Optimization of Redox Reagents for Efficient Recovery of ^{211}At from 3-octanone.

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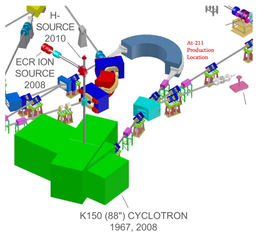
Introduction

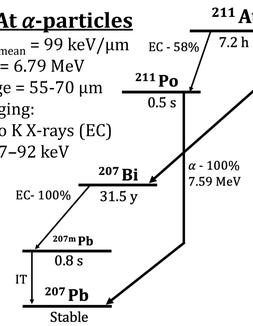
The study addresses the optimization of redox reagent conditions to efficiently recover ^{211}At from a 3-octanone organic phase, driven by the growing interest in alpha-emitting radionuclides for Targeted Alpha Therapy (TAT). ^{211}At is favored due to its beneficial properties, including a short half-life of approximately 7.2 hours and a clean decay scheme.

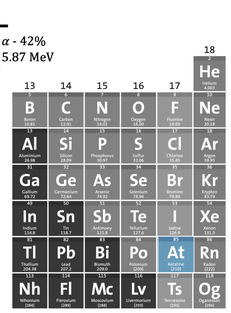


^{209}Bi + α → ^{211}At + 2n

^{211}At α-particles

LET$_{mean}$ = 99 keV/µm
E$_{avg}$ = 6.79 MeV
range = 55-70 µm
Imaging:
^{211}Po K X-rays (EC)
77–92 keV

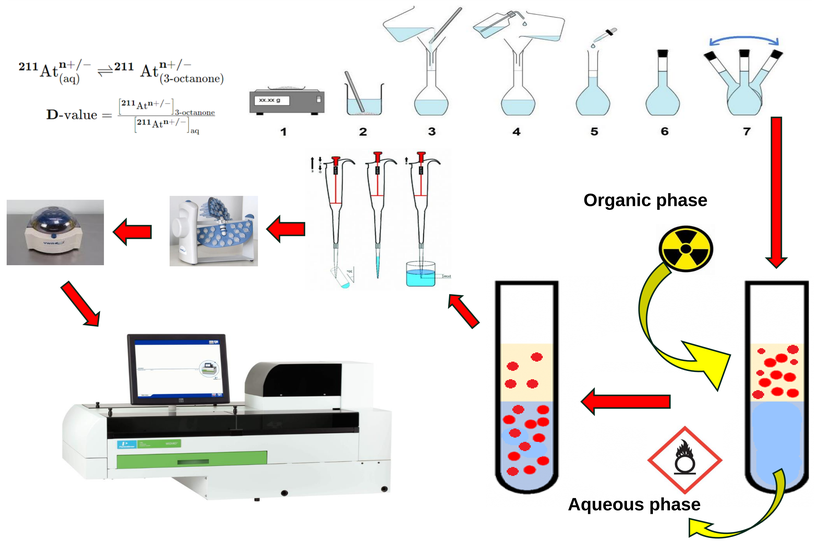




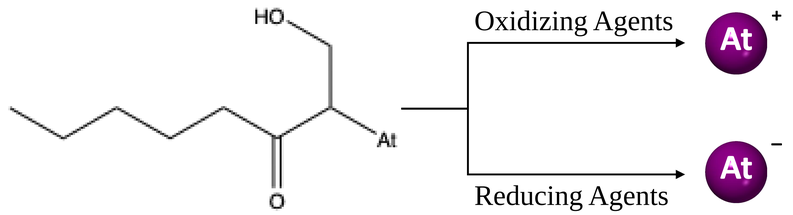
Recovery of ^{211}At from 3-octanone strip

$$^{211}At^{n+/-}_{(aq)} \rightleftharpoons {}^{211}At^{n+/-}_{(3\text{-octanone})}$$

