Table 1 TLC-Argentation of Unsaturated Hydrocarbons and Other Related Compounds with a Solution of Silver Nitrate

Solvent	Salt/solvent concentration (%)	Salt/support concentration (%)	Compounds separated	Ref.
H_2O–methanol[a]	5		Tetracyclic triterpenes	22
H_2O		2.5	Olefins	18
H_2O	12.5	26	Allylic-propenylic isomers	18
Acetone–10% H_2O	29	13	Sesquiterpenes, diterpenes	18,23
Acetone–10% H_2O	29	13	Terpenoids	5,18
H_2O–60% ethanol	54	13	Sesquiterpenes	24

[a] By spraying. All others, by using impregnated plates.
Source: Adapted from Ref. 18.

The influence in electron density around the double bond on the R_f values was also studied by Fuggerth (21) in the case of substituted stilbenes separated into their cis and trans isomers. They were successfully separated on silica gel + 2% aqueous solution of silver nitrate (5% w/w). Spots with higher R_f values were assigned to *Z* structures.

In the case of terpenes, the original procedures involving the use of silica gel layers containing silver nitrate and gypsum are still used, although some authors claim that silver perchlorate in the absence of gypsum is the optimum combination for terpene separation (5,18). This was concluded after an R_f study of several terpenes (longicyclene, isolongifolene, longifolene, α-gurgujene, α-bergamotene, β-bisabolene, α- and β-himachalene, and cembrene).

Terpene detection is usually performed by spraying with a solution of chlorosulfonic acid in acetic acid, phosphomolybdic acid in ethanol, or antimony perchlorate in chloroform.

3. Polycyclic Aromatic Hydrocarbons

Much more work has been performed on conventional TLC and HPTLC of polycyclic aromatic compounds (PACs) compared to other hydrocarbons, due to their importance in environmental problems. In general, the polycyclic aromatic hydrocarbons (PAHs) usually encountered in environmental or fuel-related samples cannot be completely separated using TLC and HPTLC. It is not even possible to separate the 18 PAHs included in the EPA list. However, in a typical analysis it is only necessary to identify or quantify a few PAHs and this is compatible with the capabilities of TLC and HPTLC.

There is no universal or single TLC method superior to all others for PAH analysis. Apart from the development of adequate elution sequences, it is also necessary to use selective fluorescence detection to determine some PAHs.

a. Normal-Phase TLC. In general, separation of PAHs on silica gel and other normal-phase adsorbents (e.g., alumina) is not successful because of poor solvent selectivity. However, these stationary phases are used for determining PAHs as a group in fuels due to the compatibility of normal-phase eluants with fuels (see Sec. IV.B.1.c).

A mixture (1 + 1) of silica gel and kieselguhr and elution using *n*-hexane–toluene (45:5, v/v) was able to sufficiently separate some PAHs: 1,2-benzanthracene, dibenz[2,4]anthracene, pyrene, benzo[*a*]pyrene, and benzo[*g,h,i*]perylene (25). The same conditions can be used to detect benzo[*a*]pyrene among benzofluoranthenes. In the same research, aluminum oxide plates were also used, and eluants were either *n*-hexane–toluene–chloroform (45:5:10) or *n*-hexane–toluene–carbon tetrachloride (45:5:5). This allowed 1,2-benzanthracene, dibenz[*a,h*]anthracene, pyrene, benzo[*a*]pyrene, and chrysene to be separated. In all cases the plates were dried and observed under UV illumination (λ = 254 nm).

Polyamide TLC plates were also used for separating PAHs. Elution was carried out using dichloromethane–methanol (60:40), and detection was by fluorescence densitometry (26). In ad-