EVOLUTION'S ACHILLES' HEELS

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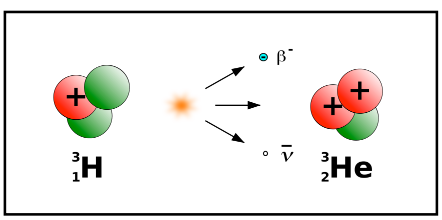
OUTLINE

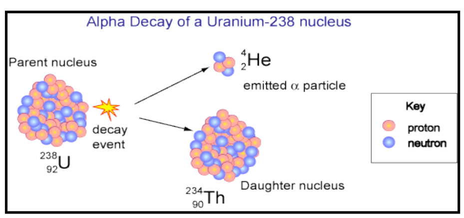
RADIOMETRIC DATING METHODS

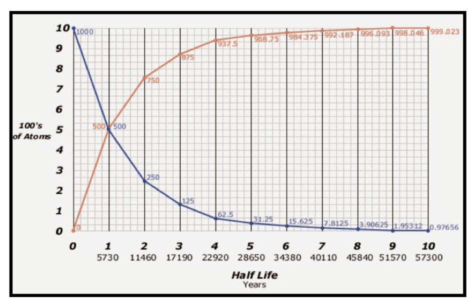
Basic radiometric dating

Radiometric dating is the measurement of the remaining amount of an unstable element, a radioactive isotope, which is called the parent, as it decays into another form of the element, called the daughter, by loosing an alpha or beta particle. Below are some illustrations of a parent isotope decaying to a daughter.

- Left (beta decay): A neutron becoming a proton by loosing a beta particle (an electron) and an anti neutrino, thus changing the element into another.
- Middle (alpha decay): ^{238}uranium decaying into ^{234}thorium by loosing a helium atom.
- Right: The carbon correlation chart of the parent, carbon-14 (^{14}C) in blue, to the daughter, nitrogen-14 (^{14}N) in red, by the percent in the sample (Y-axis), versus half-lives – 5730 years each (X-axis). After 8-10 half-lives, 50-60 thousand years, the remaining ^{14}C is no longer detectable.







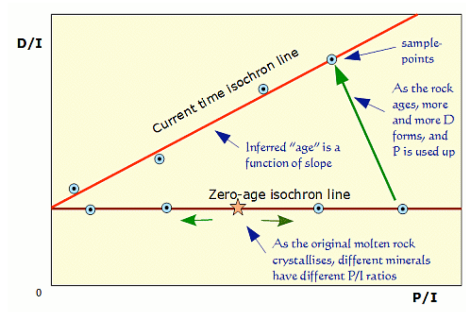
An element becomes an isotope when the number of protons and neutrons is no longer balanced. The proper terminology to designate an element or isotope is to put the mass number (the number of protons plus neutrons) as a superscript before its symbol or name. Stable carbon is ^{12}C, having 6 protons and 6 neutrons. It becomes a radioactive isotope, ^{14}C, with 2 more neutrons making it an unbalanced 6 protons and 8 neutrons.

Isotope: Parent	Isotope: Daughter	Half-life of parent (years)	Useful range (years)
Carbon 14	Nitrogen 14	5,730	100 - 30,000
Potassium 40	Argon 40	1.3 billion	100,000 - 4.5 billion
Rubidium 87	Strontium 87	47 billion	10 million - 4.5 billion
Uranium 238 Uranium 235	Lead 206 Lead 207	4.5 billion 710 million	10 million - 4.6 billion

Measuring the ratio of parent to daughter and comparing it to the established half-life decay rate for the radiometric isotope determines the date of the sample. Above is a parent and daughter chart for common isotopes, the parent half-life, and the useful range. However, if there is any initial daughter, the sample will measure billions of years old.

Isochron dating

[illegible] doesn't [illegible] from the rock that are the same age, but might have different compositions [illegible] then [illegible] the [illegible] (P) [illegible] the [illegible] (D) [illegible] The samples also need to contain an independent nonradioactive isotope (I) of the daughter, called the sister, as a stable reference. The symbol △ (delta) means the amount of change of a sample.



