You will need to answer this worksheet on a separate piece of paper.

1) An organic compound with the molecular formula was analysed using HPLC.

Five standard solutions of the organic compound were analysed and the area under the peak measured. The results are shown on the right.

a) Draw a calibration curve, using the graph below, to express the relationship between concentration and area under the peak.

Fig1
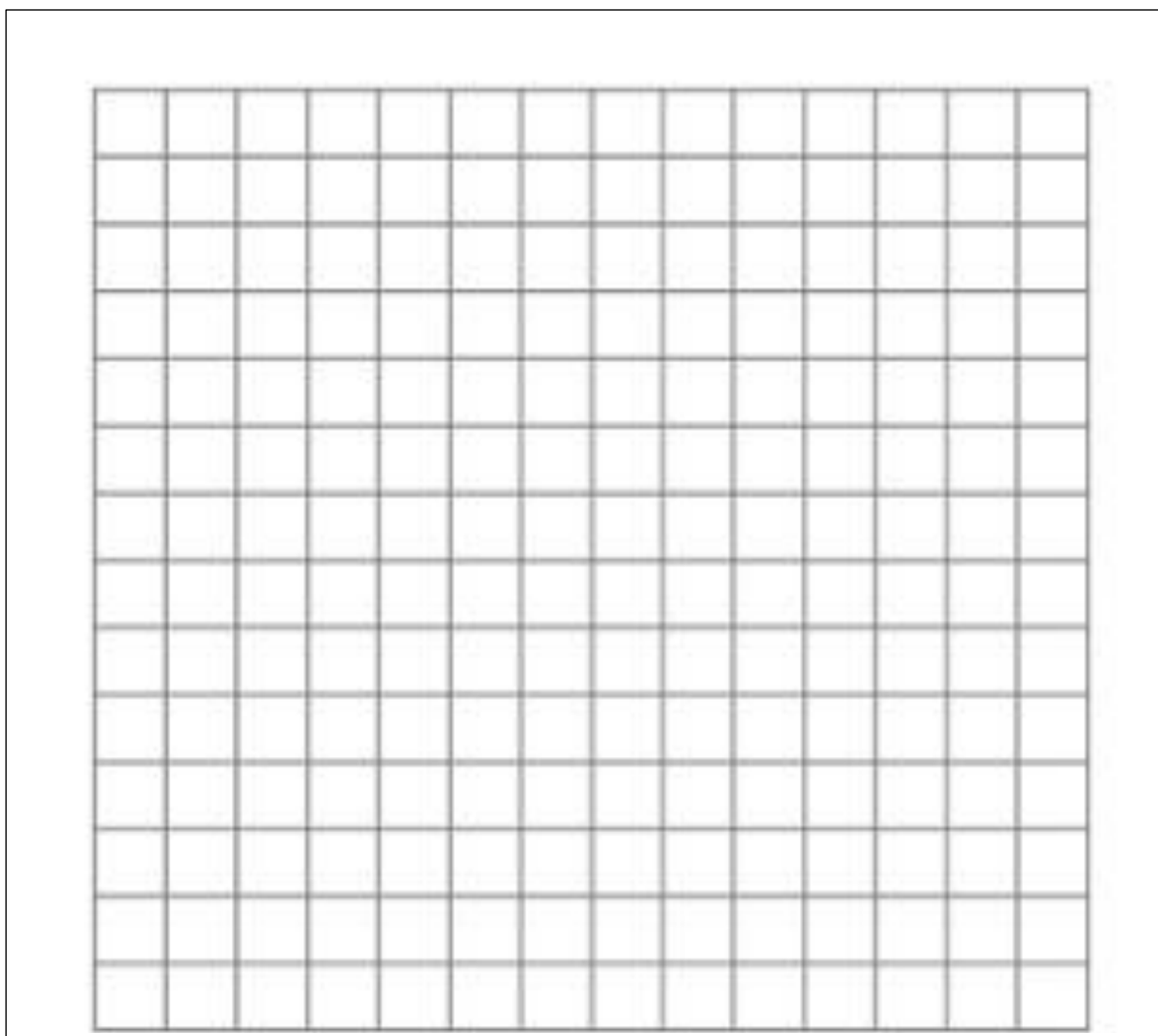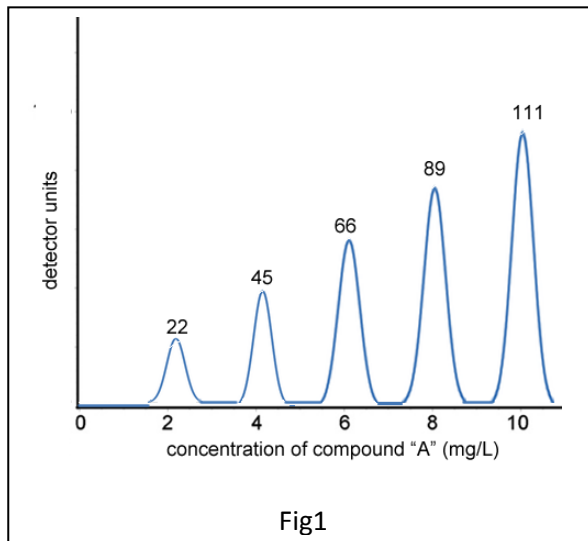
b) The following compounds, with the molecular formula $C_4H_{10}O$, were put through the column.

