☐ *Stationary Phase Selectivity*

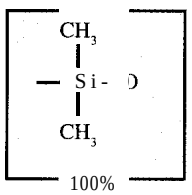
When purchasing a new column, the most important consideration is the stationary phase. There are many different interactions that occur between the analytes and the functional groups of the stationary phase. These interactions contribute more to the overall results of the analysis than any other factor in the column. That is why it is important to understand as much about your column and sample as possible.

Table I shows the chemical structure of most common stationary phases. Changes in selectivity can be observed by using a column with different functional groups as well as increasing the percentage of substitution of those functional groups. The non-polar Rtx-1 phase will preferentially retain non-polar compounds compared to polar compounds such as alcohols. As non-polar methyl units are substituted with polar functionalities such as phenyl and cyanopropyl units, the selectivity of the column shifts towards more polar compounds. In turn, non-polar compounds are retained less as there are less overall methyl units for the non-polar compounds to interact with. The Rtx-200 stationary phase contains triflouropropyl units which provide high selectivity for analytes containing lone pair electrons, such as nitro and carbonyl groups. Polyethylene glycol columns, such as Stabilwax and Rtx/MXT-WAX, are polar and are highly selctive towards polar compounds such as alcohols.

☐ *Table 2*

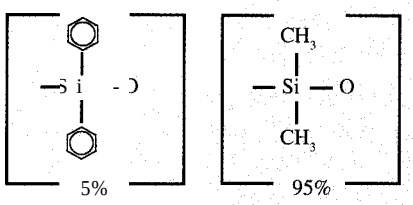
Comparison of structures, polarities, properties, and uses for each capillary column phase listed in order of increasing polarity.

Rtx/MXT-1
100% dimethyl polysiloxane



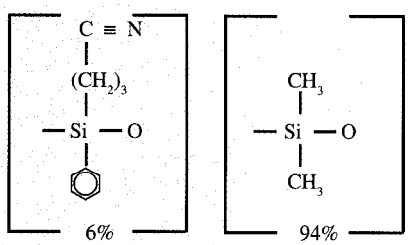
Polarity: *non-polar*
Uses: *solvents, petroleum products, pharmaceutical samples, waxes*

Rtx/MXT/XTI-5
5% diphenyl - 95% dimethyl polysiloxane



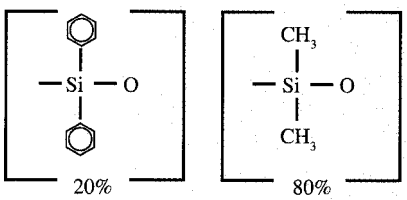
Polarity: *non-polar*
Uses: *flavors, environmental samples, aromatic hydrocarbons*

Rtx/MXT-1301, Rtx/MXT-624
6% cyanopropylphenyl
94% dimethyl polysiloxane



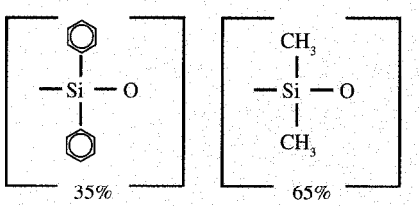
Polarity: *slightly polar*
Uses: *volatile compounds, insecticides, residue solvents in pharmaceutical products*

Rtx/MXT-20
20% diphenyl - 80% dimethyl polysiloxane



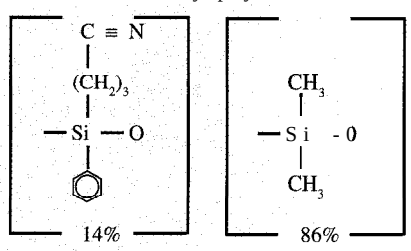
Polarity: *slightly polar*
Uses: *volatile compounds, alcohols*

Rtx/MXT-35
35% diphenyl - 65% dimethy polysiloxane



Polarity: *intermediately polar*
Uses: *pesticides, Aroclors, amines, nitrogen containing herbicides*

Rtx/MXT-1701
14% cyanopropylphenyl
86% dimethyl polysiloxane

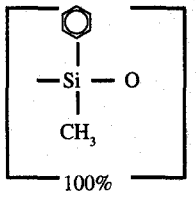


Polarity: *intermediately polar*
Uses: *pesticides, Aroclors, alcohols oxygenates*

