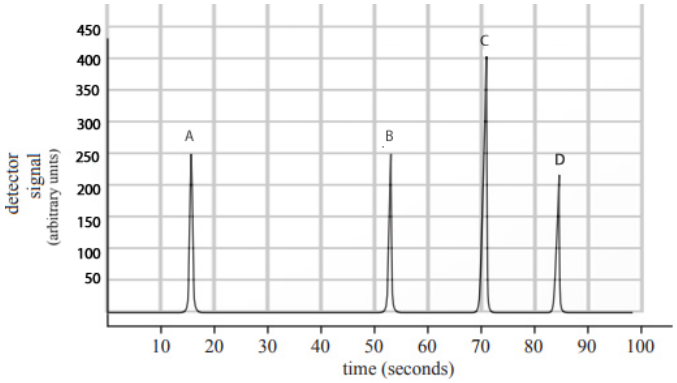
Ongoing revision 13 – organic, pathways, naming, chirality, HPLC, HNMR, proteins, fats and lipids.

1. A mixture of the amino acids, threonine, serine, isoleucine and aspartic acid was separated using reverse phase chromatography and the chromatogram on the right was obtained.

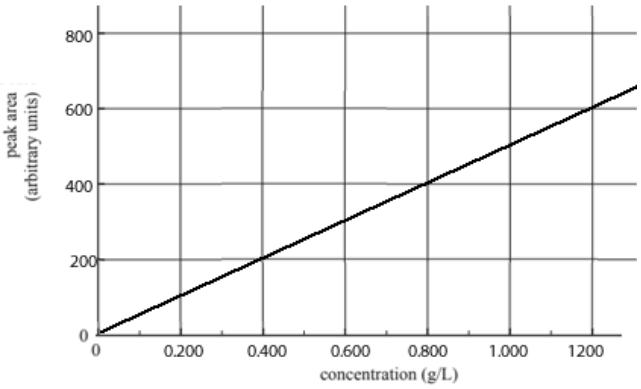



   a. Name the amino acid forming peak:
      - A _____
      - B _____
      - C _____
      - D _____
   b. Explain your answer in question a. above.

   c. Give the systematic names of:
      i. Threonine -
      ii. Aspartic acid -
      iii. Serine –
      iv. Isoleucine-

   d. Which amino acids have 4 isomers able to rotate polarised light. Give an explanation for your answer.

e. The mass of threonine in a particular vitamin drink was determined by high-performance liquid chromatography (HPLC). The calibration curve produced from running standard solutions of threonine through an HPLC column, in the exact same conditions as the those used to derive the chromatogram above, is shown on the right.
A 10.0 mL aliquot of the 350 mL can vitamin drink was diluted to 100.0 mL with de-ionised water. A sample of the diluted drink was run through the HPLC column under identical conditions to those used to obtain the calibration curve, shown here.



Calibration curve

i. Calculate, to the right number of significant figures, the concentration of threonine (119.12 g/mol), in mol/L, in the 350 mL drink can.

ii. Which one of the following would make a good solvent to use as the mobile phase in the column? Explain your reasoning.
$CCl_4$, ethanol, hexan-1-ol or octane.

f. Consider the peptide Gly-Gly-Ala

i. Draw the structural formula of the peptide in the space provided, circle and name all the functional groups.

ii. Calculate its formula mass.

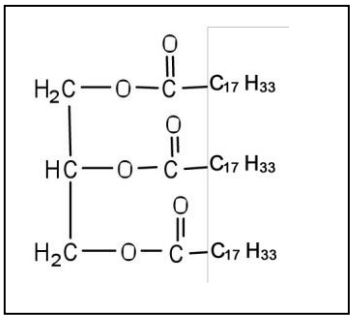
iii. Are the two peptides Gly-Gly-Ala and Ala-Gly-Gly the same?

iv. Draw the structural formulae of both and justify your answer to iii. Above.

