RADIOISOTOPE DATING

1) Basics of Chemistry

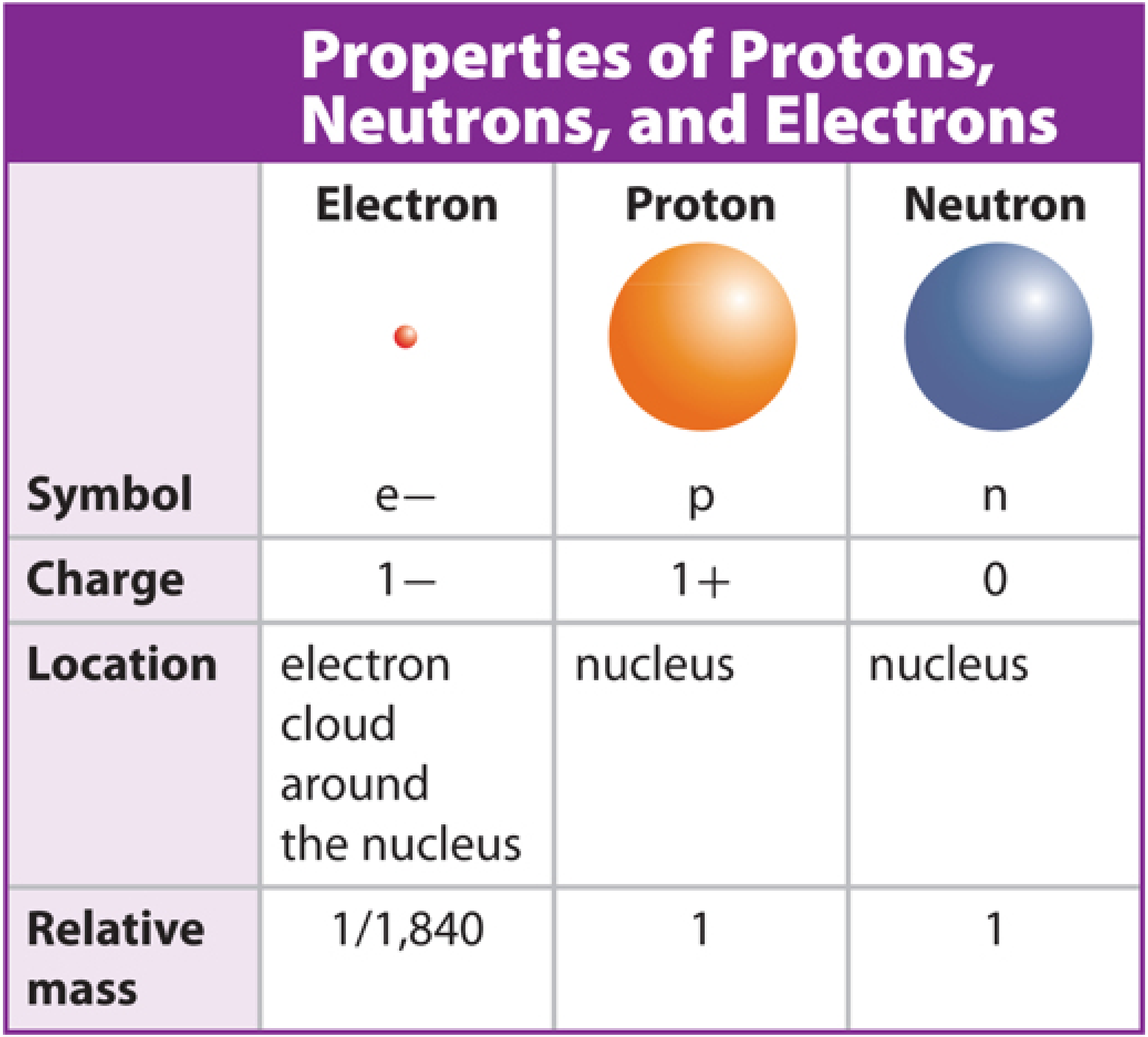
2) Basics of Carbon-14 Dating

3) The Significance of Carbon-14 Dating

4) Recalibrating Carbon-14 Ages

5) Long Age Radioisotope Dating

By John Williamson



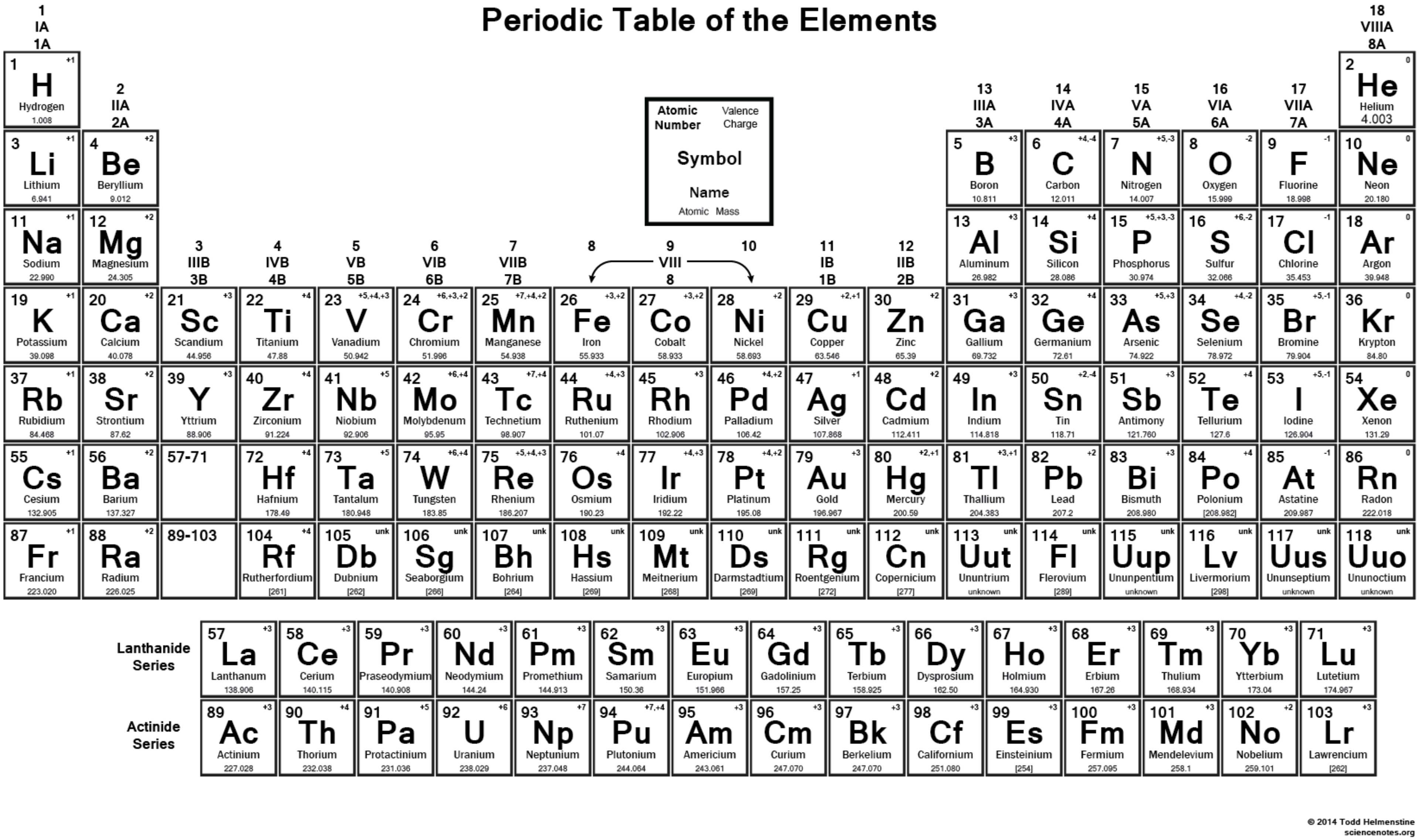
Properties of Protons, Neutrons, and Electrons

	Electron	Proton	Neutron
Symbol	e−	p	n
Charge	1−	1+	0
Location	electron cloud around the nucleus	nucleus	nucleus
Relative mass	1/1,840	1	1

Atomic Number: The number of protons in the nucleus of an atom, which determines the chemical properties of an element and its place in the periodic table.

Atomic Mass: The number of protons *and* neutrons in the nucleus of an atom.

Half-Life: The time required for a quantity to reduce to half its initial value.



