

|   |  |   |  |   |  |
|---|--|---|--|---|--|
| <p><b>LENGTH/VELOCITY</b><br/>                 10008 Km = pole to equat<br/>                 1 mile = 5280 feet<br/>                 = 1000 Roman 2 steps<br/>                 1 foot = Charlemane's<br/>                 1 cubit = elbow to finger<br/>                 1 fathom = 6ft arm/arm<br/>                 1 furlong = 1/8 mile<br/>                 =10 chains<br/>                 1 naut mile = 6080 ft<br/>                 =1 minute of a degree<br/>                 1 league = 3 naut mile<br/>                 1 in = 2.54 cm<br/>                 1A = 1E-10 meters<br/>                 1 parsec = 3.084E13 Km<br/>                 Light = 2.99795E8 m/s<br/>                 Sound = 1127 ft/sec<br/>                 1 mile/hour = 1.47ft/s</p> <p><b>AREA</b><br/>                 1 acre = 1 oxen/day<br/>                 = 10 square chains<br/>                 1 mile^2 = 640 acres<br/>                 1 hectare = 10E4 m^2<br/>                 1 circular mil<br/>                 = (PI/4)E-6 in^2</p> <p><b>MonthlyPayments=</b><br/>                 Prin(I/(1-(1+i)^-N)<br/>                 i=Int/12 N=#months</p> <p>trillion 10^18<br/>                 billion 10^12<br/>                 exa ^18 deci ^-1<br/>                 petra^15 centi ^-2<br/>                 tera ^12 milli ^-3<br/>                 giga ^9 micro ^-6<br/>                 mega ^6 nano ^-9<br/>                 kilo ^3 pico ^-12<br/>                 hecto^2 femto ^-15<br/>                 deka^+1 atto ^-18</p> <p><b>GAS</b><br/>                 1 Atm= 76.0 cm Hg<br/>                 =14.7 lbf/in<br/>                 =101.3KPa<br/>                 1 pascal=N/m^2<br/>                 1 torr = 1mm Hg<br/>                 1 millibar = 100 Pa<br/>                 1 mole = 6.022045E23<br/>                 volume = 22.4138 liter<br/>                 PV =RT R = 8.31441J/K<br/>                 Air = 1.29grams/liter<br/>                 =75%N,21%O, 9.4%Inert,<br/>                 .04%CO2,0.2%H2O</p> | <p><b>VOLUME</b><br/>                 1 liter= 1000 cm^3<br/>                 = 1 Kgm H2O<br/>                 1 milliliter = 1cm^3<br/>                 1 fl oz = 30 cm^3<br/>                 = 1/16 pint<br/>                 1 tsp = 5 cm^3<br/>                 1 Tbsp= 15 cm^3<br/>                 1 cup = 1/2 pint<br/>                 1 quart = 2 pints<br/>                 = .9353 liters<br/>                 1 Gallon = 4 quarts<br/>                 1 Bushel = 8 Gal<br/>                 = 4 Pecks<br/>                 1 Gill = 1/4 pint</p> <p><b>MASS and FORCE</b><br/>                 1 Kg = 1liter H2O<br/>                 = 2.2046 lbs<br/>                 = .0685 slugs<br/>                 1Kgf = 9.807 Newtons<br/>                 1 lbf =slug weight<br/>                 = 4.448 Newtons<br/>                 1 lbm =16 ozm<br/>                 1 ozm = 28.35 grams<br/>                 = 437.5 grains<br/>                 1 metric ton = 1000Kg<br/>                 1 ton short = 2000lb<br/>                 g = 32.1740 ft/sec^2<br/>                 = 9.807 m/sec^2</p> <p><b>ENERGY</b><br/>                 1 cal = 1gm H2O 1C<br/>                 = 4.186 joules<br/>                 1 BTU = 1lb H2O 1F<br/>                 = 778.28 ft-lbs<br/>                 1 Therm = 1E5 BTU<br/>                 1 cordwood = 4X4X8 ft<br/>                 = about 240 Therms<br/>                 1 Watt = 3.413 BTU/hr<br/>                 = 860 cal/hour<br/>                 1 ft-lb = 1.356 watt<br/>                 1 horsepower = 746 watt<br/>                 = 550 ft-lb/sec<br/>                 Man = 3 Megcal/day<br/>                 = 3/4 pounds fat<br/>                 running = 600Kcal/hour<br/>                 walking = 200 sit = 100<br/>                 1 Phon = 2E-5 N/M^2</p> <p>R=F+459.67<br/>                 K=C+273.15</p> <p><b>NUCLEAR</b><br/>                 