

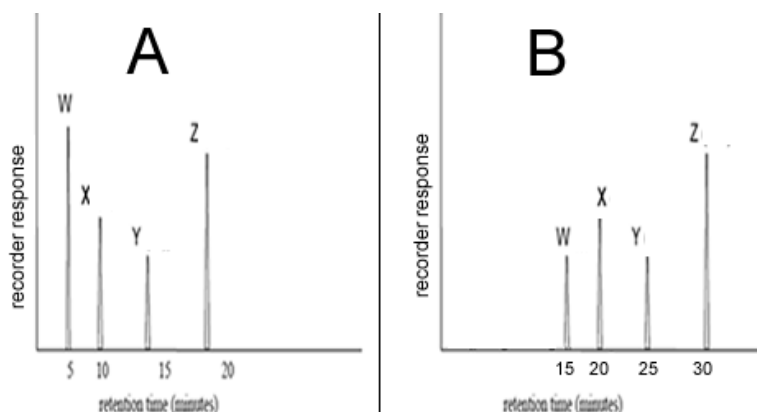
Friday Worksheet
Chromatography 6

Name:

- 1) Chromatogram A was obtained by analysis of a sample of a mixture of 4 esters, W, X, Y and Z, using high performance liquid chromatography (HPLC). Chromatogram B was obtained by analysing another sample of the same mixture, left in an unsealed bottle overnight, by HPLC under different conditions.

Consider the following changes which could be made to the operating conditions for HPLC.

- I) decreasing the pressure of the mobile phase
- II) decreasing the temperature
- III) using a less tightly packed column

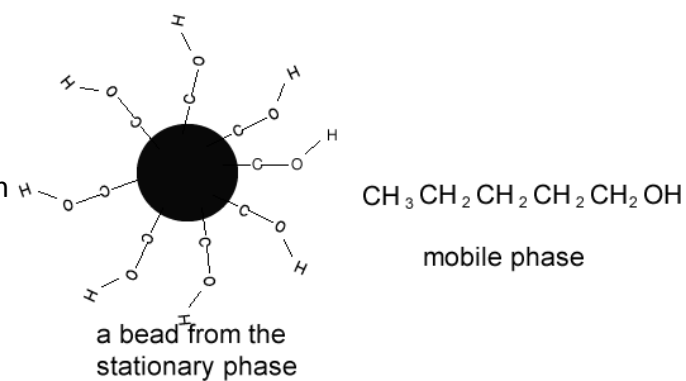


- a) Suggest, with reasons, how each of the changes above could affect the appearance of the chromatogram, hence suggest what could have changed to produce chromatogram "B"
- I) Decreasing the pressure would slow the flow rate of the mobile phase and hence decrease the retention time of all esters in the mixture.*
 - II) Decreasing the temperature would decrease the kinetic energy of molecules and would slow the movement of the mobile phase through the column and also increasing the amount of time components were adsorbed onto the stationary phase. This would also decrease the retention times*
 - III) Using a less tightly packed column would result in less interaction with the stationary phase and would thus increase the retention times.*
- b) Looking at the data provided suggest which ester is likely to have the lowest melting point. Give a reason.
- Ester W, because its peak area in the chromatogram B is far less than in chromatogram A indicating there is less of it present. We assume it has evaporated due to a low melting point.*

2) A column is set up with a stationary and mobile phase as shown on the right.

a) Place the following in order of retention time.

- a) ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)
- b) ethanoic acid (CH_3COOH)
- c) 2-propanol ($\text{CH}_3\text{CHOHCH}_3$)
- d) Propane



Propane, 2-propanol, ethanol, ethanoic acid

b) Give a reason for your choices.

The stationary phase is very polar, coated with hydroxyl groups (OH), whereas the mobile phase is less polar. Butanol has a large nonpolar section. The more polar the molecules the more it will be adsorbed to the stationary phase and interact less with the mobile phase thus experiencing a higher retention time.