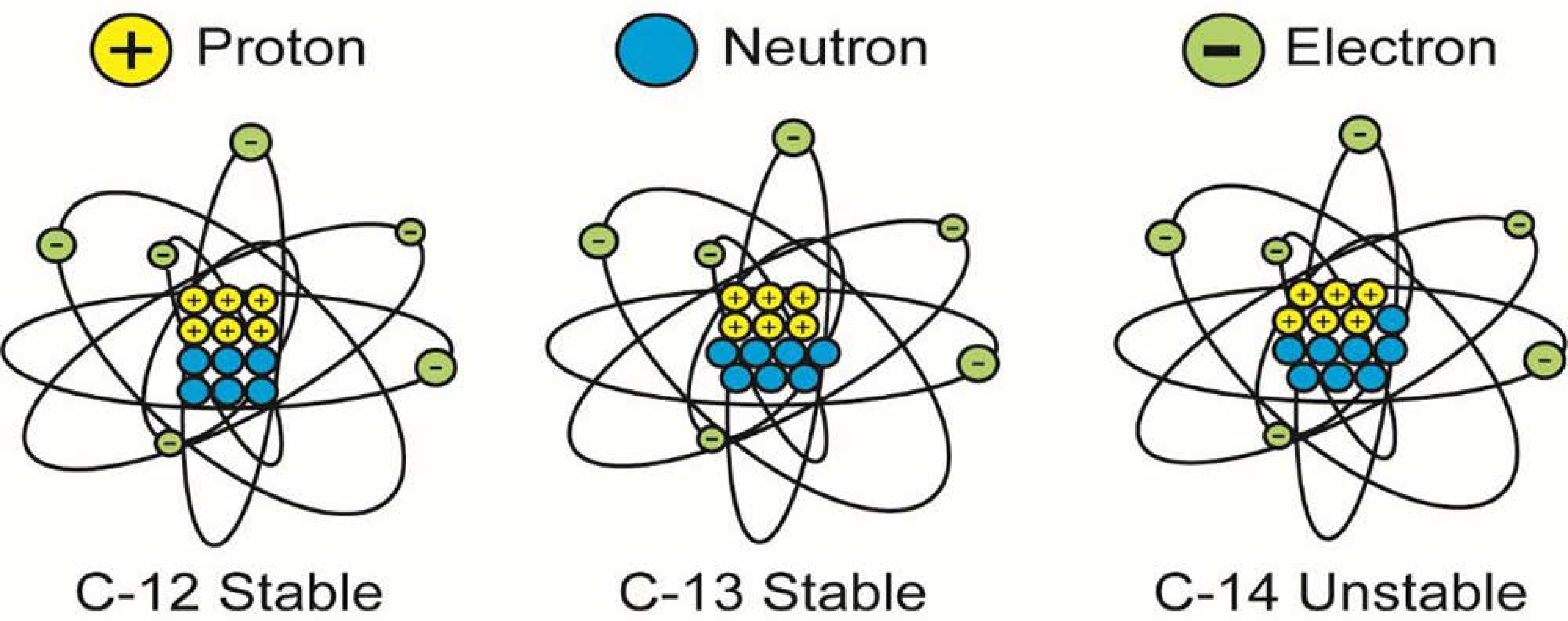
Periodic Table of the Elements

Atomic Number Valence Charge
Symbol
Name
Atomic Mass

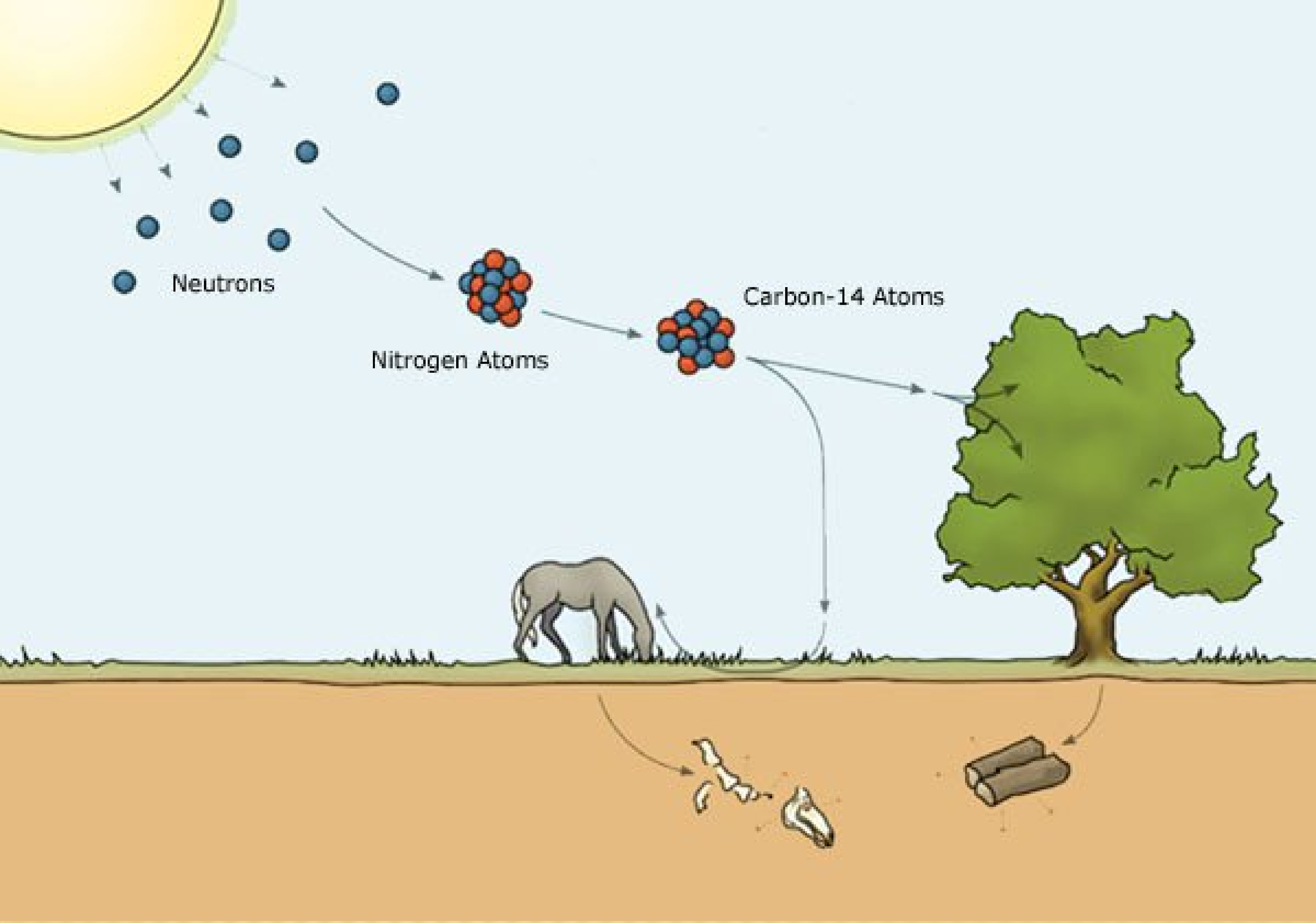
1 IA 1A	2 IIA 2A	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8	9 VIII 8	10	11 IB 1B	12 IIB 2B	13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A
1 +1 **H** Hydrogen 1.008																	2 0 **He** Helium 4.003
3 +1 **Li** Lithium 6.941	4 +2 **Be** Beryllium 9.012											5 +3 **B** Boron 10.811	6 +4,-4 **C** Carbon 12.011	7 +5,-3 **N** Nitrogen 14.007	8 -2 **O** Oxygen 15.999	9 -1 **F** Fluorine 18.998	10 0 **Ne** Neon 20.180
11 +1 **Na** Sodium 22.990	12 +2 **Mg** Magnesium 24.305											13 +3 **Al** Aluminum 26.982	14 +4 **Si** Silicon 28.086	15 +5,+3,-3 **P** Phosphorus 30.974	16 +6,-2 **S** Sulfur 32.066	17 -1 **Cl** Chlorine 35.453	18 0 **Ar** Argon 39.948
19 +1 **K** Potassium 39.098	20 +2 **Ca** Calcium 40.078	21 +3 **Sc** Scandium 44.956	22 +4 **Ti** Titanium 47.88	23 +5,+4,+3 **V** Vanadium 50.942	24 +6,+3,+2 **Cr** Chromium 51.996	25 +7,+4,+2 **Mn** Manganese 54.938	26 +3,+2 **Fe** Iron 55.933	27 +3,+2 **Co** Cobalt 58.933	28 +2 **Ni** Nickel 58.693	29 +2,+1 **Cu** Copper 63.546	30 +2 **Zn** Zinc 65.39	31 +3 **Ga** Gallium 69.732	32 +4 **Ge** Germanium 72.61	33 +5,+3 **As** Arsenic 74.922	34 +4,-2 **Se** Selenium 78.972	35 +5,-1 **Br** Bromine 79.904	36 0 **Kr** Krypton 84.80
