

²¹⁰Bi

Rutherford from McGill University reported on a new activity later assigned to ²¹⁰Bi in “Slow transformation products of radium” in 1905 (1905Ru01). Alpha- and beta-ray decay spectra of slow transformation products separated physically and chemically from fast decaying radium were measured. “I have recently examined more carefully the product radium D, and have found strong evidence that it is not a single product, but contains two distinct substances. The parent product, radium D, does not give out rays at all, but changes into a substance which gives out only β rays, and is half transformed in about six days. Unless observations are made on the product radium D shortly after its separation, this rapid change is likely to escape detection. The work on this subject is still in progress, but the evidence at present obtained indicates that the active deposit from the emanation, after passing through the three rapid stages, represented by radium A, B, and C, is transformed into a ‘rayless’ product D, which changes extremely slowly. D continuously produces from itself another substance - which may for the time be termed D₁ - which is transformed in the course of a few weeks and emits only β rays.” The reported half-life for radium D₁ (²¹⁰Bi) is about six days. As stated in the quote Rutherford had earlier missed this activity, assigning radium D as a pure β emitter with a half-life of about 40 years and radium E as an α emitter with a half-life of about 1 year (1904Ru05, 1905Ru03). In a paper submitted four months later Rutherford renamed radium D₁ to radium E and the old radium E to radium F (1905Ru04). In October 1904, Hofmann et al. (1904Ho01) had identified a β -emitter chemically separated from radiolead (radium D, ²¹⁰Pb) which Rutherford acknowledges (1905Ru04), however, the extracted half-life of about six weeks was incorrect.

Adapted from reference (2013Fr04)

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