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Particle Impaction for Trace Contaminant Detection in a Very-High-Volume Airstream MATTHEW FULGHUM, MICHAEL HARGATHER, GARY SETTLES, Pennsylvania State University — An impactor with automated thermal desorption has been designed and tested for airborne trace contaminant detection in a very- high-volume airstream, up to one cubic meter per second. This airflow is scanned for contaminants using an ion mobility spectrometer, which is flow rate-limited to $\sim 10\frac{cc}{s}$. As the chemicals of interest, once impacted, are capable of being thermally desorbed and interrogated as a vapor, a novel method of collecting these particles was devised. A 0.3m long linear-slot impactor is used to concentrate particles upon a periodically-heated notch of equal length in a rotating rod. After impaction, this rod is rotated into the interrogation position and is heated to thermally desorb the impacted particles into the carrier-gas flow as a vapor. This flow is several orders of magnitude smaller than the primary airstream being sampled and carries a heavy concentration of the desorbed vapor from the impacted particles to subsequent chemical analysis by the IMS, improving contaminant detection without overwhelming its flow rate capabilities.

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