37 +1 **Rb** Rubidium 84.468	38 +2 **Sr** Strontium 87.62	39 +3 **Y** Yttrium 88.906	40 +4 **Zr** Zirconium 91.224	41 +5 **Nb** Niobium 92.906	42 +6,+4 **Mo** Molybdenum 95.95	43 +7,+4 **Tc** Technetium 98.907	44 +4,+3 **Ru** Ruthenium 101.07	45 +3 **Rh** Rhodium 102.906	46 +4,+2 **Pd** Palladium 106.42	47 +1 **Ag** Silver 107.868	48 +2 **Cd** Cadmium 112.411	49 +3 **In** Indium 114.818	50 +2,-4 **Sn** Tin 118.71	51 +3 **Sb** Antimony 121.760	52 +4 **Te** Tellurium 127.6	53 +5,-1 **I** Iodine 126.904	54 0 **Xe** Xenon 131.29
55 +1 **Cs** Cesium 132.905	56 +2 **Ba** Barium 137.327	57-71	72 +4 **Hf** Hafnium 178.49	73 +5 **Ta** Tantalum 180.948	74 +6,+4 **W** Tungsten 183.85	75 +5,+4,+3 **Re** Rhenium 186.207	76 +4 **Os** Osmium 190.23	77 +4,+3 **Ir** Iridium 192.22	78 +4,+2 **Pt** Platinum 195.08	79 +3 **Au** Gold 196.967	80 +2,+1 **Hg** Mercury 200.59	81 +3,+1 **Tl** Thallium 204.383	82 +2 **Pb** Lead 207.2	83 +3 **Bi** Bismuth 208.980	84 +4 **Po** Polonium [208.982]	85 -1 **At** Astatine 209.987	86 0 **Rn** Radon 222.018
87 +1 **Fr** Francium 223.020	88 +2 **Ra** Radium 226.025	89-103	104 +4 **Rf** Rutherfordium [261]	105 unk **Db** Dubnium [262]	106 unk **Sg** Seaborgium [266]	107 unk **Bh** Bohrium [264]	108 unk **Hs** Hassium [269]	109 unk **Mt** Meitnerium [268]	110 unk **Ds** Darmstadtium [269]	111 unk **Rg** Roentgenium [272]	112 unk **Cn** Copernicium [277]	113 unk **Uut** Ununtrium unknown	114 unk **Fl** Flerovium [289]	115 unk **Uup** Ununpentium unknown	116 unk **Lv** Livermorium [298]	117 unk **Uus** Ununseptium unknown	118 unk **Uuo** Ununoctium unknown