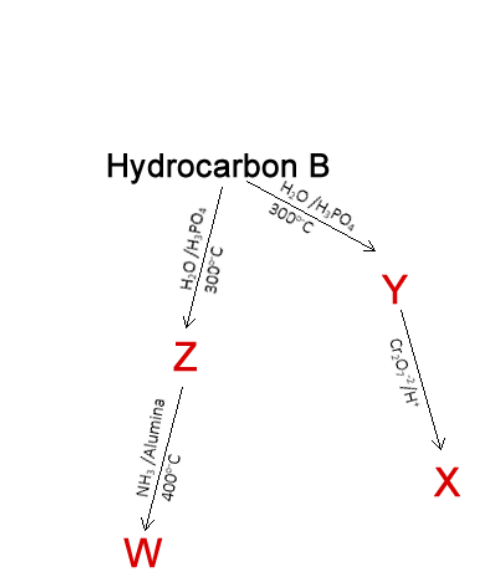
2. Consider the two fatty acids, oleic ($C_{17}H_{33}COOH$) and elaidic ($C_{17}H_{33}COOH$).
   a. Although both have the same chemical formula elaidic acid melts at 45°C while oleic acid melts at 13.4°C. Account for the difference in melting temperatures.

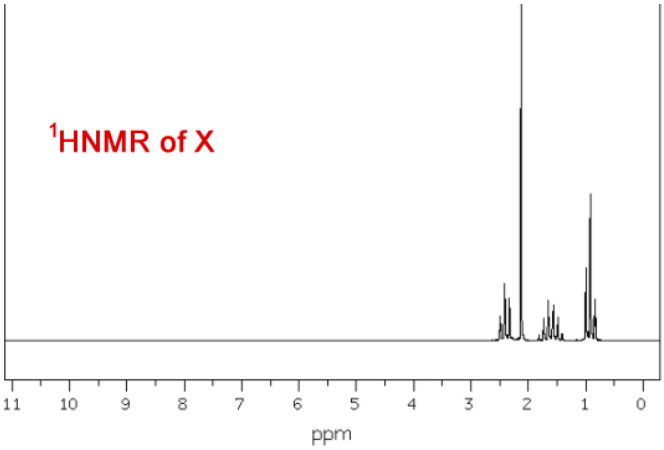
   b. Oleic acid has a boiling temperature of 360°C while elaidic acid boils at 288 °C. Account for the difference in boiling temperatures.

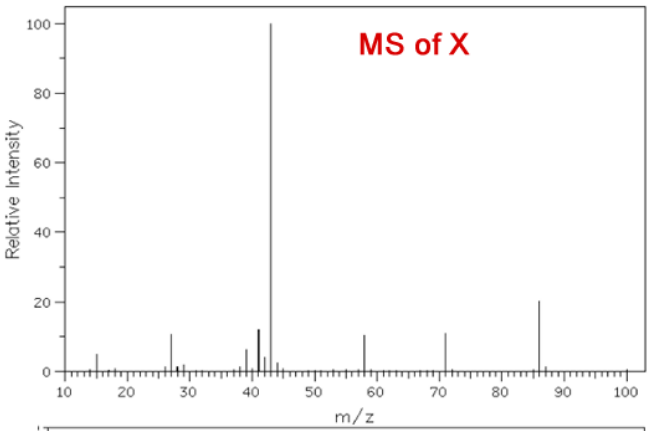
   c. Draw the structural formula of the triglyceride that contains only oleic acid fatty acids. You may abbreviate oleic acid to $C_{17}H_{33}COOH$.

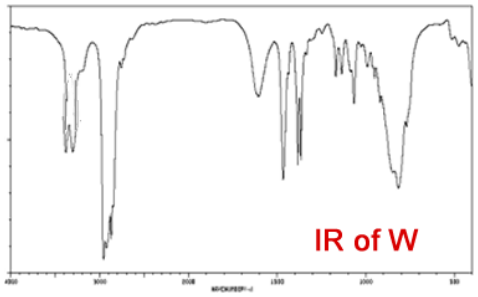


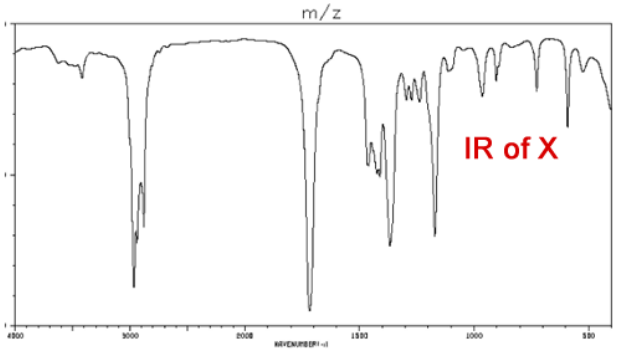
3. Consider the reaction pathway shown below and the different spectra of some compounds.




a. Identify compounds :
   - Y –
   - Z –
   - W -
   - B -

b. Identify the class of compounds that X belongs to.