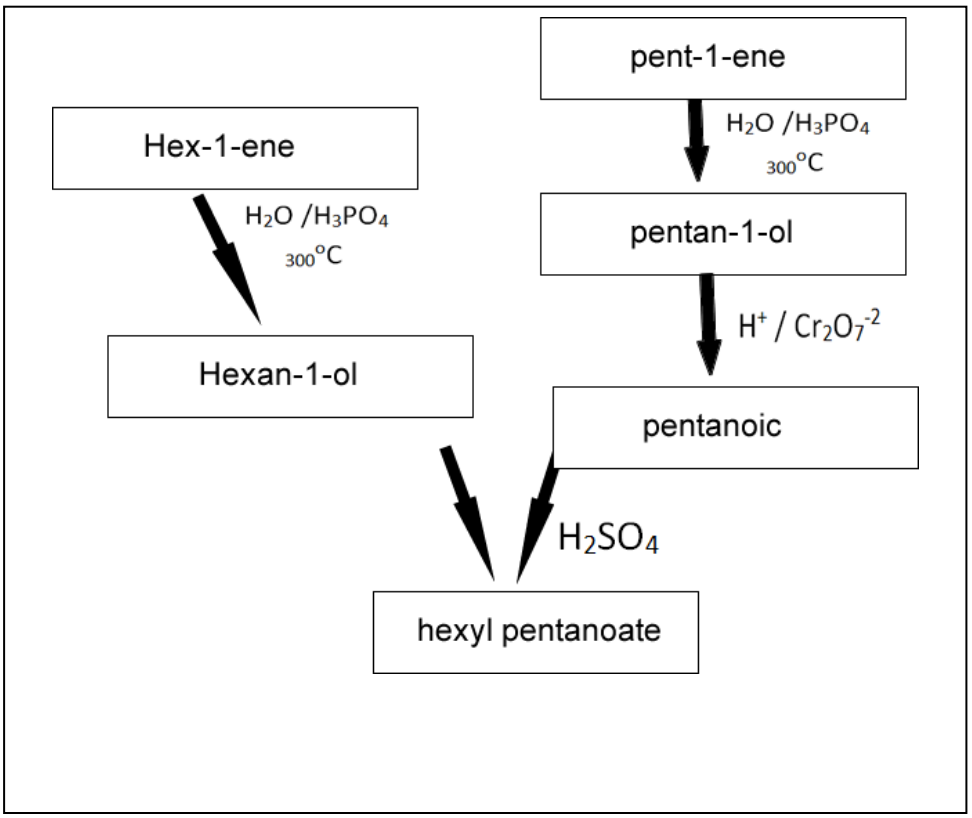
Friday Worksheet **Name: …….**

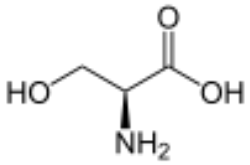
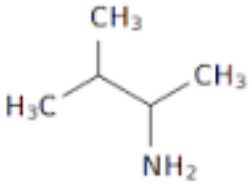
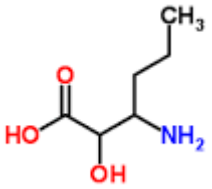
Analytical chemistry and organic 9

1) An 0.082 g sample of an unsaturated hydrocarbon contains 2 carbon to carbon double bonds. This sample reacted fully with 0.320 grams of bromine (Br_2) solution. What is the name of this hydrocarbon?
   Since one molecule of Br_2 is added across each double bond, we can say that for every mol of the hydrocarbon two mol of Br_2 is required.
   Step 1 find the mol of Br_2
   => 0.320 /160 = 0.002
   Step 2 find the mol of the hydrocarbon
   => 0.001
   Step 3 find the formula mass of the hydrocarbon
   => Fm = m/n = 0.082/0.001 = 82
   Step 4 identify the unsaturated hydrocarbon
   Hexadiene
2) Give the systematic name of:
   a) Isoleucine = 2-amino-3-methylpentanoic acid
   b) Threonine = 2-amino-3-hydroxybutanoic acid

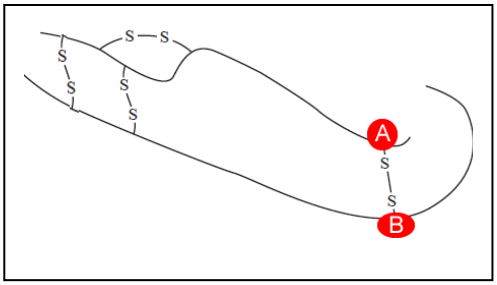
3) Draw a reaction pathway on a separate piece of paper for the formation of hexyl pentanoate from hex-1-ene and pent-1-ene. Show the structural formulae of all reactants and the reagents and conditions used for each reaction.



4) Fill in the table below

Name	Structural formula	Semi-structural formula
2-amino-3-hydroxypropanoic acid		$CH(OH)CH(NH_2)COOH$
3-methylbutan-2-amine		$CH_3CH_2(CH)_4CH(NH_2)CH_3$
3-amino-2-hydroxyhexanoic acid		$CH_3CH_2CH_2CH(NH_2)CH(OH)COOH$

5) The diagram below is a simplified illustration of a protein. This protein consists of 62 amino acids arranged in two individual chains linked by disulfide bridges.



a) How many amide links are present in one molecule of the protein?
In one protein chain containing n amino acids there are n-1 amide links.
Since there are two chains there will be 2 less amide links for the total number of amino acids.
Hence 60 amide links.

b) Identify amino acids A and B
Cysteine and cysteine

c) Using the protein shown on the right clearly explain the difference between

i. Primary structure
Primary structure is the chain of amino acids linked by covalent bonds.

ii. Secondary structure
The spiral helix and beta pleated sheets formed by the attraction between the C=O and N-H of neighbouring amide links. The secondary structure is due to hydrogen bonding .

iii. Tertiary structure
The folding of the secondary structure due to interactions between the amino acid side chains. The type of bonding includes, H-bonding, dispersion, ionic and covalent.

iv. Quaternary structure
The **quaternary protein structure** involves the grouping of two or more tertiary structures of individual **protein** chains into a final specific unit. A variety of bonding interactions hold the quaternary structure in place, including hydrogen bonding, ionic, and disulfide bonds.

6) Complete the equations below using structural formulae to represent the products and name all the possible products.

1- $CH_3CHCHCH_3$ (l) + Br_2(aq) => 1,2-dibromopropane
2- $CH_2CHCH_2CH_2CH_3$ (l) + HCl(g) => 2-chloropentane or 1-chloropentane