Lanthanide Series	57 +3 **La** Lanthanum 138.906	58 +3 **Ce** Cerium 140.115	59 +3 **Pr** Praseodymium 140.908	60 +3 **Nd** Neodymium 144.24	61 +3 **Pm** Promethium 144.913	62 +3 **Sm** Samarium 150.36	63 +3 **Eu** Europium 151.966	64 +3 **Gd** Gadolinium 157.25	65 +3 **Tb** Terbium 158.925	66 +3 **Dy** Dysprosium 162.50	67 +3 **Ho** Holmium 164.930	68 +3 **Er** Erbium 167.26	69 +3 **Tm** Thulium 168.934	70 +3 **Yb** Ytterbium 173.04	71 +3 **Lu** Lutetium 174.967
Actinide Series	89 +3 **Ac** Actinium 227.028	90 +4 **Th** Thorium 232.038	91 +5 **Pa** Protactinium 231.036	92 +6 **U** Uranium 238.029	93 +7 **Np** Neptunium 237.048	94 +7,+4 **Pu** Plutonium 244.064	95 +3 **Am** Americium 243.061	96 +3 **Cm** Curium 247.070	97 +3 **Bk** Berkelium 247.070	98 +3 **Cf** Californium 251.080	99 +3 **Es** Einsteinium [254]	100 +3 **Fm** Fermium 257.095	101 +3 **Md** Mendelevium 258.1	102 +2 **No** Nobelium 259.101	103 +3 **Lr** Lawrencium [262]

CARBON ISOTOPES



Isotope: any of two or more forms of a chemical element, having the same number of protons in the nucleus, or the same atomic number, but having different numbers of neutrons in the nucleus, or different atomic weights.


