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Optimization of scintillator loading with the tellurium-130 isotope for long-term stability LAUREN DUHAMEL, XIAOYA SONG, MICHAEL GOUTNIK, TANNER KAPTANOGLU, JOSHUA KLEIN, Univ of Pennsylvania, SNO+ COLLABORATION — Tellurium-130 was selected as the isotope for the SNO+ neutrinoless double beta decay search, as ^{130}Te decays to ^{130}Xe via double beta decay. Linear alkyl benzene(LAB) is the liquid scintillator for the SNO+ experiment. To load tellurium into scintillator, it is combined with 1,2-butanediol to form an organometallic complex, commonly called tellurium butanediol (TeBD). This study focuses on maximizing the percentage of tellurium loaded into scintillator and evaluates the complex's long-term stability. Studies on the effect of nucleation due to imperfections in the detector's surface and external particulates were employed by filtration and induced nucleation. The impact of water on the stability of TeBD complex was evaluated by liquid-nitrogen sparging, variability in pH and induced humidity. Alternative loading methods were evaluated, including the addition of stability-inducing organic compounds. Samples of tellurium-loaded scintillator were synthesized, treated, and consistently monitored in a controlled environment. It was found that the hydronium ions cause precipitation in the loaded scintillator, demonstrating that water has a detrimental effect on long-term stability. Optimization of loaded scintillator stability can contribute to the SNO+ double beta decay search.

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