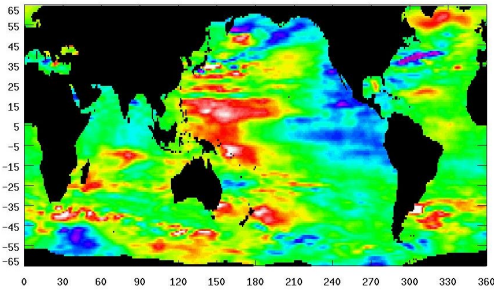


Trend of Sea Level Change (1993-2008)



EVPP 506

Science of the Environment I

INSTRUCTOR:

E. PETERS

SPRING 2021

3 CREDITS

ONLINE

SYNCHRONOUS

Tuesday

4:30 – 7:10 pm

PERIODIC TABLE
Atomic Properties of the Elements

NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

Physics Laboratory
physics.nist.gov

Standard Reference Data Group
www.nist.gov/srd

Frequently used fundamental physical constants
For the most accurate values of these and other constants, visit physics.nist.gov/constants
1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ¹³³Cs

Speed of light in vacuum c 299 792 458 m s⁻¹ (exact)
Planck constant h 6.626 070 15 × 10⁻³⁴ J s (exact) ($h = h/2\pi$)
Elementary charge e 1.602 176 634 × 10⁻¹⁹ C
Electron mass m_e 9.109 383 56 × 10⁻³¹ kg
Proton mass m_p 1.672 621 923 × 10⁻²⁷ kg
Fine-structure constant α 1/137.035 999 084
Rydberg constant R_∞ 10 973 731.77 m⁻¹
Boltzmann constant k 1.380 658 529 × 10⁻²³ J K⁻¹

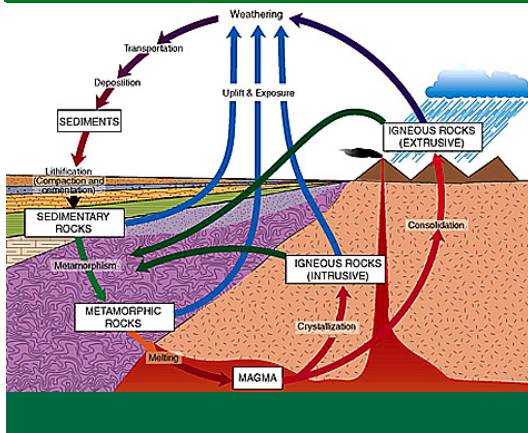
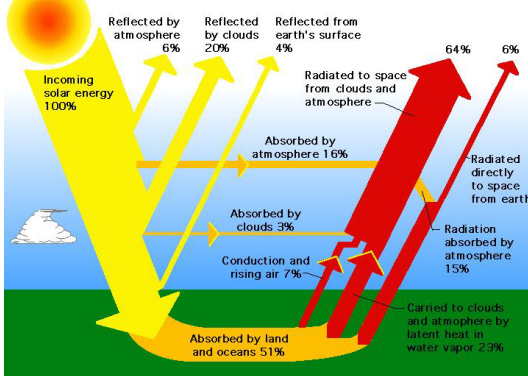
Legend:
Solids (blue)
Liquids (green)
Gases (red)
Artificially Prepared (yellow)