Neutrons
Nitrogen Atoms
Carbon-14 Atoms

BASICS OF CARBON-14 DATING

1) Half-life of Carbon-14: 5730 years.
2) Only substances which were once alive may be Carbon-14 dated.
3) Any sample over 100,000 years old should be radiocarbon dead (containing no Carbon-14), because it all would have decayed away.

BASICS OF CARBON-14 DATING

Question: Are there any objects whose supposed (evolutionary) age is over 100,000 years that contain measurable radiocarbon?

Answer: Yes! All tested coal, limestone, wood, and even diamond samples contain C-14, even though they are supposedly tens to hundreds of millions of years old.

FIGURE 3

Sample from Marlstone Rock Bed, a muddy limestone in one wall of the Hornton Quarries at Edge Hill, west of Banbury in England. Pieces of fossilized wood in Jurassic rocks, supposedly 150-200 million years old, yielded radiocarbon “ages” of only 20,700–28,820 years. *Photo courtesy of Dr. Andrew Snelling*

FIGURE 4

Sample from mudstone on top of the Great Northern Seam in the upper Permian Newcastle Coal Measures in the Newvale No. 2 Coal Mine north of Sydney, Australia. A fossilized tree stump, found in Permian layers, supposedly hundreds of millions of years old, yielded coalified bark with a radiocarbon “age” of 33,700 years. *Photo courtesy of Dr. Andrew Snelling*

A sea creature, called an ammonite, was discovered near Redding, California, accompanied by fossilized wood. Both fossils are claimed by strata dating to be 112–120 million years old but yielded radiocarbon ages of only thousands of years. *Photo courtesy of Dr. Andrew Snelling*

ACCURACY OF CARBON-14 AGES

Question: Are Carbon-14 Ages Accurate?

Answer: Yes, back to about 400 BC (~2400 years ago), the time of Alexander the Great. (Based on dating samples of known ages)

Question: Why are C-14 dates for older samples inaccurate?

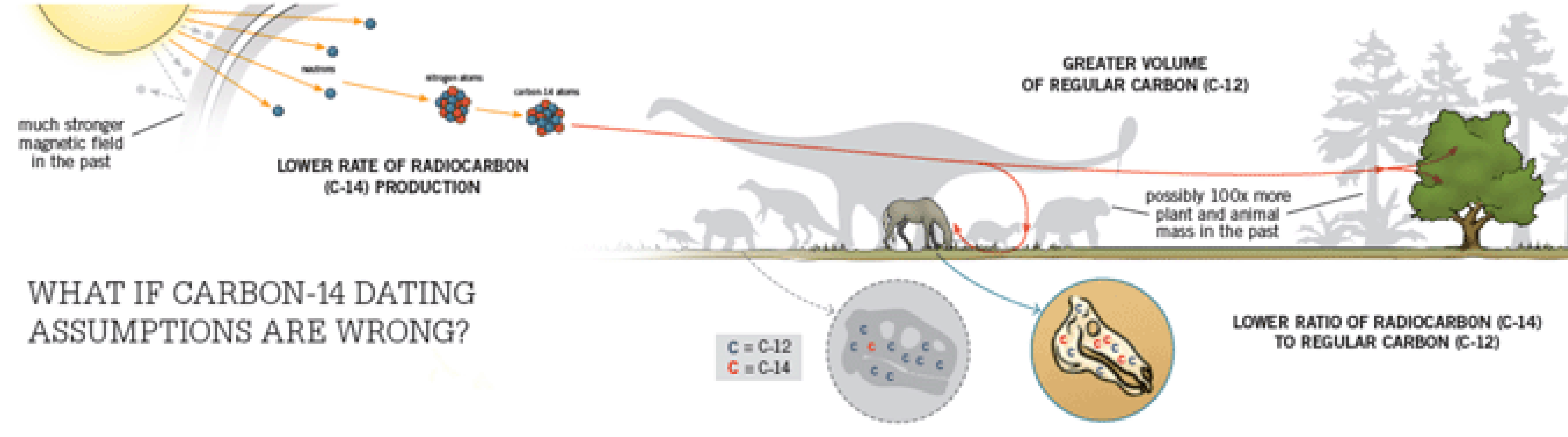
Answer: Incorrect Assumptions!

RECALIBRATING CARBON-14 AGES

1) Decay of Earth’s Magnetic Field (half-life ~1500 years).
2) Greater Biomass on Earth prior to Noah’s Flood.