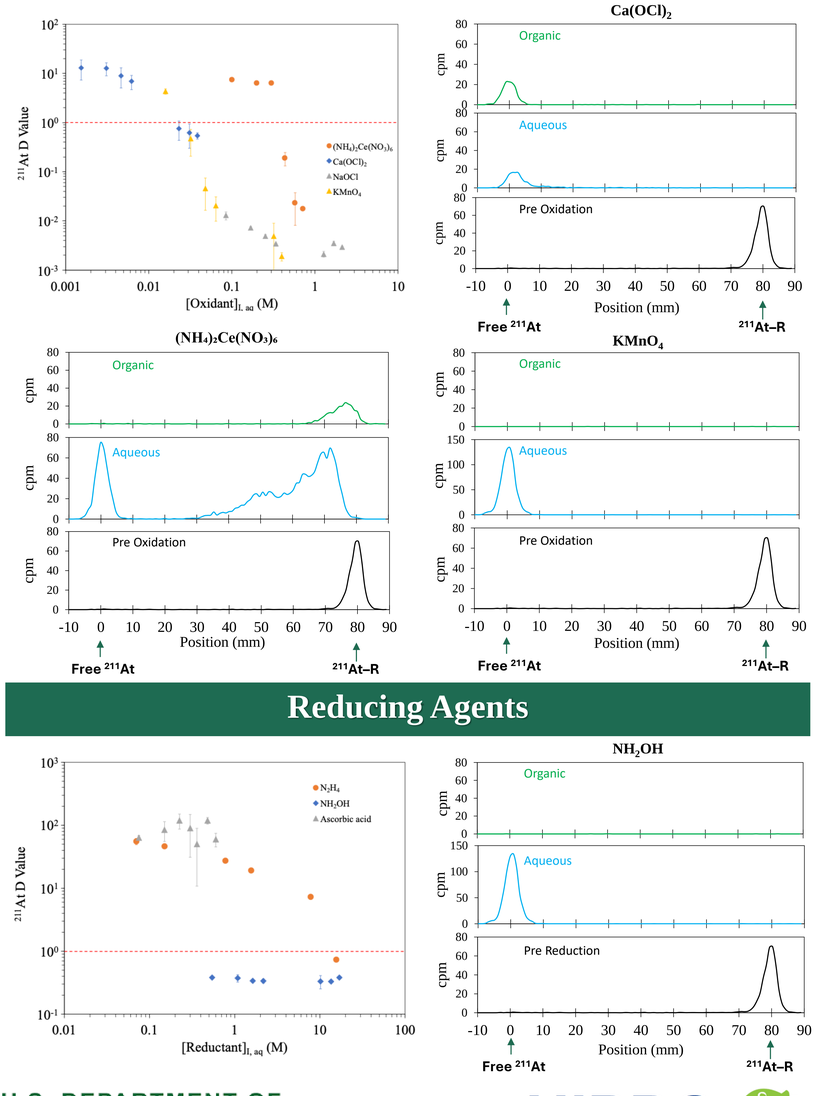
$$\text{D-value} = \frac{[^{211}At^{n+/-}]_{3\text{-octanone}}}{[^{211}At^{n+/-}]_{aq}}$$



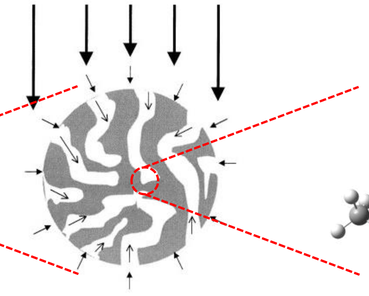
Redox Reactions



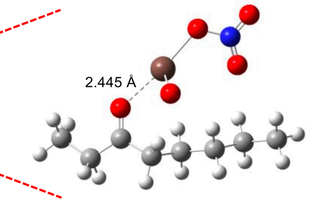
Oxidizing Agents

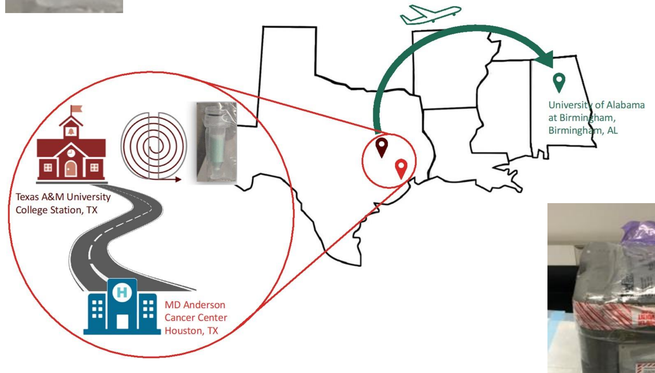


Cartridge Column Loading & Shipping ^{211}At



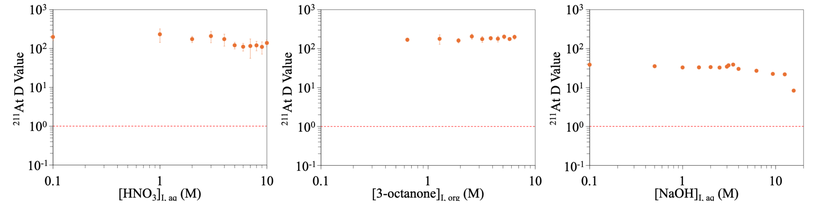
3-octanone
FDA UNII: 79173B4107

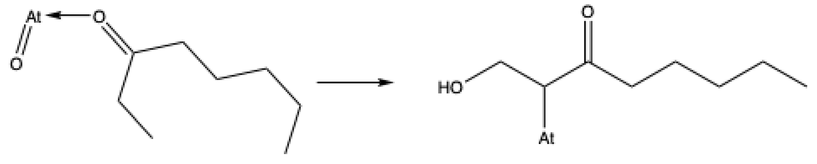




Recovery of ^{211}At from 3-octanone strip

$$AtO(NO_3)_{aq} + n \cdot O{=}CR_1R_{2_{org}} \not\rightleftharpoons (AtO(NO_3) \cdot (O{=}CR_1R_2)_n)_{org}$$





Reducing Agents

Acknowledgments

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