



# CHROMATOGRAPHY

- 1) A mixture of pentanal and pentan-1-ol were separated by column chromatography using a silica powder with cyclohexane as eluent. Which of pentanal or pentan-1-ol is likely to reach the bottom of the column first? Explain your answer.

**pentanal**

**pentanal is less polar than pentan-1-ol**

**pentanal has greater relative affinity than pentan-1-ol towards the non-polar eluent relative to the polar silica**

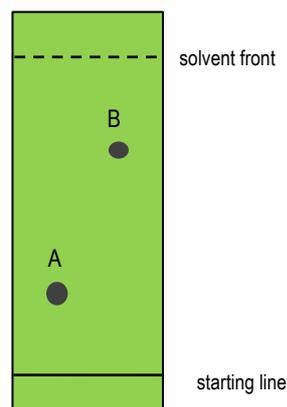
- 2) The following TLC chromatogram was produced under a UV lamp.

- a) Calculate the  $R_f$  values for substances A and B.

**give or take a little**

**A = 0.24**

**B = 0.71**



- b) The plate was coated in silica powder and the solvent used was hexane. One substance was phenylamine and the other substance was tetrachloromethane. Which substance is likely to be which? Explain your answer.

**A = phenylamine, B = tetrachloromethane**

**Solvent is non-polar, silica is polar**

**Phenylamine is polar; tetrachloromethane is non-polar**

**Phenylamine has greater attraction to polar silica so moves slower**

**Tetrachloromethane has greater attraction to non-polar hexane so moves faster**

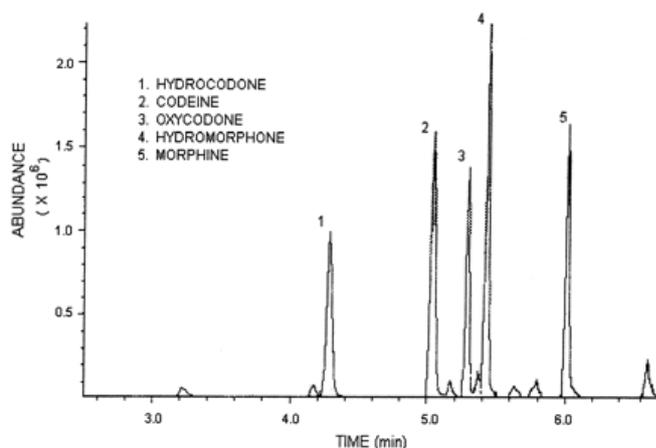
- 3) A mixture of opiates found in a sample of urine was analysed by gas chromatography.

- a) Which opiate had the longest retention time?

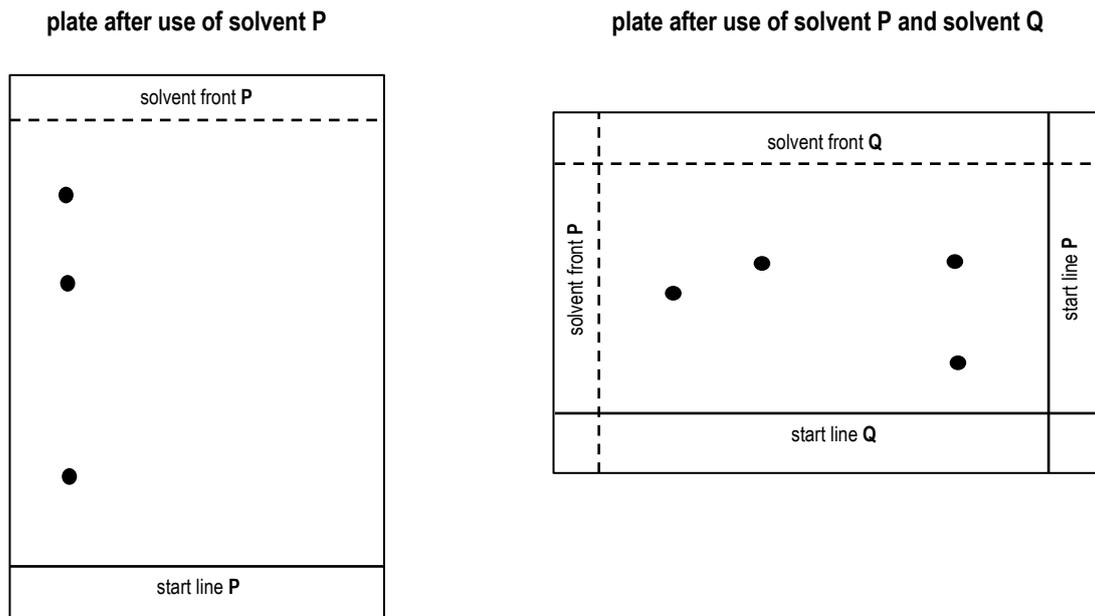
**5, morphine**

- b) Explain why this substance had the longest retention time.

**takes longest to move through column, so must have greater relative affinity for stationary phase in tube than the carrier gas than the other substances**



- 4) A mixture of amino acids was analysed by TLC in solvent P. The plate is then turned anticlockwise and analysed using solvent Q. The results are shown.



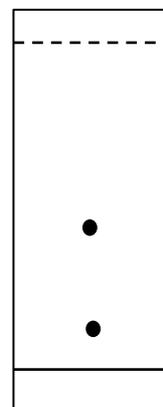
- a) How many amino acids are in the mixture? **4**
- b) Why were two solvents required to fully separate the amino acids?

**because two of the amino acids have the same  $R_f$  value in solvent P, and a different pair of amino acids have the same  $R_f$  in solvent Q**

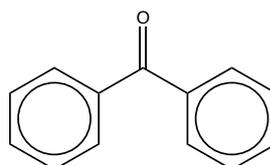
- 5) Tripeptides contain 3 amino acids joined together. The TLC of a tripeptide was done and the result shown.

Suggest two possible reasons why there are two spots and not three in the chromatogram.

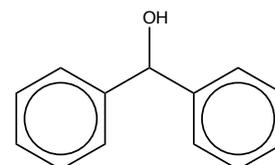
**two of the three amino acids have the same  $R_f$  in this solvent, or  
two of the three amino acids in the tripeptide are the same amino acid**



- 6) The structure of two compounds are shown. Suggest which compound has the greatest  $R_f$  value in TLC using silica plates and methanol as solvent. Explain your answer.



benzophenone



benzhydrol

**methanol can interact with hydrogen bonds to benzhydrol (and benzophenone)  
methanol is likely to interact more with benzhydrol with hydrogen bonds than benzophenone  
so benzhydrol is likely to move faster and so have a greater  $R_f$  than benzophenone**