)
benzene	C <sub>6</sub> H <sub>6</sub> (l)
methanol	CH <sub>3</sub> OH(l)
ethanol	C <sub>2</sub> H <sub>5</sub> OH(l)

Key to Naming Acids (Common Name to Classic Name)			Examples		
hydrogen ____ ide	becomes	hydro ____ ic acid	Molecular Name	Classic Acid Name	Modern Acid Name
hydrogen ____ ide	becomes	hydro ____ ic acid	hydrogen chloride	hydrochloric acid	aqueous hydrogen chloride
hydrogen ____ ate	becomes	____ ic acid	hydrogen chlorate	chloric acid	aqueous hydrogen chlorate
hydrogen ____ ite	becomes	____ ous acid	hydrogen chlorite	chlorous acid	aqueous hydrogen chlorite

Key to Naming Acids (Classic Name to Common Name)		
hydro ____ ic acid	becomes	hydrogen ____ ide
____ ic acid	becomes	hydrogen ____ ate
____ ous acid	becomes	hydrogen ____ ite

Key for naming some complex ions	
* ____ ate	most common
per ____ ate	1 more oxygen
____ ite	1 less oxygen
hypo ____ ite	2 less oxygen
thio ____	1 less oxygen & 1 more sulfur
bi-	1 H <sup>+</sup> added