GE Silicone Sealants ²²²Rn Emanation Measurement

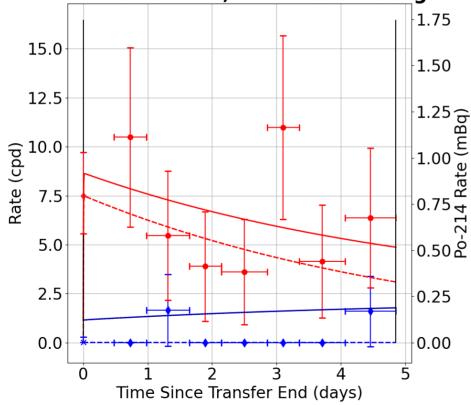
H. Ryott Glayzer Lab Assistant SD Mines

GE All-Purpose Sealant

- GE All-Purpose Sealant has a rate of $0.00^{+0.02}_{-0.00}$ mBq
 - This measurement is taken from 465 hours of usable data
 - The uncertainties in this figure were calculated separately for top and bottom errors in order to provide a more conservative estimate
- A sample with ~200cm² of surface area was emanated six times throughout Summer 2023 at SD Mines
 - Four of those runs contained useful data
- The emanation rate of this sealant is sufficiently low for SuperCDMS

Rate vs. Time, Run 717





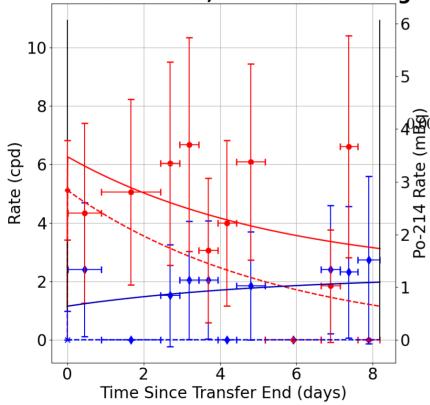
Measured Po-214 (Rebinned)
Measured Po-218 (Rebinned)
Inferred Po214 Rate
Inferred Po218 Rate
Inferred Rate
Combined
Background Model
Po-214: 0.00 +0.03 -0.00 mBq (with efficiency) 0.01 +0.29 -0.00 cpd detected x²/dof=3.82/6, p=0.7007
Po-218: 0.86 +0.25 -0.22 mBq (with efficiency) 7.50 +2.21 -1.94 cpd detected x²/dof=4.43/6, p=0.6182

p-values calculated using combined rate

- This run indicates a rate of $0.00^{+0.03}_{-0.00}$ mBq
- This is based solely off of the ²¹⁴Po rate because of low resolution between ²¹⁸Po and ²¹⁰Po peaks which caused ²¹⁰Po events to 'spill over' into the ²¹⁸Po ROI which makes the ²¹⁸Po rate unreliable

Rate vs. Time, Run 720

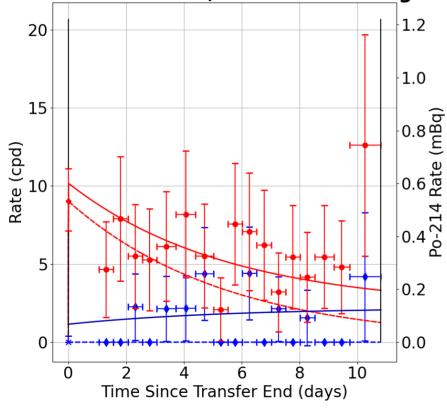
Rate vs Time Run 720, with Model Background



- Measured Po-214 (Rebinned) Measured Po-218 (Rebinned) --- Inferred Po214 Rate Inferred Po218 Rate ····· Inferred Rate Combined Background Model Po-214: 0.00 +0.54 -0.00 mBg (with efficiency) 0.00 +0.97 -0.00 cpd detected $\chi^2/dof=3.38/10$. p=0.9709Po-218: 3.09 +1.03 -1.03 mBg (with efficiency) 5.12 +1.70 -1.70 cpd detected $y^2/dof = 6.50/10$. p=0.7715p-values calculated using combined rate
- This run indicates a rate of $0.00^{+0.54}_{-0.00}$ mBq
- This is based solely off of the ²¹⁴Po rate because of low resolution between ²¹⁸Po and ²¹⁰Po peaks which caused ²¹⁰Po events to 'spill over' into the ²¹⁸Po ROI which makes the ²¹⁸Po rate unreliable

