Abstract Submitted
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R&D Isotope Separation with Large Thermal Gradients for Ultra-Low Background Experiments[1] ANGELA ALANSON CHILLER, CHRISTOPHER CHILLER, BENJAMIN JASINSKI, NATHAN SNYDER, DONGMING MEI, University of South Dakota — Seeking an alternative method to obtain enriched 76Ge and 73Ge for planned neutrinoless double-beta decay and dark matter experiments, a cryogenic distillation column is developed in our university laboratory for germane gas. Prior to experimenting with germane gas, which requires significant safety measures in place, the distillation column was tested with CO2. The preliminary analysis shows that 45CO2 was separated and enriched within two hours at room temperature. Exploiting the isotopic gradient within the two-meter length and removing preferentially from top and bottom points, 44CO2, 45CO2, and 46CO2 were bottled for further analysis. Methods of preferential condensation and vaporization used for depletion and enrichment of bottled gases show equal viability for purification and isotope enrichment with CO2 as well as gases with phase changes within the equipment specifications. Potential for purification and isotope enrichment/depletion of gases such as argon and xenon are investigated.

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