Stage 2 Chemistry Organic & Biological Chemistry Assignment 3

- 1.
- (a) (must have an amine end and a carboxyl end, with something else connected to a C in the middle)
- (b) (H^+ attached on amine end, OH changed to O⁻ on carboxyl end)
- (c) (chain shouldn't have complete ends, should have open bond. CONH connects monomers)
- (d) (CONH)
- (e) Amide
- (f) H₂O molecule(s) with dotted lines showing H bonding to C=O or N-H
- (g) Hydrogen bonding

(h)
$$H_2N - CH - COOH$$

- 2.
- (a) A protein's structure gives it specific sites within its structure where its function can be performed. If the spatial arrangement of the protein is altered, the sites will be modified or destroyed and hence the protein can no longer perform its function.
- (b) Too much or too little H⁺ will convert ionic side groups into covalent forms. The ionic bonds between side groups will be prevented and hence the structure changed.
- (c) Raising the temperature causes sufficient molecular movement to weaken and break the bonding. The bonds cannot reform and so the structure is changed.
- 3.

(a) $CH_3(CH_2)_{10}COOCH_2$

CH₃(CH₂)₇CH=CH(CH₂)₇COOCH

- (b) 1,2,3-propantriol
- (c) Animal (animal fats)
- (d) Br_2 and I_2 are coloured and will react with C = C groups (unsaturated groups) to produce a colourless product. The more bromine or iodine that can react, the more saturated the compound.
- (e) (doesn't have to be trans)

$$\begin{array}{c|c} CH_3(CH_2)_{10}COCH_2\\ Br \\ CH_3(CH_2)_7CH-CH(CH_2)_7COCH\\ Br \\ CH_3(CH_2)_{16}COCH_2 \end{array}$$

(f) Increasing temperature increases energy of particles. Increasing the pressure increases the concentration of gas reactant (H₂). The catalyst provides an alternate reaction pathway with a lower activation energy.

Each of these will increase the number of productive collisions per time, leading to a faster rate of reaction. Hydrogenation either occurs very slowly or not at all without them.



(b) In both forms, glucose has a high number of polar hydroxyl groups for its size. These polar groups form H-bonding with water, allowing it be surrounded by water molecules (hence soluble).

(c) An aldehyde group

(d)

(e) The *orange* dichromate ions would be reduced to *green* chromium ions as the aldehyde group on the glucose is oxidised to a carboxylic acid group.

$$\begin{array}{c} 6e^- + 14H^+ + Cr_2O_7^{2-} \longrightarrow 2Cr^{3+} + 7H_2O \\ (orange) \qquad (green) \end{array}$$

4.