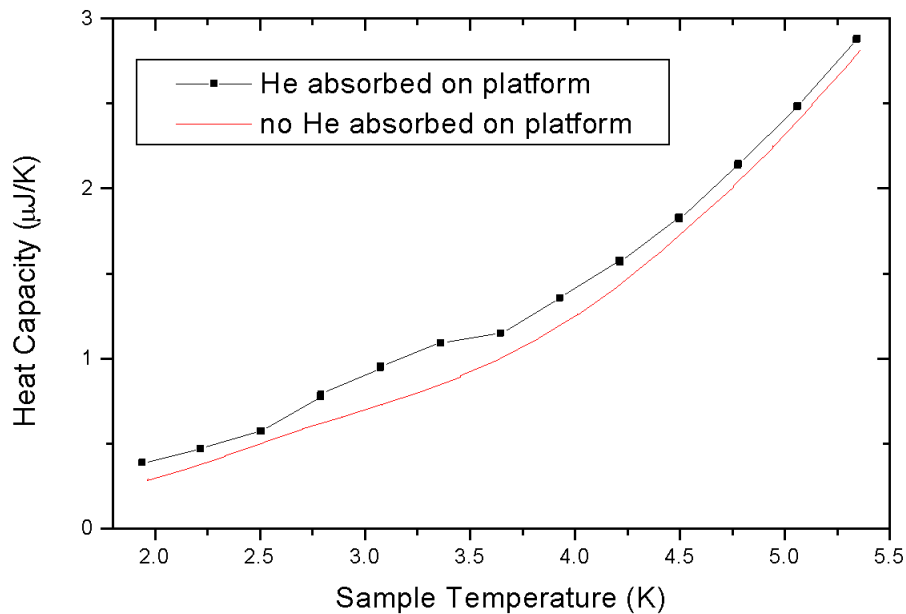




TOPIC: Helium Cryopumped on Heat Capacity Sample Causes Peak in Low Temperature Heat Capacity

Below about 10 K, it is possible to condense helium on a heat capacity sample, the heat capacity platform, or the wires which suspend the platform. The condensation occurs because the platform or sample becomes a cryopump with more pumping power than the PPMS high-vacuum system below approximately 10 K. The result is a broad peak in the heat capacity in the range of 3 to 5 K, as shown by the black squares in the figure.

In order to prevent this problem, the user should always install the charcoal holder on the contact baffle assembly. This charcoal is a very effective cryopump for helium below 15 K, so the helium condenses on the charcoal rather than on the sample. The heat capacity data showing the broad peak (black squares) were generated with no charcoal holder present on the contact baffle. The red line shows the heat capacity with the charcoal installed. Note the absence of the peak in these data.



Even with the charcoal holder installed, helium can condense on the sample if the sample is kept below 10 K for several hours. Condensation is especially possible on porous samples, because such samples are very good cryopumps. In this case, cycling the PPMS up to 20 K will flush out the condensed helium.

The charcoal is reasonably delicate, and so should be handled with care. Also, oil contamination on the charcoal will spoil the cryopumping quality of the charcoal. Therefore, you should never touch the charcoal. If your charcoal is missing or damaged, please contact Quantum Design for a replacement contact baffle assembly (part # 4083-010).