

A BERYLLIUM DOME SPECIMEN HOLDER FOR XRD ANALYSIS OF AIR SENSITIVE MATERIALS

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We have designed a versatile sample holder for powder XRD analysis of air sensitive specimens. This holder employs a beryllium dome that hermetically seals to an aluminum base via a simple O-ring compression fitting. The design is such that the base of the specimen holder defines the plane of analysis and therefore aids in alignment of the specimen at the proper sample height during preparation. The holder can be easily transferred in and out of a glove box for straightforward specimen preparation of reactive materials. The beryllium dome (Be-dome) makes an air-tight seal that is more robust compared to other thin organic materials which can display atmospheric leakage over time. The surface of the beryllium hemisphere sits well above the X-Ray focal plane, so the XRD pattern is essentially free of extra diffraction peaks. Additionally, the design of the stainless-steel ring attachment that holds the Be-dome is such that the steel ring sits below the line-of-sight for the X-Ray beam. This allows the analyst access to a very large range of 2θ ($1^\circ \leq \theta \leq 160^\circ$) without contribution from the holder to the observed diffraction pattern. The holder is configured to fit into a Siemens D500 system, however, it can easily be employed on a D8 Discover system w/GADDS as well, and the design can be relatively easily modified to fit other system configurations. Diffraction data shall be presented from analyses of various rare-earth halide compounds (e.g. LaBr_3) as well as examples of other air sensitive materials.

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