A = $CH_3CH_2OCH_2CH_3$

B = $CH_3CH_2CH_2CH_2OH$

C = $CH_3CHOHCH_2CH_3$
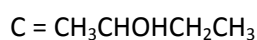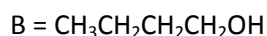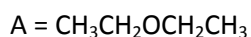
Given that ethers are not as soluble as alcohols in water and that secondary alcohols are less soluble in water than primary alcohols discuss whether the mobile phase is polar or non-polar?
Explain how you arrived at your answer.

c) A sample of an organic mixture was placed in the column and allowed to run through the column creating the chromatogram shown on the right (fig 3).
i. Which of the three compounds A, B and C are present in the mixture?
ii. Substance 4 was the compound that was analysed in question a) above. What is the concentration of compound 4, shown in figure 3, opposite?
iii. Explain how you can distinguish between the ^{1}HNMR spectra of A, B and C.
d) Draw, on figure 3, how the peak representing compound 5 would change if its concentration in the mixture had doubled.
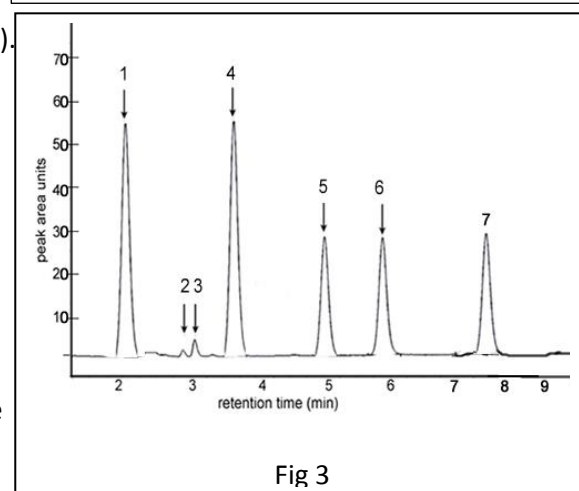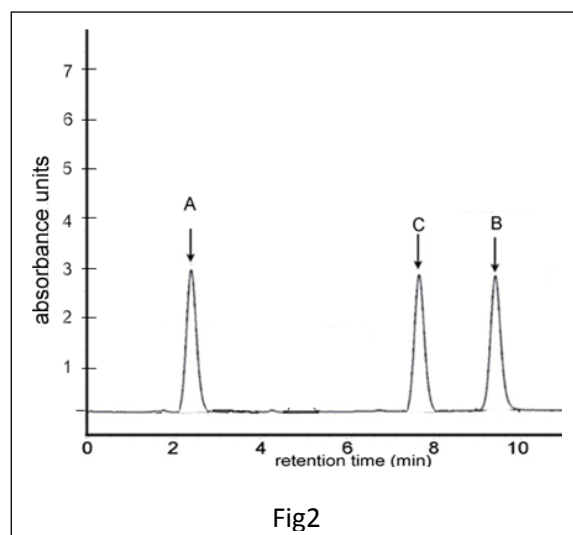
2) Figure 4 shows the chromatogram when a mixture of alcohols and carboxylic acids are separated using GC.
If the mixture contained propan-1-ol, butan-1-ol, hexan-1-ol, ethanoic acid and propanoic acid, identify the peaks that belong to each. Give a reason.