RECALIBRATING CARBON-14 AGES

1) Lower Rate of Radiocarbon (C-14) Production
2) Greater Volume of Regular Carbon (C-12)
3) Lower Ratio of Radiocarbon (C-14) to Regular Carbon (C-12)


much stronger magnetic field in the past
LOWER RATE OF RADIOCARBON (C-14) PRODUCTION
GREATER VOLUME OF REGULAR CARBON (C-12)
possibly 100x more plant and animal mass in the past
WHAT IF CARBON-14 DATING ASSUMPTIONS ARE WRONG?
C = C-12
C = C-14
LOWER RATIO OF RADIOCARBON (C-14) TO REGULAR CARBON (C-12)

LONG AGE RADIOISOTOPE DATING

1) Used to date igneous and metamorphic rocks from the time they solidified.
2) ***ALL*** samples of known historical ages tested by long age radioisotope dating have yielded ***VASTLY*** inflated age estimates.
3) Example: Rocks taken from the 1986 eruption of Mount St. Helens have been Potassium-Argon tested to an age of 380,000 years!

LONG AGE RADIOISOTOPE DATING

Question: Is long age radioisotope dating accurate?

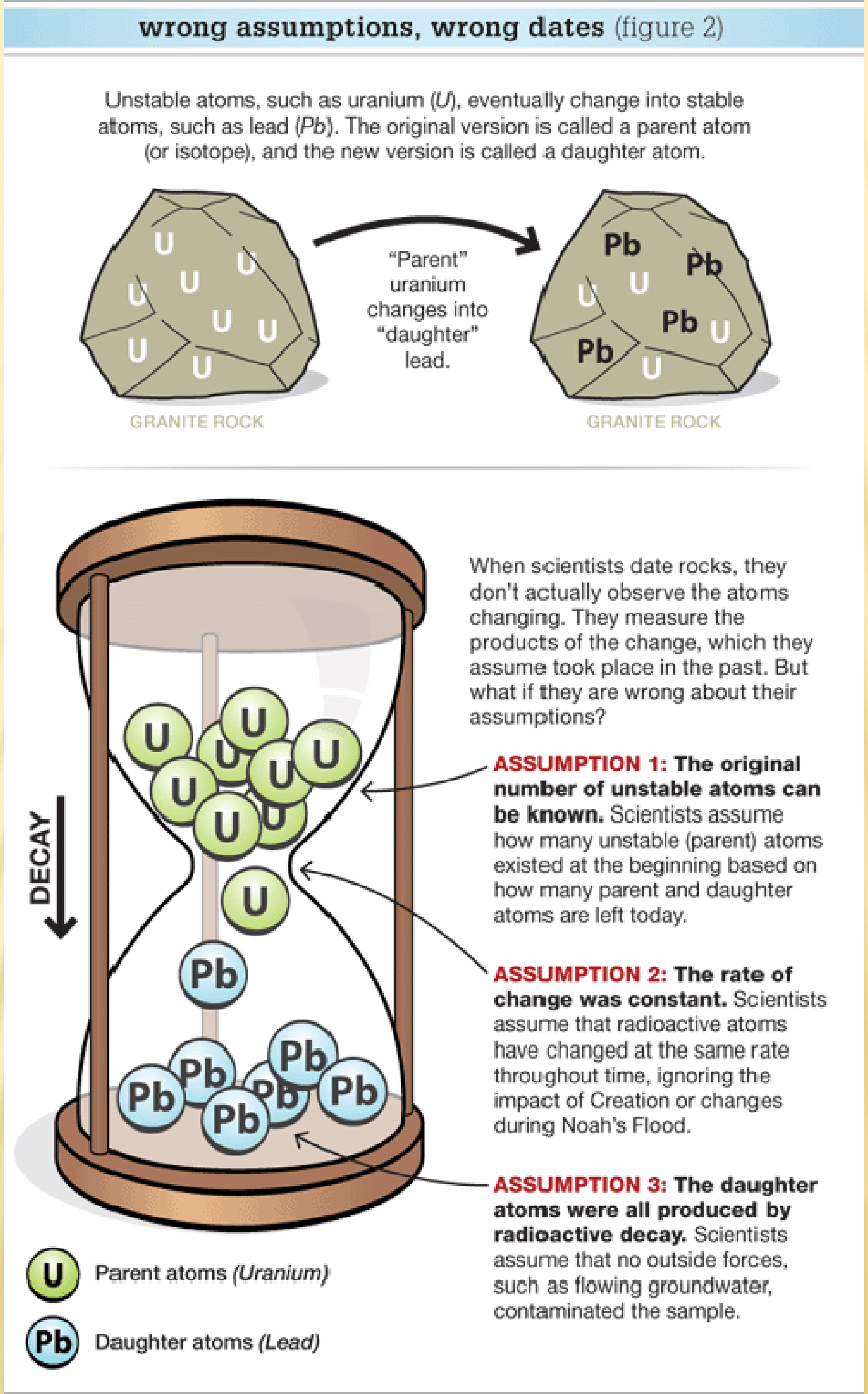
Answer: NO!

Question: Why is long age radioisotope dating not accurate?

Answer: Incorrect Assumptions!

wrong assumptions, wrong dates (figure 2)

Unstable atoms, such as uranium (*U*), eventually change into stable atoms, such as lead (*Pb*). The original version is called a parent atom (or isotope), and the new version is called a daughter atom.



When scientists date rocks, they don't actually observe the atoms changing. They measure the products of the change, which they assume took place in the past. But what if they are wrong about their assumptions?

ASSUMPTION 1: The original number of unstable atoms can be known. Scientists assume how many unstable (parent) atoms existed at the beginning based on how many parent and daughter atoms are left today.