- The ratios will be: △(D/I) and △(P/I) where:
  I = the amount of the independent Sister Isotope,
  △D = the amount of Daughter, and
  △P = the amount of Parent at the present time.
- T[illegible] (S)
  [illegible] =△D/△P, It increases as the amount of daughter increases so it is related to the number of half-lives as calculated below.
- The number of half-lives (using geometry)) for a given slope is its cotangent, and the equation X + CX = 10 calculates where it falls on the correlation chart above because the x-axis range is 0-10. {X is the value on the (D/I) axis (the Y-axis); and C is the cotangent of the angle between the zero age isochron line and the current age isochron line}. Examples for three angles are:
  - 45^0: the cotangent is 1, then X + 1X = 10, or 2X = 10 so X = 5 which is 1 half-life.
  - 60^0: the cotangent is 1.7, then X + 1.7X = 10, or 2.7X = 10 so X = 3.7 which is 1.5 half-lives.
  - 71^0: the cotangent is 3, then X + 3X = 10, or 4X = 10 so X = 2.5 which is 2 half-lives

RADIOMETRIC DATING ASSUMPTIONS

We see from above that radiometric dating is not a direct measurement of time. The measurement of the remaining isotope within the sample, or in the case of isochron dating the measurement of the ratios of the parent versus a sister, and the daughter versus a sister must be interpreted to ascertain the date. In the process it is necessary to make some assumptions.

Assumptions in radiometric dating

Since we don't know what the conditions were in the past, certain assumptions are necessary which adds uncertainty into whether the radiometric date is accurate. If these assumptions are not true the results are not reliable,

- "The rock has been a closed system since it was formed; no change has occurred through: ionic transport, hydrothermal activity, partial melting, and nuclear reactions . . . by cosmic rays.
- Every radioactive element will decay at a constant rate. [constant parent-daughter change rate]
- All daughter atoms . . . created by the radioactive decay of the corresponding parent atom."[1]
- When the substance . . . first formed, there was no daughter element present.
  - But, if even only a very minute amount of daughter is present and the rock is only thousands of years old it will measure billions of years old!

Fluctuations in decay rates - Purdue 2010

"Radioactive decay rates, thought to be unique physical constants and counted on . . . may be more variable than once thought. . . . in synch with the rotation of the sun's core. . . . [and] in response to solar activity and the distance between the Earth and the sun . . . [evidence] Purdue researchers . . . have been gathering for the last four years. . . . of the radioactive isotopes silicon-32 and chlorine-36. .

. . 'One of our next steps is to look into the isotopes used medically to see if there are any variations that would lead to overdosing or underdosing in radiation treatments, but there is no cause for alarm at this point. . . . [but] what was thought to be a constant actually varies . . . where there shouldn't be one." . . . it is an effect that no one yet understands . . ."[2]

In addition to the evidence being gathered by the Purdue researchers on ^{32}Si and ^{36}Cl, the decay rate of elements ^{60}Co, ^{137}Cs, and ^{226}Ra also vary. Because some elements have been found to vary in the short-term, even though small, we cannot be sure that others don't vary, and to what degree, in the long-term as there is no way to validate this.

Assumptions in isochron dating

The isochron method rules out the potential error caused by some initial daughter in the sample, but it retains the second and third assumptions of radiometric dating and imposes three more. If these assumptions are not true the results are not reliable.

- There has been no migration of daughter or parent nuclei within the matrix since solidification.
- Crystallization of the rock has not been too rapid so the daughter isotopes have had sufficient time to uniformly distribute throughout the material matrix (the homogeneity assumption).
- The necessity that the samples contain varying isotope ratios at different locations to generate several independent equations for a linear relationship questions the homogeneity assumption.

INCONSISTENCIES IN 'OLD EARTH' DATE

^{14}C in wood within rock strata

"The Marlstone Rock Bed on the Dorset coast of southern England. . . . is said to be about 189 million years old. . . . Three samples of fossil wood were collected from the south wall of Hornton Quarries. . . . The woody internal structure was clearly evident, thus the samples were not the remains of roots that had grown into this weathered rock. . . . Pieces of all three samples were sent for radiocarbon (^{14}C) analyses to Geochron Laboratories in Cambridge, Boston (USA), while as a cross-check, a piece of the first sample was also sent to [the laboratory at] the Australian Nuclear Science and Technology Organisation near Sydney (Australia). . . . The radiocarbon (^{14}C) results are . . .

