Improved Re-Ignition Technique for Flame Photometric Detectors

by Laurice E. Fetzer, Jr.
Technical Development Laboratories, Aedes aegypti Eradication Program, National Communicable Disease Center, Bureau of Disease Prevention and Environmental Control, Public Health Service, U.S. Department of Health, Education, and Welfare, Savannah, Georgia

The flame photometric detector first described by Brody and Chaney (1) has proven to be an excellent tool for the detection of phosphorous- and sulfur-containing compounds after separation by gas chromatography. One of the disadvantages of the detector is the ease whith which the hydrogen rich flame is extinguished by the solvent as it passes from the column into the detector. Normally the flame will be extinguished when one or more µl of solvent is injected. The recommended operating procedure is to turn off the hydrogen supply after the flame is extinguished by the solvent, wait 15 or 20 seconds to insure that all the hydrogen has been purged from the detector then turn on the igniter and the hydrogen and re-ignite the flame. Not only is it inconvenient to have to re-ignite the flame after each injection, but also the time required for this procedure is so long that early peaks in the chromatogram may likely go undetected. The procedure also affects the stability of the detector, which results in a noisy and shifting baseline.

In order to simplify the operational procedure, the following technique was developed for re-ignition of the flame in the flame photometric detector. Five µl of n-hexane was injected into the instrument and after waiting 5 seconds the igniter button was pressed and held down until the solvent passed through the detector and the flame automatically re-ignited. The re-ignition was easily detectable by a soft sputtering sound at the exit tube of the detecton. The experiment was repeated with one to 10 µl of benzene, acetone, ethanol,

Bulletin of Environmental Contamination & Toxicology,
Vol. 3, No. 4, 1968, published by Springer-Verlag New York Inc.

n-hexane, and 2,2,4-trimethylpentane. In all cases the flame was re-ignited smoothly and it was never necessary to shut off the hydrogen flow as required in the original publication (1). The time elapsed between injection and pressing of the ignitor button may be left to the operator, but should be about the time required for the solvent to reach the detector. The ignitor button must be held down until re-ignition is complete. This normally occurs within 20 seconds after injection, at which time the pen has returned to the baseline and the instrument is capable of detecting any phosphorous or sulfur compounds which emerge from the column.

The equipment used in the above experiments was a Micro-Tek Gas Chromatograph Model 220 equipped with a Melpar flame photometric detector. The ignitor coil originally furnished with the instrument was replaced by a 3/4" length of 0.016" (26 gauge) platinum wire. The column was 6' x 1/4" aluminum packed with 2.5% E-301 plus 0.25% Epon 1001 on 80/100 mesh Chromosorb W DMCS. The column oven was held at 193°C. The flow rate of nitrogen carrier gas was 70 ml per minute, hydrogen 150 ml per minute and oxygen 20 ml per minute.

Reference

1. SAM. S BRODY and JOHN E. CHANEY, _J. Gas Chromatog._ _4_, 42 (1966)

Trade names are for identification purposes only and do not constitute endorsement by the Public Health Service.