ASSUMPTION 2: The rate of change was constant. Scientists assume that radioactive atoms have changed at the same rate throughout time, ignoring the impact of Creation or changes during Noah's Flood.

ASSUMPTION 3: The daughter atoms were all produced by radioactive decay. Scientists assume that no outside forces, such as flowing groundwater, contaminated the sample.

bad dates from wrong assumptions (figures 1–5)

ASSUMPTION—CONDITIONS AT TIME ZERO

Scientists do not know how many "daughter atoms" were present when most rocks first formed. So when they test rocks produced by lava flows in recent years, their bad assumptions yield old "ages."

FIGURE 1

BAD RESULTS: "OLD" DATES FOR RECENT ERUPTIONS

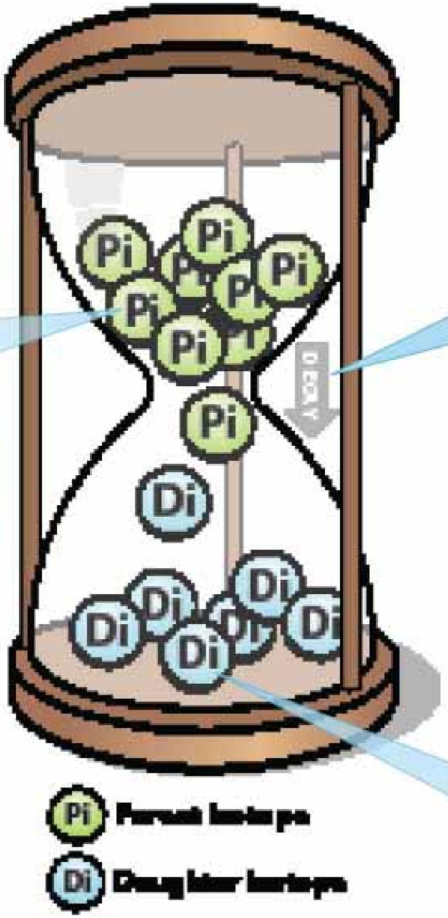
A rock formed at Mount St. Helens in 1986 yielded a radiometric age of 350,000 years.

FIGURE 2

A rock formed by lava flows at Mt. Ngauruhoe in 1954 yielded a radiometric age of 3.5 million years.

FIGURE 3

A rock at the top of Grand Canyon, formed by a recent volcanic eruption, yielded the same age as volcanic rocks deep below the canyon wall—1.143 billion years.



ASSUMPTION—CONSTANT DECAY RATE

Scientists do not know how quickly radioactive atoms decayed in the past. So they assume a constant rate. But when they tested zircon crystals from a borehole in New Mexico, they found two very different dates, depending on what measurement they used.

BAD RESULTS: CONTRADICTORY DECAY RATES

Measuring the uranium in these crystals yields an "age" of 1.5 billion years. But measuring the amount of helium that leaked out as a result of the decay yields an age of 6,000 years.

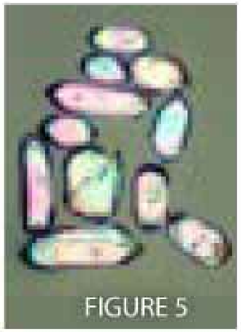


FIGURE 5

ASSUMPTION—NO CONTAMINATION

Scientist do not know how much the rocks have been contaminated. So they usually assume no contamination.

BAD RESULTS: DIFFERENT DATES FROM THE SAME ROCKS

Contamination of lava flows at Mt. Ngauruhoe, known to be less than 50 years old, yielded three different "ages" for rocks—133 million years, 197 million years, and 3.908 billion years.

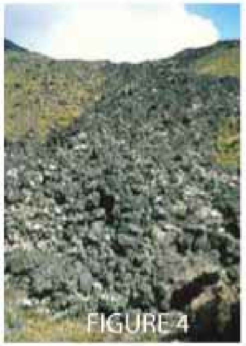


FIGURE 4

FIGURE 1: USGS/Cascades Volcano Observatory FIGURES 2–5: courtesy Andrew Snelling

RADIOMETRIC AGES OF ROCK SAMPLES

Samples from the same rock unit can yield very different radiometric "ages," depending on the atoms being measured. The table below shows varying "ages" from rock units found in the Grand Canyon. Why is there so much variation? The measurements are not wrong, so there is only one reasonable answer: each radioactive element decayed at a different, faster rate in the past!

