

**Certificate of Authenticity
and Technetium Extraction Procedure**
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Around 2004, I was a graduate nuclear engineering student at North Carolina State University. I conceived and initiated a unique project that would transmute niobium-93 into technetium-97 using the alpha-emitter betafite from Betafo, Madagascar. The nuclear reaction follows:



The experiment ran from 2004 until today of 2018, 14 years. For that period, a niobium metal plate was surrounded by crushed betafite and put in secure storage. The probability of the nuclear reaction above depends on the alpha-cross-section of technetium-97, given the typical energy level of alphas emitted from the betafite. The probability is statistically significant (the reaction **will** occur given enough time). Considering the alpha-activity of betafite and the time-period of 14 years, the surface of the niobium plate **does** contain **some** technetium-97. How much will have to be determined by the owner using the following extraction procedure:

1. wear safety glasses and acid-protection gloves and gown
2. obtain approximately 0.5 L medium strength nitric acid
3. obtain a 7x7 inch ceramic/plastic/glass dish
4. place the niobium-technetium plate in the dish
5. carefully pour just enough acid to immerse the plate
6. agitate/scrub with a plastic brush
7. let soak for 24 hours and repeat step 6
8. let soak for 24 more hours and repeat step 6
9. use a rubber spatula to get all acid from the plate
10. safely discard/clean the equipment

The nitric acid collected from the soak-dish will contain some technetium in solution. Niobium is inert with respect to nitric acid. In order to determine exactly how much technetium is dissolved in the acid, the owner should consult with a trusted analytical laboratory.

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