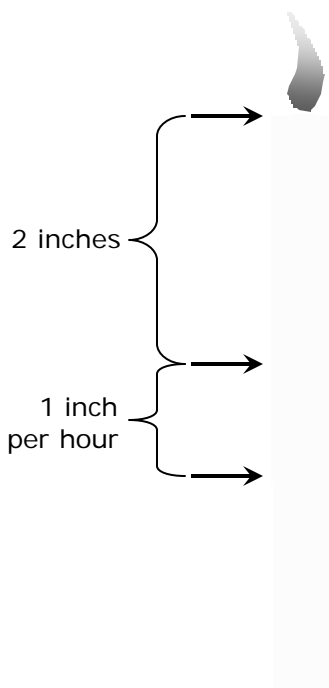


# Radioisotope Dating

Does it prove the earth is  
billions of years old?

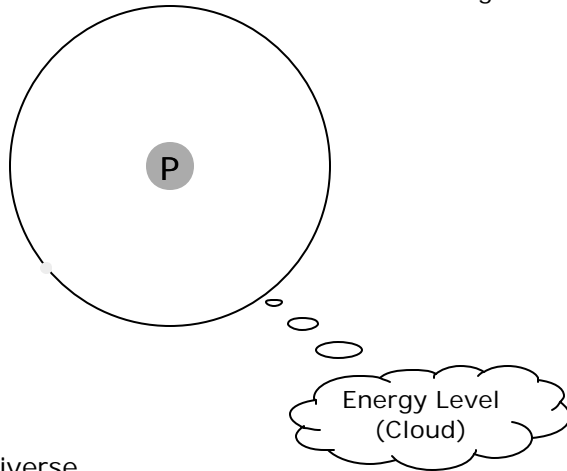
How Long has  
the candle  
been burning?



# Hydrogen

Atomic Number: 1

Atomic Weight: 1

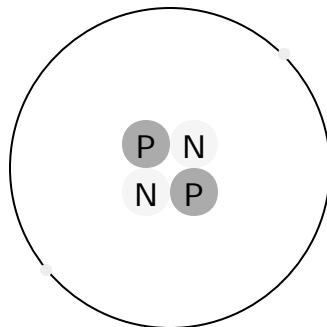


90% of matter in universe

# Helium

Atomic Number: 2

Atomic Weight: 4

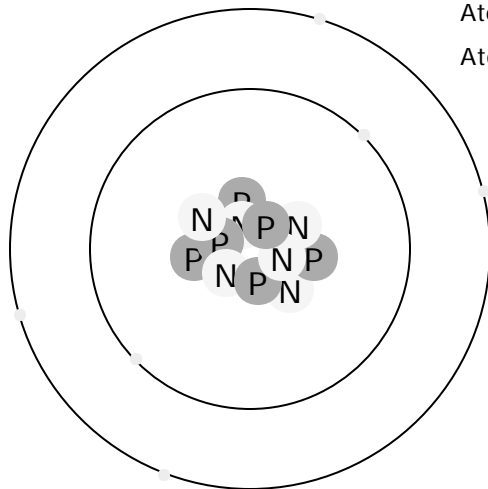


Net Zero Charge

Protons  $\approx$  Neutrons

# Carbon

Atomic Number: 6  
Atomic Weight: 12



Carbon always has 6 protons

All life is carbon based

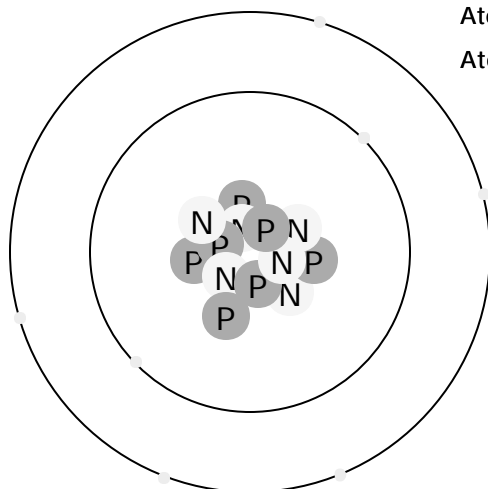
What's changed?

Cosmic ray  
bombardment

# Carbon-14 (radioactive)

Atomic number  
has changed

Atomic Number: 7  
Atomic Weight: 14



Nitrogen has 7 protons

Isotope = abnormal # neutrons

# Types of Radiation

- Beta Decay (weak)
  - Electron N = Po
- Alpha Decay (strong)
  - Helium nucleus
- Gamma Rays (strongest)
  - High energy electromagnetic radiation

What's changed?

