ADVANCES IN COLD CURATION: DEALING WITH DUST.
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Introduction: Modern astromaterials curation routinely involves the use of controlled environment and glove
box technology in order to isolate samples from the conditions at the Earth’s surface. The advantages of curation of
astromaterials under cold conditions are increasingly being realized: curation and handling at temperatures well be-
low standard room temperature, but warm enough to ensure user comfort and safety (i.e., -10 to -20 °C) enables –
among other things – the retention of intrinsic volatiles, the inhibition of microbial activity, and the reduction in re-
action rates of oxidation and hydrolysis of intrinsic organic compounds and minerals [1]. The Subzero Facility for
the Curation of Astromaterials [1] provides a facility in which to develop and test cold curation methods that are
potentially applicable to a wide range of astromaterials, such as freshly fallen meteorites (including the Hamburg
meteorite, [2]), and those from sample return missions. Here we report on a study of best methods for mitigation of
dust during processing of the Tagish Lake meteorite within the Subzero Facility.

The Tagish Lake Dust Problem: The Tagish Lake C2 ungrouped chondrite is exceptionally friable and porous;
subsampling has routinely been carried out within the Ar glove box at -10 °C using sterile scalpels rinsed in ul-
trapure water prior to use [e.g., 3]. Processing of larger specimens in recent years has been accomplished using a
guillotine cutter (HSE Harvard Apparatus). The friable nature of the meteorite results in a significant amount of dust
and small fragments generated during subsampling, especially using the guillotine. This material represents a loss of
sample, either because it cannot be readily recovered, or because what is recovered has come into contact with the
interior of the glove box and is therefore contaminated. Furthermore, the dust represents a potential source of cross-
contamination between Tagish Lake lithologies [4] or between different samples processed within the glove box.

Methods: All materials used in this study were carefully cleaned with ultrapure water and/or dichloromethane
(DCM) prior to use within the glove box. HPLC-grade DCM was used as a solvent for potential organic contami-
nants, via soaking of cotton-tipped swabs, for most materials; ultrapure methanol was used for testing of the key-
board vacuum due to the solubility of the plastic in DCM. Two mL of either DCM or methanol were added to the
swab tips and analyzed by GC-MS at MacEwan University following the methods of [3].

Guillotine Enclosure. In order to mitigate the spreading of dust and small fragments during guillotine cutting, we
constructed an enclosure for the guillotine cutter using 0.8 mm thick Teflon sheets mounted using zip ties to an alu-
minum wire frame (Figure 1a). The enclosure is just large enough to enable the use of the guillotine, which was test-
ed on a specimen of the Tagish Lake meteorite (Fig. 1b) inside the glove box under Ar at -10 °C. A Teflon sheet was
used as a base beneath the guillotine and enclosure in order to facilitate collection of material.

Mini Portable Vacuum Cleaner. We used a handheld (e.g., keyboard) vacuum cleaner to test the collection of
dust generated by cutting of the same Tagish Lake specimen (Fig. 1c). The advantage of the vacuum is that has a
relatively simple design, and is powered by a Li-ion battery. The cloth dust filter was replaced by Kimwipe cut to fit.

Results and Conclusions: The combination of guillotine enclosure and handheld vacuum enabled the collection
of most of the dust and small fragments generated during cutting of the Tagish Lake specimen (a total of 0.17 g)
with the exception of a small amount of dust adhered to the Teflon base which could not be recovered, and dust
trapped within the filter of the vacuum. None of the materials were found to have detectable organic contaminants.

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