Fig2

Fig 3

Fig 4
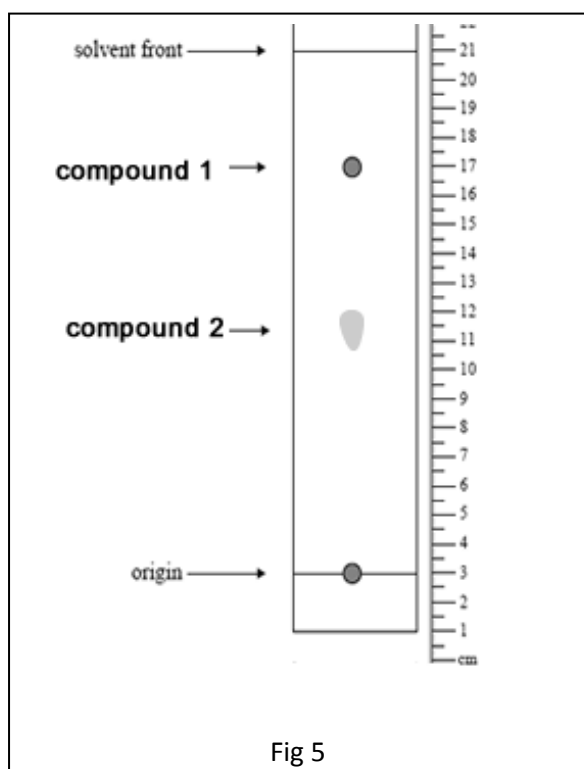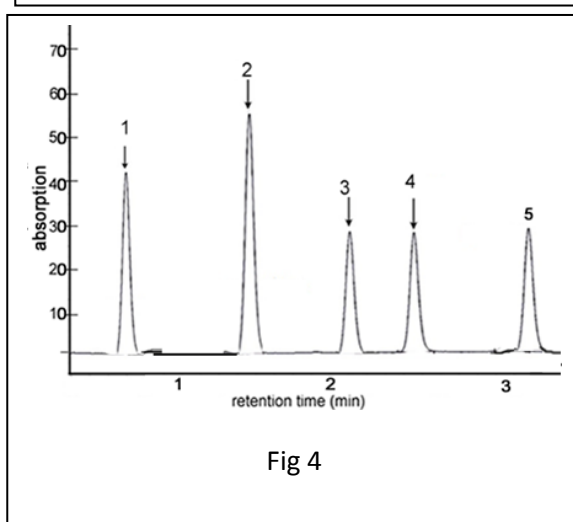
Fig 5

3) A thin layer chromatography (TLC) plate was set up with a non-polar solvent, hexane, and a polar stationary phase, silica gel. The chromatogram, on the left (fig 5), was obtained using a mixture of two compounds. A ruler was then placed next to the plate, as shown.
a) Which compound is the most polar? Explain
b) A compound of interest has an R_f value of 0.47 when run through the plate . Is this compound present? Explain.