SAMPLE	LAB	LAB CODE	^{14}C 'AGE' (YEARS BP)	$\delta^{13}C_{PDB}$ ‰
UK-HB-1	Geochron ANSTO	GX-21666-AMSOZC201	24,005 ± 600 20,700 ± 1,200	-22.9 -16.6
UK-HB-2	Geochron	GX-21611-AMS	22,730 ± 170	-24.0
UK-HB-3	Geochron	GX-21612-AMS	28,820 ± 350	-25.3

Could the radiocarbon be due to contamination? Four reasons why not

- Pieces of the same sample were sent to the two laboratories and they both independently obtained similar results. Furthermore, three separate samples were sent to the same laboratory in two batches and again similar results were obtained. This rules out contamination.
- The . . . ^{14}C left was between about 2.5% and 7.5% of the amount in living plants today. Any unavoidable contamination . . . would amount to at most 0.2% . . . a negligible effect . . .
- The last column in Table 1 lists the $\delta^{13}C_{PDB}$ ‰ results, which are consistent with the analysed carbon in the fossil wood representing organic carbon from the wood of land plants.
- Such a claim would . . . cast a slur on the Ph.D. scientific staff of two radiocarbon laboratories . . ."[3]

Definition of $\delta^{13}C$, $_{PDB}$, and its standard range

"The carbon isotope ratio values, (written as d13C and pronounced "delta see thirteen") [is the] ratio of ^{13}C to ^{12}C . . . <u>the carbon standard</u>. . . . The international <u>reference standard</u> for carbon isotopes is VPDB, which is shorthand for "Vienna Pee Dee Belemnite". The original PDB sample was a sample of fossilized shells . . . collected decades ago from the banks of the Pee Dee River in South Carolina.

The original sample was used up long ago, but other reference standards were calibrated . . . [the VPDB and PDB abbreviations are used interchangeably.]"[4]

The standard range for stable carbon isotopes C^{13}/C^{12} in *Geology - Volume II* is -80% to +20%.[5]

^{14}C in fossils and all fossil fuels

Fossils, whether sea animals, land animals, or wood; or in fossil fuels (coal, oil, and natural gas, which have been analyzed since the 1970s) contain ^{14}C. Coal is the remains of plants compressed between strata. Samples taken globally and throughout the geological record (all layers of strata) all contained ^{14}C and all statistically registered the same amount. Therefore evidence these plant layers were all buried at about the same time only thousands of years ago.

^{14}C in diamond example 1

"[F]ive diamonds to be analyzed for ^{14}C. . . . contained radioactive carbon, . . . [A] diamond has remarkably strong lattice bonds . . . so subsequent atmospheric or biological contamination should not find its way into the interior. . . . The diamonds' carbon-dated 'age' of about 58,000 years is thus an upper limit for the age of the whole earth. . . . ^{14}C workers have no real answer to this problem, namely that all the 'vast-age' specimens they measure still have ^{14}C."[6]

^{14}C in diamond example 2

According to 'old earth' geologists, diamonds formed about 1–3 billion years ago. In a study, an investigation for ^{14}C in a number of diamonds was conducted. The radiocarbon laboratory reported that there was over 10 times the detection limit. Diamonds should have had no detectable ^{14}C remaining as the half-life of ^{14}C is only 5,730 years and the detection limit is about 18-10 half-lives (30-50 thousand years). Six more alluvial (in loose soil) diamonds from Namibia were tested, and these had even more radiocarbon. They therefore could only have been thousands of years old, not billions.[7]

The radiocarbon revolution - NC State University report

"Since its development by Willard Libby in the 1940s, radiocarbon ^{14}C dating has become one of the most essential tools in archaeology. . . . The application of Accelerator Mass Spectrometry (AMS). . . . permitted the dating of much smaller sized samples with even greater precision. . . . Probably the most important factor to consider when using radiocarbon dating is if external factors, whether through artificial contamination, animal disturbance, or human negligence, contributed to any errors in the determinations. . . . To help resolve these issues, radiocarbon laboratories have conducted inter-laboratory comparison exercises [and] devised rigorous pretreatment procedures to remove any carbon-containing compounds unrelated to the actual sample being dated, and developed calibration methods for terrestrial and marine carbon."[8]

14C dating acceptance dichotomy

Based on the previous NC State University article, ^{14}C dating has been used and trusted by geologists for the past half century. A secular online site mentions the ^{14}C dating of:

"A sample of acacia wood from the tomb of the pharoah Zoser [Egypt]: 4,900 years old; the Turin Shroud: 1260-1390 AD; The Dead Sea Scrolls: close agreement [with] the dates recorded on the scrolls themselves; The Iceman: 5500 years ago (3300-3100 BC). [article also mentions:] Most rocks formed hundreds of thousands if not millions of years ago. Geologic deposits of coal and lignite formed from the compressed remains of plants contain no remaining radiocarbon so they cannot be dated."[9] (Apparently the author hasn't seen the data on ^{14}C in fossil fuels {coal, oil, and natural gas}, etc.)