Rate vs. Time, Run 721

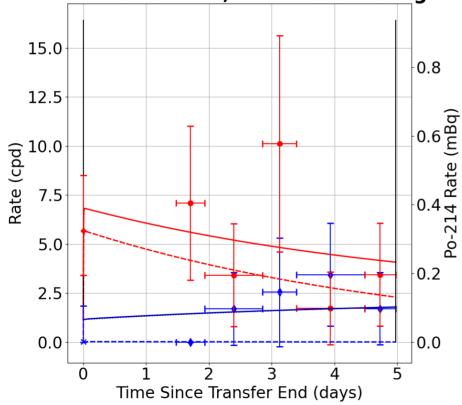
Rate vs Time Run 721, with Model Background



- Measured Po-214 (Rebinned)
 Measured Po-218 (Rebinned)
 Inferred Po214 Rate
 Inferred Po218 Rate
 Inferred Rate
 Combined
 Background Model
 Po-214: 0.00 +0.02 -0.00 mBq (with efficiency)
 0.00 +0.41 -0.00 cpd detected
 \(\chi^2\)/dof=12.65/16,
 p=0.6982
 Po-218: 0.58 +0.13 -0.12 mBq (with efficiency)
 9.03 +2.09 -1.90 cpd detected
 \(\chi^2\)/dof=11.57/16,
 p=0.7729
 p-values calculated using combined rate
- This run indicates a rate of $0.00^{+0.02}_{-0.00}$ mBq
- This is based solely off of the ²¹⁴Po rate because of low resolution between ²¹⁸Po and ²¹⁰Po peaks which caused ²¹⁰Po events to 'spill over' into the ²¹⁸Po ROI which makes the ²¹⁸Po rate unreliable

Rate vs Time, Run 722

Rate vs Time Run 722, with Model Background

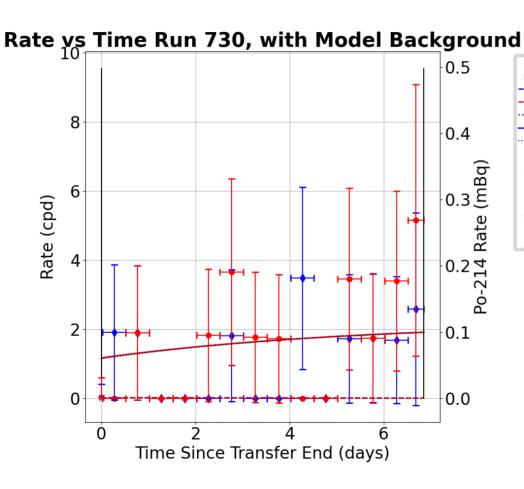


- Measured Po-214 (Rebinned)
 Measured Po-218 (Rebinned)
 Inferred Po214 Rate
 Inferred Po218 Rate
 Inferred Rate
 Combined
 Background Model
 Po-214: 0.00 +0.10 -0.00 mBq (with efficiency)
 0.03 +1.82 -0.02 cpd detected
 x²/dof=1.70/4,
 p=0.7899
 Po-218: 0.35 +0.17 -0.14 mBq (with efficiency)
 5.69 +2.81 -2.28 cpd detected
 x²/dof=3.31/4,
 p=0.5074
 p-values calculated using combined rate
- This run indicates a rate of $0.00^{+0.10}_{-0.00}$ mBq
- This is based solely off of the ²¹⁴Po rate because of low resolution between ²¹⁸Po and ²¹⁰Po peaks which caused ²¹⁰Po events to 'spill over' into the ²¹⁸Po ROI which makes the ²¹⁸Po rate unreliable

GE Advanced Sealant

- GE Advanced Sealant has a rate of $0.00^{+0.03}_{-0.00}$ mBq
 - This measurement is taken from 163 hours of usable data
- A sample with ~200cm² of surface area was emanated one time in September 2023 at SD Mines
 - This run resulted in 163 hours of usable data
- The emanation rate for this sealant is sufficiently low for SuperCDMS purposes

Rate vs Time, Run 730



Measured Po-214 (Rebinned)
 Measured Po-218 (Rebinned)
 Inferred Po214 Rate
 Inferred Rate
 Combined
 Background Model
 Po-214: 0.00 +0.02 -0.00 mBq (with efficiency)
 0.02 +0.38 -0.00 cpd detected
 χ²/dof=6.05/13,
 p=0.9442
 Po-218: 0.00 +0.03 -0.00 mBq (with efficiency)
 0.02 +0.58 -0.00 cpd detected
 χ²/dof=8.53/13,
 p=0.8071

p-values calculated using combined rate

- Weighted Mean of 214 Po and 218 Po rates gives a rate of $_{0.00}^{+0.03}_{-0.00}^{mBq}$
- The weighted mean was chosen because there was good resolution between the ²¹⁰Po and ²¹⁸Po ROIs

Summary

- Both Sealants assayed are sufficiently low for use in SuperCDMS
- Both sealants assayed have a sufficient amount of usable data and no additional runs are necessary