Fusion = 2 E8 ev/atom<br/>                 ev = 1.6 E-19 Joules<br/>                 U235 1 mole =235 grams<br/>                 criticalmass U235 = 20 lbs<br/>                 1/2 life Neut = 12 min</p> | <p><b>ELECTRIC</b><br/>                 Weber =Joul/Amp<br/>                 Tesla = Weber/m^2<br/>                 Gauss =1E-10W/cm^2<br/>                 B = uH V = NA^db/dt NI=HL<br/>                 Energy = V^2*C/2 = eE^2/2<br/>                 i^2*I/2 = uH^2/2 P = HxE</p> <p><b>LIGHT</b><br/>                 Red/Yellow/Violet<br/>                 = .7um/.6/.45um<br/>                 1 ftcandle = 1Lum/ft^2<br/>                 1 sphere = 4*PI*ster<br/>                 1 Lumen = candelaster<br/>                 40 Watts = 40 candlePwr<br/>                 100 Watts = 125 candlePwr<br/>                 12.56 Lumens=1candlePwr<br/>                 680 Lum = 1watt @blue<br/>                 photons = wl*watt/h*c<br/>                 Sun = E+5 Lum/meter^2<br/>                 Moon = 3E-1Lm/meter^2</p> <p><b>DENSITY</b><br/>                 H2O=62.431lbm/ft^3<br/>                 =1E+3 Kg/m^3<br/>                 Alum=2.7 Lead=11.3<br/>                 Steel=7.9 Gold=19.3<br/>                 Copper =8.9 Hg=13.6<br/>                 Tin =7.3 Brass=13.6<br/>                 Silver=10.5 Nickel=8.9<br/>                 Silicon=2.42 Sufur=2<br/>                 Air = .0013 H2=.00009</p> <p><b>SPHERE</b><br/>                 S = 4*PI*R^2<br/>                 V = (4*PI*R^3)/3<br/>                 C = 2.9979245E8 m/s<br/>                 G = 6.67E-11m^3/Kgs^2<br/>                 q = 1.6021892E-19Cou<br/>                 h = 6.626176E-34 J*s<br/>                 N = 6.022045E+23<br/>                 R = 8.3141J/mole*K<br/>                 V = 22.41383 liters<br/>                 k = 1.380662E-23 J/K<br/>                 F = 9.649E4 Cou/mole<br/>                 u = 4*PI*E-7 H/m<br/>                 e = ( 1/36*PI ) *E-9 F/m<br/>                 SB = 5.670E-8W/m^2K^4<br/>                 mn = 1.6749543E-27Kg<br/>                 mp = 1.6726485E-27Kg<br/>                 me = 9.1095344E-31Kg<br/>                 mr = 5.2917706E-11m</p> <p>1 fortnight = fourteen nights</p> | <p><b>PHYSICS</b><br/>                 c = speed of light<br/>                 = 1/(e*u)^1/2<br/>                 Z of space = 377 ohms<br/>                 = (u/e)^1/2<br/>                 e = 1/36E-9 F/meter<br/>                 u = 4*PI*E-7 Henry/m<br/>                 c = (S/u)^1/2<br/>                 S = tension on wire<br/>                 = pressure per volume<br/>                 u = mass per length<br/>                 = mass per volume</p> <p>Force = Kqq'/r^2<br/>                 k = e for electric<br/>                 and q = coulombs<br/>                 k = G for gravity<br/>                 and q = mass<br/>                 Magnetic Force=<br/>                 1Amp=2E-7 Newtons/m</p> <p>energy per degree free<br/>                 = (1/2)*m*v^2<br/>                 = (3/2)*nRt , R/No=k<br/>                 No = 6.02 E+23<br/>                 heat capacity diatom gas<br/>                 = 4.98 cal/mole*C<br/>                 Max-Boltzman distr=<br/>                 # atoms/vel ran=dN/dv<br/>                 4N/PI^*(1/2)*<br/>                 (m/2KT)^(3/2)*<br/>                 v^2*exp^-(mV^2/2kT)</p> <p>Entropy =ds<br/>                 ds = dQ/T delta heat/temp<br/>                 Uncertainty<br/>                 = dE*dt-dp*dx-h/(2PI)<br/>                 QUANTUM NUMBERS<br/>                 s,p,d,f sharp,principal,<br/>                 diffuse,fundamental<br/>                 2,6,10,14<br/>                 n=energy quantum<br/>                 l=orbit angle momen quan<br/>                 l=0,1,...n-1<br/>                 ml= orbital magnet quant<br/>                 ml=-l,...