

Ultrahigh Vacuum Quartz Crystal Microbalance Studies of Pure Compound Vapor Pressures

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We are reporting about an apparatus for measuring vapor pressures using a version of the Knudsen effusion technique, involving the use of a quartz crystal microbalance (QCM) in an ultrahigh vacuum environment. We expect that measurements down to the 1×10^{-7} Torr level will be attainable with this apparatus. The ultrahigh vacuum construction of the apparatus (with the nominal base pressure 5×10^{-10} Torr) and the ability to control the temperature of the QCM to within 0.1 K, are critical to the measurement of these low vapor pressures. This work is part of a program sponsored by the Transportation Security Administration to improve the knowledge of vapors emitted by explosives. We are focusing on several of the components of common explosives, with the intention of extending the temperature range over which the measurements have been made.