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JET APPARATUS FOR LIQUID SAMPLED GC OF CONDENSABLE GASES

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Stable isotope-labeled products include some gases that liquefy when moderately pressurized in steel cylinders, such as ammonia-15N. Several gas chromatographs in this laboratory are interfaced with pressure manifolds that are setup for handling gas-phase GC samples. However, for test cylinders that contain liquefied gas, it is sometimes necessary to determine component concentrations in both liquid phase and vapor phase. Toward this objective a useful "Jet apparatus" was designed to regulate the expansion of gravity-fed sample into an evacuated reservoir (prior to chromatography). The compact Jet device consists of one 4-way stainless steel cross, plus the following parts connected to NPT ports: 1/ pressure gauge, -15 psig to +30 psig; 2/ threaded nut with 0.01-inch jet (connected to the sample cylinder); 3/ diaphragm valve (connected to the GC manifold); 4/ bellows valve (connected to 25 mL expansion cylinder).

A sample test begins with attachment of the analyte cylinder to the high-pressure side of the 0.01-inch jet orifice. Following manifold evacuation back to the sample cylinder valve, the selection of sampling liquid or vapor depends upon cylinder-valve orientation. To sample liquid, the cylinder valve would be positioned at the bottom relative to the actual cylinder. At this stage liquid phase analyte can be gradually expanded into the 50-mL reservoir, and next throttled to the main GC manifold. The title Jet device permits preferential phase sampling, eliminates droplet contamination in gas manifolds, and improves operator safety. It has been successfully applied to liquefied materials such as ammonia-15N and sulfur hexafluoride. Concentrations of air components were measured to be significantly lower in the liquid phase for the latter two analytes.