-1,0,1,...l<br/>                 s=electron spin quant<br/>                 s= 1/2,-1/2</p> <p><b>LINEAR EXPAN/C</b><br/>                 Alum 23 (E-6/C)<br/>                 Copper 17/Steel 6.5<br/>                 Glass?1.2-2.7/Hg?18<br/>                 Gold 14/Lead 28<br/>                 Nickel 13/Silver 19<br/>                 latinum 8.9/</p> | <p><b>SNELL'S LAW</b><br/>                 n*sin@=n'sin@<br/>                 400nm to 700nm<br/>                 index for wavelength<br/>                 flint glass 1.65-1.61<br/>                 crown glass 1.52-1.505<br/>                 fused quartz 1.47-1.46<br/>                 1/s+1/s'=1/f</p> <p><b>SOUND PRESSURE</b><br/>                 sound press level<br/>                 =SPL=20logP/.0002<br/>                 P measured in bars<br/>                 1 bar = 1ATM<br/>                 l=P^2/p*c<br/>                 l=sound intensity<br/>                 p,c=density,speed<br/>                 of sound in air<br/>                 .0002ubars=<br/>                 lref(0dB)=<br/>                 1E-16 watts/cm2</p> <p><b>TV DATA</b><br/>                 Horz = 15734.24<br/>                 =2/455 times Chroma<br/>                 Vert =59.94Hz =2/52H<br/>                 Horz blank = 18 H<br/>                 Vert blank= 21H<br/>                 Color Vector<br/>                 red x=.67 y=.33<br/>                 blue x=.21 y=.71<br/>                 green x=.14 y=.08<br/>                 Video 45.75 Meg<br/>                 Sound 41.25 Meg</p> <p><b>POWER</b><br/>                 cord wood =240 therms<br/>                 Nat Gas 1000 BTU/ft^3<br/>                 Gasoline 11E3 cal/gm<br/>                 R-30 FACTOR =1/30<br/>                 BTU/ft^2 @ 1ft/hr<br/>                 walls 20 windows 2<br/>                 man =100Kcal/hr sitting<br/>                 WINDPOWER<br/>                 P=(E*M*PI^D^2*V^3)/8<br/>                 E =efficient =38%<br/>                 M= mass air =.08 lb/ft^3<br/>                 D = dia blades<br/>                 V= velocity wind</p> <p>Wood=\$1/Therm<br/>                 Gas = \$.4/Therm<br/>                 Electric=\$2.70/Therm<br/>                 Therm=27.77KWhr</p> | <p>Mass earth =5.975E24Kgm<br/>                 49%O,26%Si,7.5%Al<br/>                 4.7%Fe,3.4%Ca,2.6%Na<br/>                 2.4%K,1.9%Mg,0.9%H2<br/>                 0.6%Ti,0.7% other<br/>                 Mass sun =1.99E30Kgm<br/>                 Mass moon=7.35E22Kgm<br/>                 1AU =to sun =1.49E11m<br/>                 to moon=3.84E8m<br/>                 Dia sun=1.39E9m<br/>                 Dia moon =1.738<br/>                 Earth incline 23.45 deg</p> <p><b>SILICON</b><br/>                 5.00E22 Atom/cm^3<br/>                 Diamond 8 atoms/unit<br/>                 5.43 A lattice constant<br/>                 energy gap 1.11eV<br/>                 ni = 1.45E10/cm^3<br/>                 mobity 1350cm^2/sec<br/>                 480 cm^2/sec holes<br/>                 Breakdown field 30v/u<br/>                 Glass 600V/u<br/>                 Dielectric =11.7 Si<br/>                 Thermal expansion =3.9<br/>                 Dielectric glass =3.9<br/>                 2.5E-6 Si<br/>                 5E-6 Glass<br/>                 Specific heat .76joule/g*C<br/>                 1.0 Joule/g*C<br/>                 thermal conductive<br/>                 =84 Watts/meter*C</p> <p><b>ELECTRIC</b><br/>                 Resistance =p*(1+aT)<br/>                 ohms*m / 1/ C<br/>                 Alum 2.63E-8/.0039<br/>                 Carbon 3.5E-5/.0005<br/>                 Copper 1.72E-8/.00393<br/>                 Silver 1.47E-8/.0038<br/>                 Gold 2.44E-8/.0034<br/>                 Glass 10E10-10E14<br/>                 DIELECTRIC<br/>                 Air 1/Glass 5-10/TIO 173</p> <p><b>THERMALCOUPLE</b><br/>                 =a*T + (1/2)*b*T^2<br/>                 Alum -.47/.003 uV/C<br/>                 Copper 2.76/.012 uV/C<br/>                 Gold 2.90/.0093 uV/C<br/>                 Iron 16.6/-.030 uV/C<br/>                 Nickel 19.1/-.030 uV/C<br/>                 Silver 2.50/.012 uV/C<br/>                 Platinum 2.5/.012 uV/C<br/>                 Steel 10.8/-.016 uV/C</p> |
