Waters
Lab Highlights
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ANALYSIS OF THE VASODILATOR PETN AND ITS RELATED NITRATE ESTERS

PETN (pentaerythritol tetranitrate) and other nitrate esters such as nitroglycerin (NG) are most often thought of as explosives or propellants (See LAH 0161). These nitrate esters and many of their homologs are also commonly used as cardiac vasodilators and are subject to careful monitoring in their production for such criteria as purity and amounts of decomposition products formed. The goal of this work was to replace the more subjective TLC procedures with an LC method. Workers at Monsanto and the Department of Energy (1) have developed a reversed-phase LC method for PETN and its homologs.

Figure 1 shows such an analysis using an isocratic separation on a μBONDAPAK™ C_{18} column. The chromatogram shows PETN along with four of its homologs, also nitrate esters. The detection limit for this method at 214 nm is 1.0 ng at 0.001 AUFS. To illustrate even further the advantage of LC over TLC, Figure 2 illustrates that LC can monitor contaminants not reported by TLC.

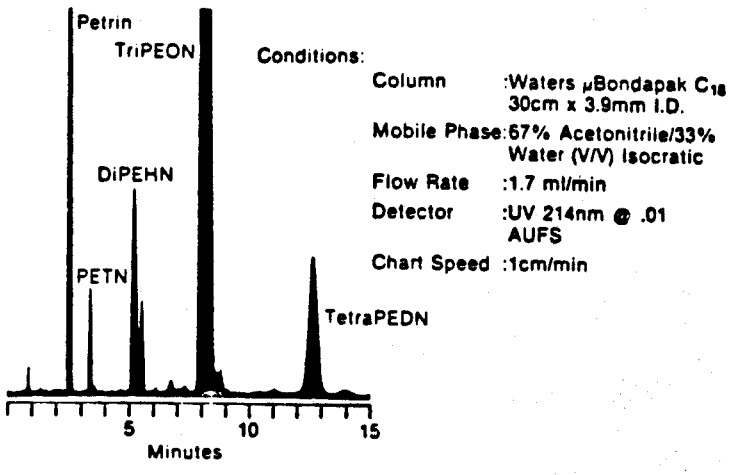

FIGURE 1

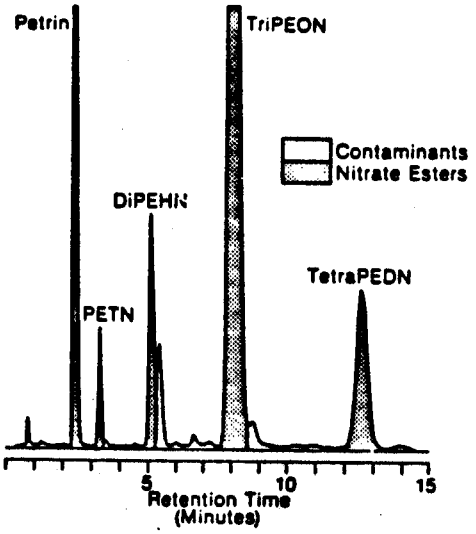

FIGURE 2

HPLC conditions same as Figure 1

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Finally, high purity PETN was desired in milligram to gram quantities. To obtain these amounts a Waters PrepLC™/System 500A liquid chromatograph was used for the purification. Direct scale-up of the analytical procedure was accomplished by increasing flow rate proportionally to the column cross sectional area, that is, maintaining constant linear velocity. Figure 3 shows a prep separation of PETN and several of its homologs. After prep separation, a single peak is seen for the PETN (Figure 4) using the analytical procedure, with no evidence of other nitrate esters.

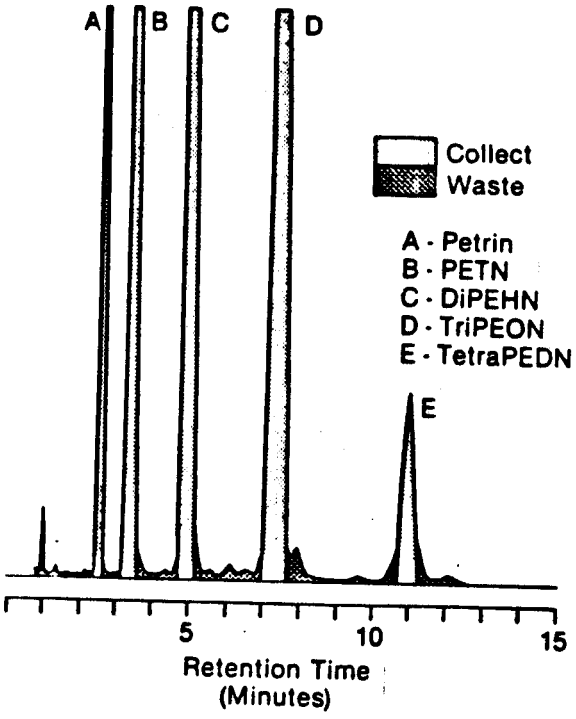

FIGURE 3

Scale-up on a PrepLC™/System 500A maintains resolution permitting multiple fractionation.

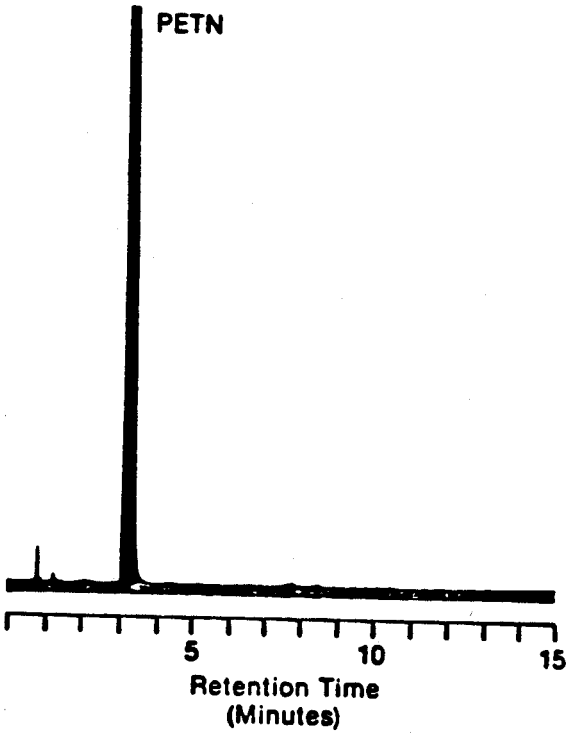

FIGURE 4

HPLC analysis of crude PETN after purification by prep LC.

Both the analytical and prep separations offer excellent resolution of PETN from its homologs. The analytical method offers better specificity and sensitivity than TLC. Good recovery of the PETN from crude mixtures has been obtained using the PrepLC™/System 500A. Further work is now underway at Monsanto (1) to develop acetone/water mobile phases in order to further increase the yield of the PETN and other nitrate esters.

1. B. V. Barnhart and R. J. Schumacher, Technical Bulletin prepared for the Department of Energy by the Monsanto Research Corporation, November, 1983. Document No. DE84002169.