## Carbon Nitrogen Decay

N = Po<sup>+</sup>

Atomic Number: 8  
Atomic Weight: 14

Beta Decay

Ion = abnormal # electrons

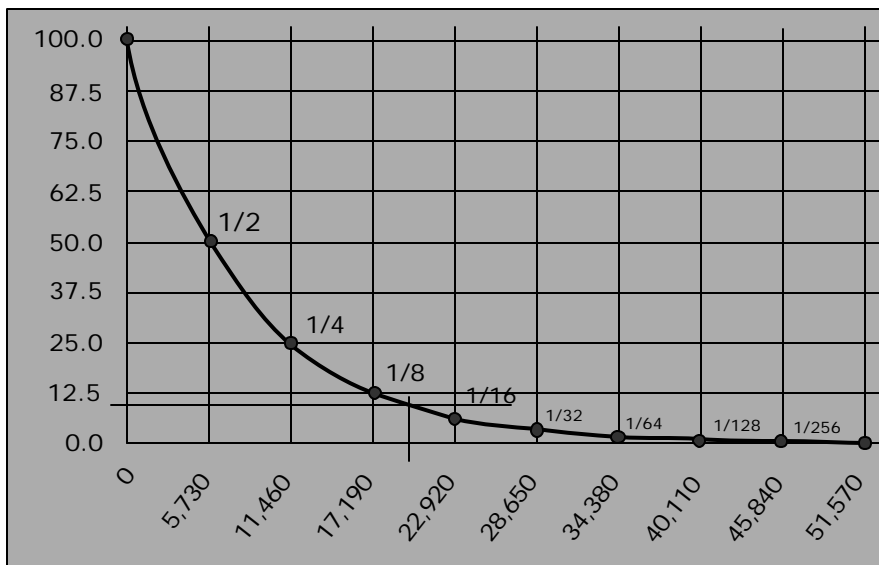
# C-14 / C-12 Ratio in Biosphere

Biosphere: Air, Plants, Animals, Soil, Sea

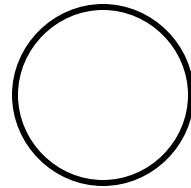
$$\frac{\text{C-14}}{\text{C-12}} = \frac{62 \text{ tons}}{75 \text{ trillion tons}} \approx \frac{1}{1.2 \text{ trillion}}$$

About one out of every trillion  
carbon atoms in your body is radioactive!

## Carbon 14 Half Life Table



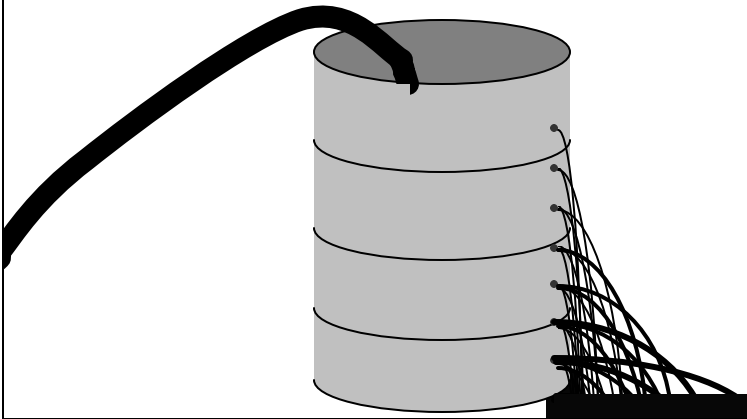
## C-14 Annual Decay Rate



## C-14 Equilibrium

- 8 Kg/year produced by cosmic rays
- 7 Kg/year lost to radioactive decay
  - $62 \text{ tons} \times (.01\% / \text{yr}) = 7\text{kg} / \text{yr}$
- Net gain of 1Kg/year
- 75 tons yields 8 Kg/year...equilibrium
  - $(13 \text{ tons}) / (1 (\text{kg} / \text{yr})) = 11,793 \text{ yrs}$