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| <p><b>RICHTER EARTHQUAKE SCALE</b></p> <table border="1"> <thead> <tr> <th>Richter Magnitude</th> <th>Mercalli Intensity</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>I</td> <td>Usually not felt, detected by instruments.</td> </tr> <tr> <td>2</td> <td>II</td> <td>Felt by few, especially on upper floors of buildings, detected by instruments.</td> </tr> <tr> <td>3</td> <td>III</td> <td>Felt noticeably indoors, vibration likes passing vehicle, cars may rock.</td> </tr> <tr> <td></td> <td>IV</td> <td>Felt indoors by many, outdoors by few, dishes &amp; doors disturbed, like heavy truck nearby, walls-cracking sound.</td> </tr> <tr> <td>4</td> <td>V</td> <td>Felt by most people, slight damage; some dishes &amp; windows broken, some cracked plaster, trees disturbed.</td> </tr> <tr> <td>5</td> <td>VI</td> <td>Felt by all, many frightened and run outdoors, damage minor to moderate.</td> </tr> <tr> <td>5 to 6</td> <td>VII</td> <td>Everyone runs outdoors, much damage to poor design buildings, minor damage to good design buildings. some chimneys broken, noticed by people driving cars.</td> </tr> <tr> <td>6</td> <td>VIII</td> <td>Everyone runs outdoors, damage is moderate to major. 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Richter Magnitudes are measured on instruments.</p> <p>Mercalli intensity is based on actual observations of the resulting damage, and therefore can not be measured on instruments.</p> <p><b>HUMAN_BODY_COMPOSITION</b></p> <table border="1"> <thead> <tr> <th>Element</th> <th>Percent (1)</th> </tr> </thead> <tbody> <tr><td>Oxygen</td><td>65</td></tr> <tr><td>Carbon</td><td>18</td></tr> <tr><td>Hydrogen</td><td>10</td></tr> <tr><td>Nitrogen</td><td>3</td></tr> <tr><td>Calcium</td><td>1.5</td></tr> <tr><td>Phosphorus</td><td>1.0</td></tr> <tr><td>Magnesium</td><td>0.05</td></tr> <tr><td>Iron</td><td>0.008</td></tr> <tr><td>Zinc</td><td>0.0033</td></tr> <tr><td>Rubidium</td><td>0.00170</td></tr> <tr><td>Zirconium</td><td>0.00035</td></tr> <tr><td>Strontium</td><td>0.00020</td></tr> <tr><td>Aluminum</td><td>0.00014</td></tr> <tr><td>Copper</td><td>0.00014</td></tr> <tr><td>Antimony</td><td>0.00013</td></tr> <tr><td>Lead</td><td>0.00011</td></tr> <tr><td>Cadmium</td><td>0.000043</td></tr> <tr><td>Tin</td><td>0.000043</td></tr> <tr><td>Manganese</td><td>0.00003</td></tr> <tr><td>Vanadium</td><td>0.00003</td></tr> <tr><td>Barium</td><td>0.000023</td></tr> <tr><td>Titanium</td><td>0.00002</td></tr> <tr><td>Boron</td><td>0.000014</td></tr> <tr><td>Chromium</td><td>0.000008</td></tr> <tr><td>Cobalt</td><td>0.000004</td></tr> <tr><td>Molybdenum</td><td>0.000007</td></tr> </tbody> </table> | Element | Percent (1) | Oxygen | 65 | Carbon | 18 | Hydrogen | 10 | Nitrogen | 3 | Calcium | 1.5 | Phosphorus | 1.0 | Magnesium | 0.05 | Iron | 0.008 | Zinc | 0.0033 | Rubidium | 0.00170 | Zirconium | 0.00035 | Strontium | 0.00020 | Aluminum | 0.00014 | Copper | 0.00014 | Antimony | 0.00013 | Lead | 0.00011 | Cadmium | 0.000043 | Tin | 0.000043 | Manganese | 0.00003 | Vanadium | 0.00003 | Barium | 0.000023 | Titanium | 0.00002 | Boron | 0.000014 | Chromium | 0.000008 | Cobalt | 0.000004 | Molybdenum | 0.000007 |
