Parent Material →

Radioactive Parent Nuclides →

Stable Daughter Nuclides →

MATERIAL FIRST FORMED

HALF OF MATERIAL TRANSFORMED

RADIOACTIVE SPECIMEN

Relative Number of Atoms

1.0

0.5

1/2

1/4

1/8

1/16

1/32

0 1 2 3 4 5

HALF-LIFE

TIME →

HOURGLASS

Relative Number of Sand Grains

1.0

0.5

0 1 2 3 4

TIME →

FIGURE A1.4.

The hourglass and the radioactive clock. This analogy is useful in visualizing the transformation of parent to daughter material. However, in the example of an hourglass, the sand runs steadily at a uniform rate; half the sand has been transferred when half the time has elapsed. After the next half-hour all the sand will have been transferred to the bottom of the glass. In this case the sand passes through the hourglass at a linear or constant rate. In the case of radioactive nuclides, the decay occurs at a geometric rate. Half of the material will be transferred very early in the total life of the specimen. For example, if the half-life of the material is 5,000 years, then one-half of the original radioactive nuclides will remain after the first 5,000 years have elapsed. During the second 5,000 years, one half of the remaining parent material will be transformed. At the end of 10,000 years, one quarter of the original parent material will remain. This in turn will yield up one half of its remaining material in the next 5,000 years, and so on, until only an un-detectable amount of parent material remains.