## C-14 Equilibrium



## C-14 before the flood was less than today's amount

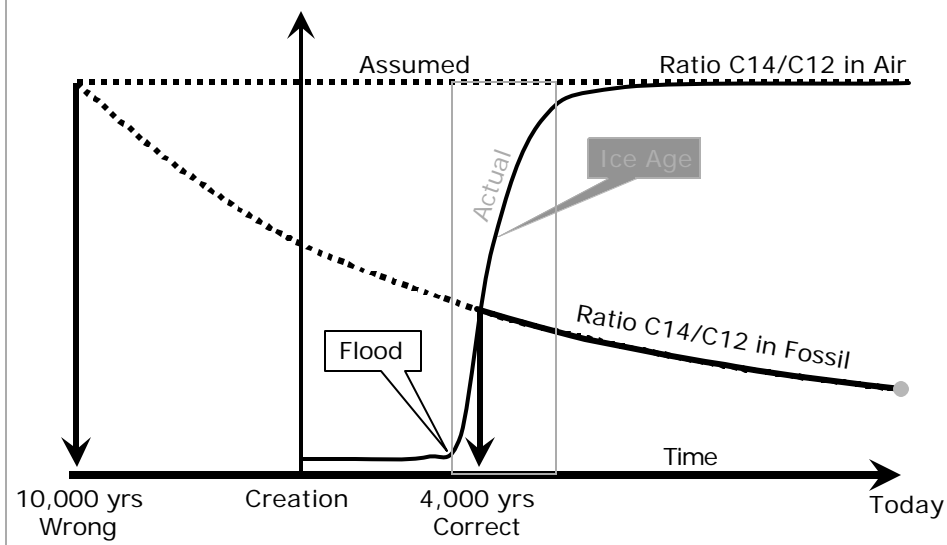
- Short time to produce
  - 1,656 years
- Lower production rate
  - stronger magnetic field, canopy?
- Pre-flood biosphere—
  - C-14: less than today
  - C-12: much greater than today

The C-14 / C-12 ratio was much smaller before the flood

	Pre-flood	Today
C-14	< 11 tons	62 tons
C-12	> 750 trillion tons	75 trillion tons
Ratio	< 0.015 trillionth	0.83 trillionth

Preflood ratio: Less than 2% of today

## Overestimating the Age of a Fossil



## C-14 is our Friend

- Ice-age dating discrepancies
  - Woolly mammoth C-14 ages:
    - Ribs                    20,400 yrs
    - Leg bones        17,575 yrs (appear younger)
- C-14 Readings on wood embedded in volcanic basalt
  
- C-14 dating must account for this difference

## Rock Dating

Parent	Daughter	Half Life
$^{40}\text{K}$	$^{40}\text{Ar}$	1,250,000
$^{87}\text{Rb}$	$^{87}\text{Sr}$	48,800,000
$^{238}\text{U}$	$^{206}\text{Pb}$	4,470,000

# Volcano Dates

- **Sunset Crater, Northern Arizona**
  - Potassium-argon: 200,000+
  - Erupted: AD 1065
- **Lava flows at Mt. Ngaurhoe, New Zealand**
  - Potassium-argon: 275,000
  - Erupted: 1949, 1954, 1975
- **Hualalai basalt, Hawaii**
  - Potassium-argon: 1.4 – 22 million
  - Erupted: AD 1801
- **Mt. Etna basalt, Sicily**
  - Potassium-argon: 140,000 – 350,000
  - Erupted: 1972

Uranium-238 → Lead-206	
Radioactive Decay	Half life
● Uranium-238	4.5×10 <sup>9</sup> years
α ● Thorium-234	24.5 days
β ○ Protactinium-234	1.14 minutes
β ● Uranium-234	2.33×10 <sup>5</sup> years
α ● Thorium-230	8.3×10 <sup>4</sup> years
α ● Radium-226	1590 years
α ● Radon-222	3.825 days
α ○ Polonium-218	3.05 minutes
α ● Lead-214	26.8 minutes
β ● Bismuth-214	19.7 minutes
β ● Polonium-214	1.5×10 <sup>4</sup> seconds
α ● Lead-210	22 years
β ● Bismuth-210	5 days
β ● Polonium-210	140 days
α ● Lead-206	stable

## 2 Peter 3:3-6

In the last days mockers will come ... saying,

"... all continues just as it was from the beginning ..."

They are willingly ignorant of this, that by the word of God the heavens existed long ago and the earth was formed out of water and by water,

through which the world at that time was destroyed being flooded with water.

## Psalm 118:8

It is better to trust in the Lord than to put  
confidence in man