Table I (cont.) *Table I, listing column phase structures, is continued on page 38.*

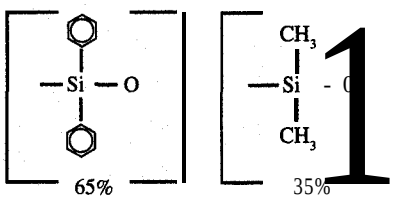
Table I (cont.) *Table I, listing column phase structures contin d* **from** *page 38.*

Rtx/XT-50
50% phenyl- 50% methyl polysiloxane



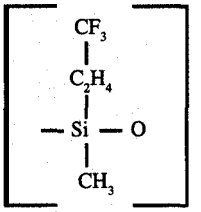
Polarity: *intermediately polar*
Uses: *triglycerides, phthalate esters, steroids, phenols*

Rtx/MXT-65TG
65% diphenyl - 35% dimthyl polysiloxane



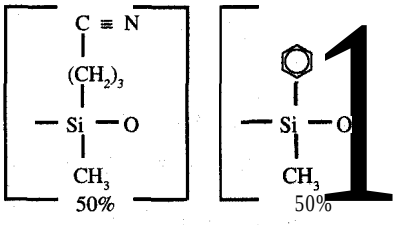
Polarity: *intermediately polar*
Uses: *triglycerides, rosin acids, free fatty acids*

RtxYMXT@-200
trifluoropropylmethyl polysiloxane



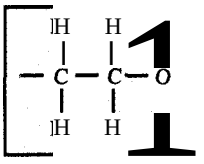
Polarity: *selective for lone pair electrons*
Uses: *environmental samples, solvents, Freons, drugs, ketones, alcohols*

Rtx®-225
50% cyanopropylphenyl
50% phenylmethyl polysiloxane



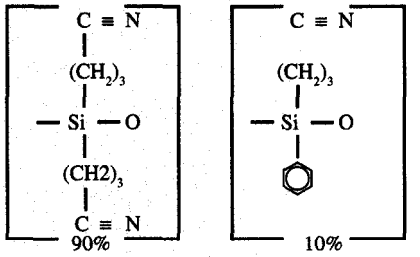
Polarity: *polar*
Uses: *FAMEs, carbohydrates*

Stabilwax®/MXT®-WAX
Carbowax® PEG



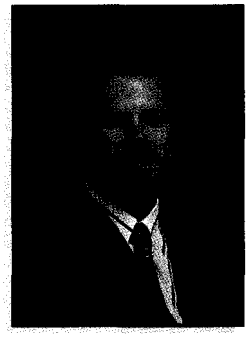
Polarity: *polar*
Uses: *FAMEs, flavors, acids, amines, solvents, xylene isomers*

Rtx®-2330
90% biscyanopropyl
10% cyanopropylphenyl polysiloxane



Polarity: *very polar*
Uses: *FAMEs,cis/trans & dioxin isomers, rosin acids*

Table II shows retention indices for the stationary phases shown in Table I. Retention indices are mathematical derivations indicating the elution point of a probe with respect to two hydrocarbons. For example, if the retention index for benzene was 650, then it would elute halfway between C6 (RI=600) and C7 (RI=700).



Rick Morehead
Fused Silica
Manufacturing Manager

Table 11

The retention indices for each phase illustrate the differences in selectivity for a variety of compounds.

Phase	Benzene	Butanol	Pentanone	Nitropropane
Rtx/MXT- 1	651	651	667	705
Rtx/MXT-5/ XTI-5/Rtx-5MS	667	667	689	743
Rtx/MXT-1301/624	689	729	739	816
Rtx/MXT-20	711	704	740	820
Rtx/MXT-35	746	733	773	867
Rtx/MXT-1701	721	778	784	881
Rtx/MXT-50	778	769	813	921
Rtx/MXT-65TG	794	779	825	938
Rtx/MXT-200	738	758	884	980
Rtx-225	847	937	958	
	963	1158	998	1230