However, the previous ^{14}C examples, and there are many, many more, confirm that ^{14}C does exist in rocks, coal, and basically all other organic materials on and in the earth. Apparently 'old earth' geologists trust ^{14}C dating, but only for examples known to be recent such as those listed. However, they refute the results of dinosaur bones, insitu wood in fossils, and all other items predetermined 'prehistoric', claiming that ^{14}C contamination of the sample is what is giving the young age.

INCONSISTANCIES IN ROCKS OF KNOWN AGES

Radioisotope-dating methods are used on volcanic rocks. The potassium-argon method is widely used in 'old earth' geological circles. It has a very large useful range from 100,000 to 4.5 billion years.

Potassium-argon dating of lava from Mount St. Helens

"In a volcanic rock sample. . . . we need to know. . . . how much 'daughter' was present in the rock when it formed. . . . [and] whether ^{40}potassium or ^{40}argon have leaked into, or out of, the rock. . . . [if it has] the 'age' . . . is usually very great, often millions of years. . . .

In June of 1992 . . . a 7-kg (15-lb) block of [volcanic] dacite. . . . was crushed and milled into a fine powder. Another piece was crushed and the various mineral crystals were carefully separated out. The 'whole rock' rock powder and four mineral concentrates were submitted . . . to Geochron Laboratories of Cambridge, MA. . . . the results ranged from 340,000 to 2.8 million years! Why? Obviously, the assumptions were wrong, and this invalidates the 'dating' method. . . . It is clear that radioisotope dating is not the 'gold standard' of dating methods, or 'proof' for millions of years of Earth history.

Sample 1	Whole rock	0.35 +/- 0.05	Sample 4	Pyroxene etc.	1.7 +/- 0.3
Sample 2	Feldspar, etc.	0.34 +/- 0.06	Sample 5	Pyroxene	2.8 +/- 0.6
Sample 3	Amphibole, etc.	0.9 +/- 0.2	[above values are in millions of years]"[10]		

Potassium-argon dating of lava from Mt. Ngauruhoe

"Mt Ngauruhoe, central North Island, New Zealand. . . . Eleven samples were collected from five recent lava flows in 1949, 1954, and 1975. . . . The samples were sent progressively in batches to Geochron Laboratories in Cambridge, Boston (USA), for whole-rock potassium-argon (K–Ar) dating. . . . No specific location or expected age information was supplied. . . . [except] probably young with very little argon in them so as to ensure extra care was taken. . . . The 'ages' range from <0.27 to 3.5 (± 0.2) million years. . . . So the lab manager kindly re-checked his equipment and re-ran several of the samples, producing similar results. This ruled out a systematic lab error. . . . it is apparent from the analytical data that these K–Ar 'ages' are due to 'excess' argon inherited from the magma source area deep in the earth. . . ."[11]

Eruption Date	Sample	Lab Code	K-Ar 'Age'	Sample	Lab Code	K-Ar 'Age'
2/11/1949	A	R-11714	<0.27	B	R-11511	1.0 ± 0.2
6/4/1954	A	R-11715	<0.27	B	R-11512	1.5 ± 0.1
6/30/1954	A #1	R-11718	<0.27	B #1	R-12003	3.5 ± 0.2
	A #2	R-12106	1.3 ± 0.3	B #2	R-12107	0.8 ± 0.2
	C	R-11509	1.2 ± 0.2			
7/14/1954	A	R-11509	1.0 ± 0.2	B	R-11716	<0.29
2/19/1975	A	R-11510	1.0 ± 0.2	B	R-11717	<0.27

NON-RADIOMETRIC METHODS EVIDENCE

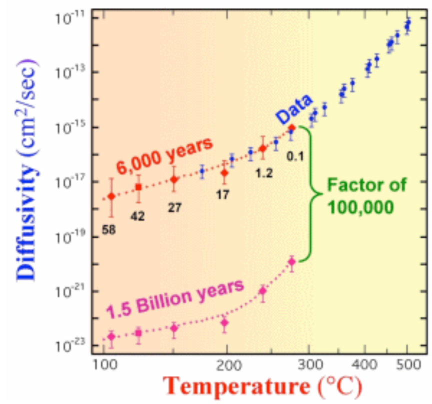
There are some non-radiometric methods for determining relative age. Several use the measured helium or argon leak rates from various materials. All result in ages of only thousands of years.