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| 5 to 6   | VII                | Everyone runs outdoors, much damage to poor design buildings, minor damage to good design buildings. some chimneys broken, noticed by people driving cars.  |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| 6  | VIII               | Everyone runs outdoors, damage is moderate to major. Damage minor in well designed structures, major in pool designs; chimneys, columns, swalls fall, heavy furniture turned, well water changes; sand & mud ejected. |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| 7  | IX                 | Major damage in all structures. ground cracked, pipes broken, shift foundation.   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| 7 & 8  | X                  | Major damage, most masonry & frame structures destroyed, ground badly cracked, landslides, water sloshed over river banks, rails bent.  |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| 8  | XI                 | Almoft all masonry structures destroyed bridges fall, big fissures in ground, land slumps. rails bent greatly.  |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| 8  | XII                | Total destruction. ground surface waves seen, objects thrown up into the air. All constnction destroyed.  |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Element  | Percent (1)        |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Oxygen   | 65                 |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Carbon   | 18                 |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Hydrogen   | 10                 |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Nitrogen   | 3                  |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Calcium  | 1.5                |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Phosphorus   | 1.0                |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Magnesium  | 0.05               |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Iron   | 0.008              |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Zinc   | 0.0033             |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Rubidium   | 0.00170            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Zirconium  | 0.00035            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Strontium  | 0.00020            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Aluminum   | 0.00014            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Copper   | 0.00014            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Antimony   | 0.00013            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Lead   | 0.00011            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Cadmium  | 0.000043           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Tin  | 0.000043           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Manganese  | 0.00003            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Vanadium   | 0.00003            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Barium   | 0.000023           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Titanium   | 0.00002            |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Boron  | 0.000014           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Chromium   | 0.000008           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Cobalt   | 0.000004           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |
| Molybdenum   | 0.000007           |   |             |   |   |  |   |    |  |   |     |  |  |    |   |   |   |  |   |    |  |        |     |  |   |      |   |   |    |   |       |   |  |   |    |  |   |     |  |  |         |             |        |    |        |    |          |    |          |   |         |     |            |     |           |      |      |       |      |        |          |         |           |         |           |         |          |         |        |         |          |         |      |         |         |          |     |          |           |         |          |         |        |          |          |         |       |          |          |          |        |          |            |          |