1 1 H Hydrogen 1.00784 1.008 1.00643	2 4 He Helium 4.002602 4.002602 4.002602	3 6 Li Lithium 6.941 6.94 6.938	4 9 Be Beryllium 9.012182 9.012 9.012182	5 10 B Boron 10.811 10.81 10.806	6 12 C Carbon 12.0107 12.011 12.0096	7 14 N Nitrogen 14.00643 14.007 14.00307	8 16 O Oxygen 15.999 16.00 15.99491	9 18 F Fluorine 18.9984032 18.998 18.9984032	10 20 Ne Neon 20.1797 20.18 20.1797	11 23 Na Sodium 22.98976928 22.99 22.98976928	12 24 Mg Magnesium 24.304 24.305 24.304	13 27 Al Aluminum 26.9815386 26.982 26.9815386	14 28 Si Silicon 28.0855 28.086 28.0855	15 30 P Phosphorus 30.973761508 30.974 30.973761508	16 32 S Sulfur 32.06 32.065 32.059	17 35.45 Cl Chlorine 35.453 35.45 35.453	18 39.948 Ar Argon 39.948 39.948 39.948	19 39.0983 K Potassium 39.0983 39.1 39.0983	20 40.078 Ca Calcium 40.078 40.08 40.078	21 44.9559 Sc Scandium 44.955910 44.956 44.955910	22 47.867 Ti Titanium 47.867 47.87 47.867	23 50.9415 V Vanadium 50.9415 50.942 50.9415	24 51.9961 Cr Chromium 51.9961 51.996 51.9961	25 51.9961 Mn Manganese 54.938044 54.938 54.938044	26 55.9349 Fe Iron 55.9349 55.935 55.9349	27 58.9332 Co Cobalt 58.9332 58.933 58.9332	28 58.9332 Ni Nickel 58.9332 58.933 58.9332	29 63.546 Cu Copper 63.546 63.546 63.546	30 65.38 Zn Zinc 65.38 65.38 65.38	31 69.723 Ga Gallium 69.723 69.723 69.723	32 72.64 Ge Germanium 72.64 72.64 72.64	33 74.9216 As Arsenic 74.9216 74.922 74.9216	34 75.9219 Se Selenium 75.9219 75.922 75.9219	35 78.9718 Br Bromine 78.9718 78.972 78.9718	36 79.904 Kr Krypton 79.904 79.904 79.904	37 85.4678 Rb Rubidium 85.4678 85.468 85.4678	38 87.62 Sr Strontium 87.62 87.62 87.62	39 88.9058 Y Yttrium 88.9058 88.906 88.9058	40 90.9073 Zr Zirconium 90.9073 90.907 90.9073	41 90.9073 Nb Niobium 92.90638 92.906 92.90638	42 92.90638 Mo Molybdenum 95.94 95.94 95.94	43 95.94 Tc Technetium 98.90625 98.906 98.90625	44 97.907 Ru Ruthenium 98.90625 98.906 98.90625	45 101.07 Rh Rhodium 101.07 101.07 101.07	46 101.07 Pd Palladium 106.363 106.36 106.363	47 106.363 Ag Silver 107.8682 107.868 107.8682	48 107.8682 Cd Cadmium 112.411 112.41 112.411	49 112.411 In Indium 114.818 114.818 114.818	50 114.818 Sn Tin 118.710 118.71 118.710	51 118.710 Sb Antimony 121.757 121.757 121.757	52 121.757 Te Tellurium 127.60 127.60 127.60	53 127.60 I Iodine 126.90547 126.905 126.90547	54 126.90547 Xe Xenon 131.29 131.29 131.29	55 132.90545 Cs Cesium 132.90545 132.905 132.90545	56 137.327 Ba Barium 137.327 137.327 137.327	57 138.90547 La Lanthanum 138.90547 138.905 138.90547	58 138.90547 Ce Cerium 140.116 140.116 140.116	59 140.116 Pr Praseodymium 140.90766 140.908 140.90766	60 140.90766 Nd Neodymium 144.242 144.242 144.242	61 144.242 Pm Promethium 144.9128 144.913 144.9128	62 144.9128 Sm Samarium 150.36 150.36 150.36	63 150.36 Eu Europium 151.964 151.964 151.964	64 151.964 Gd Gadolinium 157.25 157.25 157.25	65 157.25 Tb Terbium 158.92534 158.925 158.92534	66 158.92534 Dy Dysprosium 162.50031 162.500 162.50031	67 162.50031 Ho Holmium 164.93032 164.930 164.93032	68 164.93032 Er Erbium 167.257 167.257 167.257	69 167.257 Tm Thulium 168.93402 168.934 168.93402	70 168.93402 Yb Ytterbium 173.0547 173.055 173.0547	71 173.0547 Lu Lutetium 174.967 174.967 174.967	72 174.967 Hf Hafnium 178.49 178.49 178.49	73 178.49 Ta Tantalum 180.94788 180.948 180.94788	74 180.94788 W Tungsten 183.84 183.84 183.84	75 183.84 Re Rhenium 186.207 186.207 186.207	76 186.207 Os Osmium 190.23 190.23 190.23	77 190.23 Ir Iridium 192.222 192.222 192.222	78 192.222 Pt Platinum 195.084 195.084 195.084	79 195.084 Au Gold 196.966569 196.967 196.966569	80 196.966569 Hg Mercury 200.59 200.59 200.59	81 200.59 Tl Thallium 204.384 204.384 204.384	82 204.384 Pb Lead 207.2 207.2 207.2	83 207.2 Bi Bismuth 208.9803988 208.980 208.9803988	84 208.9803988 Po Polonium 209 209 209	85 209 At Astatine 210 210 210	86 210 Rn Radon 222 222 222	87 222 Fr Francium 223 223 223	88 223 Ra Radium 226 226 226	89 226 Ac Actinium 227 227 227	90 227 Th Thorium 232.0377 232.038 232.0377	91 232.0377 Pa Protactinium 231.036888 231.037 231.036888	92 231.036888 U Uranium 238.02891 238.029 238.02891	93 238.02891 Np Neptunium 237 237 237	94 237 Pu Plutonium 244 244 244	95 244 Am Americium 243 243 243	96 243 Cm Curium 247 247 247	97 247 Bk Berkelium 247 247 247	98 247 Cf Californium 251 251 251	99 251 Es Einsteinium 252 252 252	100 252 Fm Fermium 257 257 257	101 257 Md Mendelevium 258 258 258	102 258 No Nobelium 259 259 259	103 259 Lr Lawrencium 262 262 262
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Based upon ¹²C. () indicates the mass number of the most stable isotope.
For a description of the data, visit physics.nist.gov/data
NIST SP 966 (September 2003)

Interactive course covers the chemistry concepts organizing our world and those behind environmental issues and enhances science communication skills. Perfect for students with public health, engineering, IT, communications, policy and other backgrounds.

EARTH'S ENERGY BUDGET



Department of Environmental Science and Policy