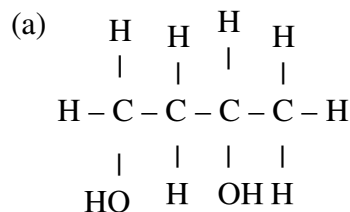


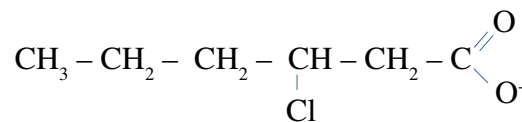
1.

- | | |
|-----------------------|--------------------|
| (a) 4-methyl pentanal | (b) propanoic acid |
| (c) penta-1,3-diene | (d) hexa-2,4-dione |
| (e) ethyl butanoate | (f) pentan-2-amine |

2.



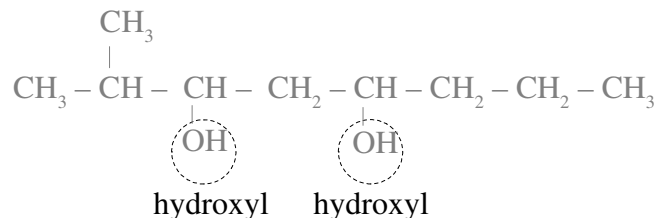
(b)



3. Propanal will be oxidised by Tollens' reagent, reducing it to silver metal which will be visible. Propanone will not react.
(this is a *how* question so an explanation is not required, and details like applying heat are welcome)
4. Hexanoic acid has a larger carbon chain than ethanoic acid, so the dispersion forces will be stronger between hexanoic acid molecules than between ethanoic acid molecules. Stronger secondary forces means higher boiling point.
5. Methanamine has N-H bonds which are able to form hydrogen bonds with water molecules. Chloromethane's Cl-C bond is not polar enough to do so and therefore will not dissolve.

6.

(a)



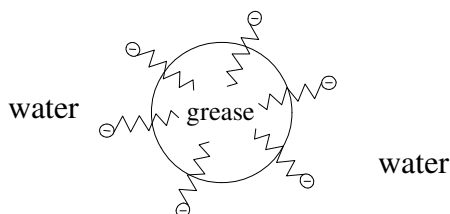
(b) It would change colour from orange to green, as secondary hydroxyl groups are oxidised reducing the dichromate ions to chromium ions.

7.

- (a) (i) **A:** hydrogen gas ($\text{H}_2(\text{g})$), **B:** nickel catalyst
 (ii) high pressure / high temperature
 (iii) unsaturated to saturated
 (iv) from a liquid at room temperature to a solid at room temperature (higher melting point)

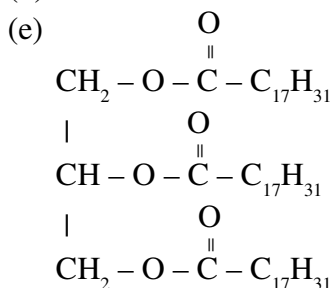
(b) alkaline hydrolysis

(c)



8.

- (a) methanol
- (b) ester
- (c) because two molecules join to form a larger molecule (ester) and a small molecule (water)
- (d) esterification is slow without a catalyst / sulfuric acid is a catalyst for this reaction

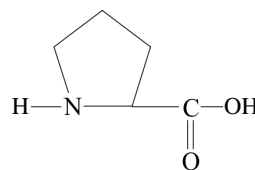
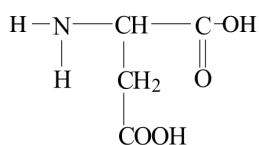
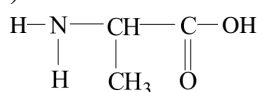


(f) It will react with bromine water since it is unsaturated (contains alkene groups).

9. (a) protein (or polypeptide)

(b) amide (any C=O;N-H circled)

(c) or or



(d) (i) **A:** hydrogen bonding, **B:** covalent bond

(ii) A change of pH may alter a side chain, for example the amino group could become protonated. This may change the interaction between groups and destabilise the unique spatial arrangement of the protein.

10. Drugs that are more soluble in water will be more effective.

Paracetamol is more polar because it has two polar functional groups (hydroxyl and amide) so it is sufficiently soluble in water whereas ibuprofen only has one polar functional group (carboxyl) so it is not. When the tablet is added to water, the sodium carbonate reacts with the carboxyl group forming a sodium carboxylate salt which is more soluble in water due to being ionic (ion dipole bonding).

11. (a) Polysaccharide

(b) It would form polyhydroxy ketones or polyhydroxy aldehydes if hydrolysed

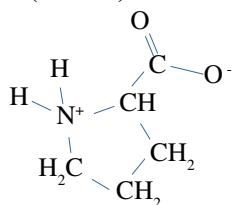
(c)

(i) $\text{C}_6\text{H}_{12}\text{O}_6$

(ii) Glucose has a chain form which has an aldehyde group. The aldehyde is able to be oxidised by Tollen's reagent.

12. (a) C (carbon)

(b)



(c) The interaction between water and the molecular form, hydrogen bonding, is weaker than the ion-dipole attraction between water and the self-ionised form. Therefore water is more able to break up and surround the ionic form.

(d)