Argon diffusion rate in feldspar

"Recently a critic[12, 13] of the Radioisotopes and the Age of The Earth (RATE) creation research project inadvertently helped me find a new line of evidence supporting the biblical 6,000-year age of the world. . . . The critic wanted to increase the helium-leak age to over a billion years by having [claiming] the formation be very much cooler in the past than it is at present. That would slow the leakage. He depended heavily on a 1986 paper in the *Journal of Geophysical Research. . . .* I found that this paper had completely ignored the heat that the nearby volcano. . . . [Valles Caldera] would have applied. . . . Feldspar, a common mineral in the granitic rock . . . contains a lot of potassium, about 0.01% of which is the radioactive isotope potassium-40. Today it decays very slowly into the stable isotope argon-40. . . . Then, using Harrison's [author of the 1986 paper] own data and equations, I calculate that the feldspar in the rock formation would have lost the observed amount of argon in only 5,100 years, give or take a few millennia. . . ."[13]

Helium diffusion rate in zircon

"Decades ago . . . crystals recovered by drilling in hot Precambrian [were] analyzed. . . . the uranium in the zircons had decayed to lead to give them a radioisotope . . . age of '1.5 billion' years. But . . . up to 58% of the helium that the nuclear decay would produce was still in the zircons. . . . I estimated what the leak rates would be. . . . [by] divid[ing] the amount of helium lost from the crystal by the time (assumed by each of two models). . . .



In 2001 we commissioned one of the world's most respected experimenters. . . . a uniformitarian. . . . in this field to measure the diffusivity of helium. . . . [The chart] shows the predictions as red and magenta diamond symbols [and] the experimental results as blue dots [all values have] '2-sigma error bars'. The data fit the 6,000-year prediction very well."[14]

This supports the 5,100 age of the earth calculation in the "Argon diffusion rate in feldspar".

SUMMARY

- Radiometric dating does not give direct age, interpretations and assumptions are required such as: no initial daughter isotope, constant decay rate, the rock has been a closed system since forming.
- A very, tiny amount of initial daughter will add millions or billions of years to the age.
- Isochron dating also has assumptions: no migration of the daughter or the parent, homogeneity of the daughter, and samples must contain varying isotope ratios, which questions the homogeneity.
- Some elements have varying short-term decay rates. Thus, long-term rates may be uncertain.
- Since 1970s ^{14}C is routinely found in all organic materials: fossils, wood, coal, oil, and natural gas.
- ^{14}C testing of coal throughout the world and the geological column shows statistically equal remaining ^{14}C. Evidence of a flood burying these plants simultaneously thousands of years ago.
- Diamonds that 'supposedly' formed 1–3 billion years ago still have ^{14}C in their carbon impurities.
- 'Old earth' geologists trust ^{14}C dating of known recent specimens: the iceman, artifacts, etc. But dinosaur bones, wood in fossils, etc., are always claimed to have gross contamination errors.
- Dactate from the 1986 Mt. St. Helens eruption was 'dated' 340,000 to 2.8 million years, and 'dates' for five Mt. Ngauruhoe, NZ, eruptions in 1949, 1954, and 1975 ranged up to 3.5 million years.
- Helium (byproduct of ^{236}U to ^{206}Pb decay) diffusion in feldspar provide age estimate of 5,100 years.
- Helium diffusivity in zircon, tested by a world respected expert who is a uniformitarian, fits a 6000 year earth age estimate, but is a factor of 100 thousand off of a billion year old earth.

BIBLIOGRAPHY

1. http://faculty.ccbcmd.edu/courses/ersc101webct/unit1/radiometric1.html
2. http://www.purdue.edu/newsroom/research/2010/100830FischbachJenkinsDec.html
3. http://creation.com/geological-conflict
4. http://wwwrcamnl.wr.usgs.gov/isoig/projects/fingernails/results/interpretdata.html
5. Benedetto De Vivo, Bernhard Grasemann, Kurt Stüwe, *Geology - Volume II, Encyclopedia of Life Support Systems*, EOLSS Publications, Paris, p. 213, 2009
6. http://creation.com/radiometric-dating-breakthroughs
7. http://creation.com/diamonds-a-creationists-best-friend
8. https://www.ncsu.edu/project/archae/enviro_radio/overview.html
9. http://www.c14dating.com/k12.html
10. http://creation.com/radio-dating-in-rubble

11. http://creation.com/radioactive-dating-failure
12. Loechelt, G.H., Critics of helium evidence for a young world now seem silent?
13. http://creation.com/argon-from-rate-site
14. http://creation.com/helium-evidence-for-a-young-world-continues-to-confound-critics