FIGURE 1

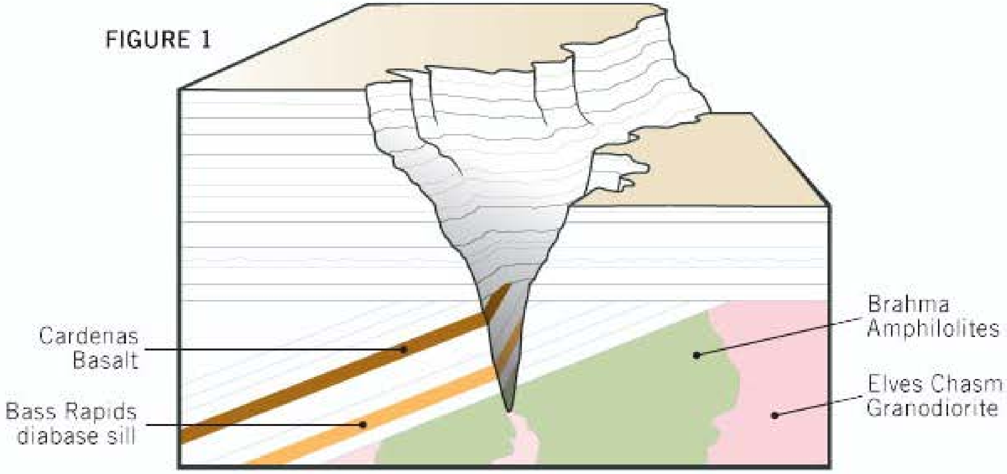


FIGURE 2—Cardenas Basalt

FIGURE 3—Bass Rapids diabase sill

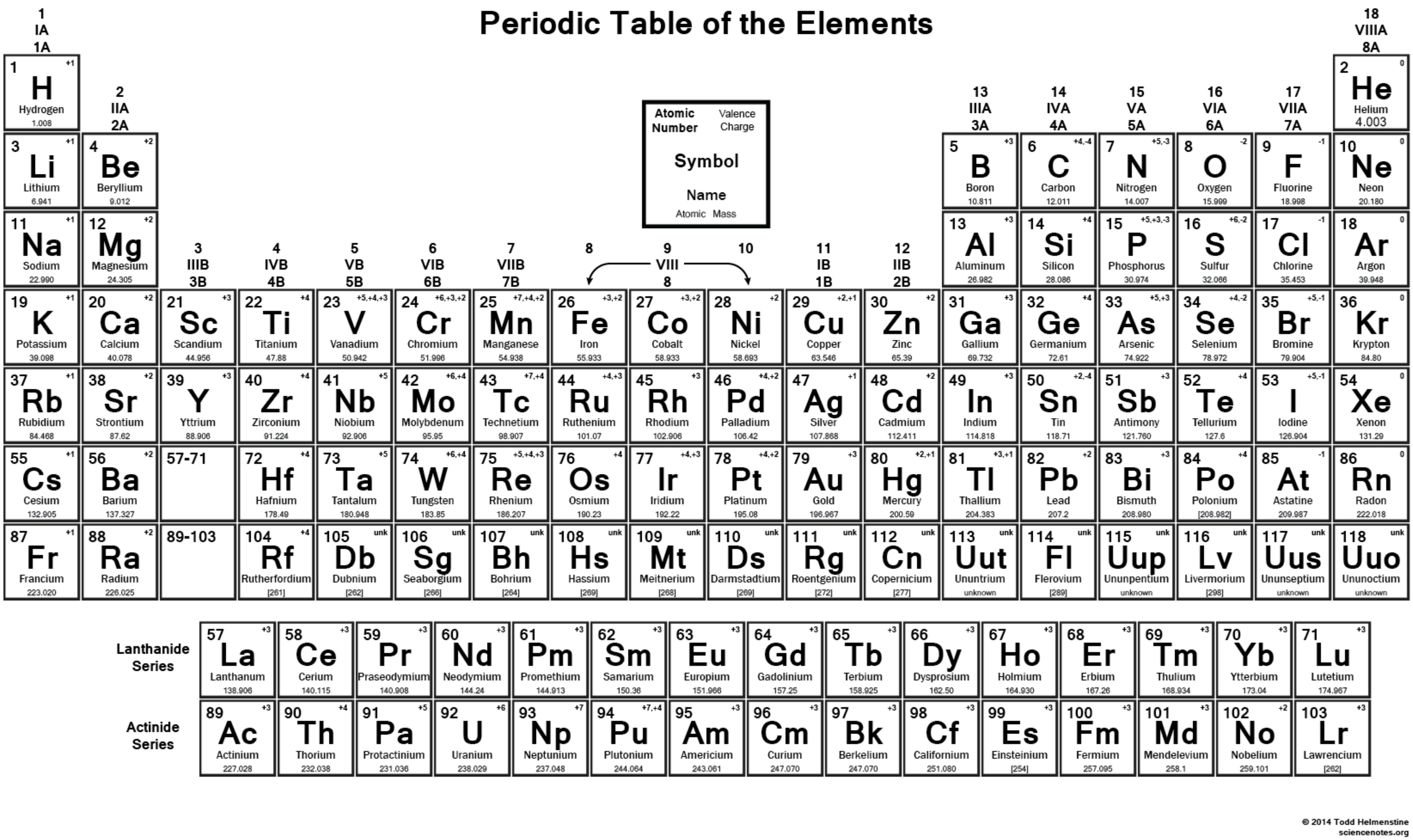
FIGURE 4—Brahma amphibolites

FIGURE 5—Elves Chasm Granodiorite

photos courtesy Andrew Snelling

TABLE 1—Radioactive ages yielded by four Grand Canyon rock units. (The error margins are shown in parentheses.)

Rock Unit	Ages (million years)			
	Potassium-argon	Rubidium-strontium	Uranium-lead	Samarium-neodymium
Cardenas Basalt	516 (±30)	1111 (±81)	—	1588 (±170)
Bass Rapids diabase sill	842 (±164)	1060 (±24)	1250 (±130)	1379 (±140)
Brahma Amphibolites	—	1240 (±84)	1883 (±53)	1655 (±40)
Elves Chasm Granodiorite	—	1512 (±140)	1933 (±220)	1664 (±200)



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Atomic Number
Valence Charge
Symbol
Name
Atomic Mass

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