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The isotope 238U decays to 206Pb with a half-life of 4.47 × 109 y. Although the decay occurs in many individual steps, the first step has by far the longest half-life; therefore, one can often consider the decay to go directly to lead. That is,

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A rock is found to contain 4.20 mg of 238U and 2.135 mg of 206Pb. Assume that the rock contained no lead at formation, so all the lead now present arose from the decay of uranium. How many atoms of (a) 238U and (b) 206Pb does the rock now contain? (c) How many atoms of 238U did the rock contain at formation? (d) What is the age of the rock? |