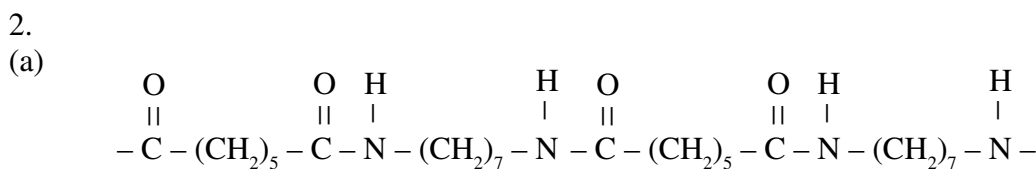
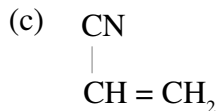
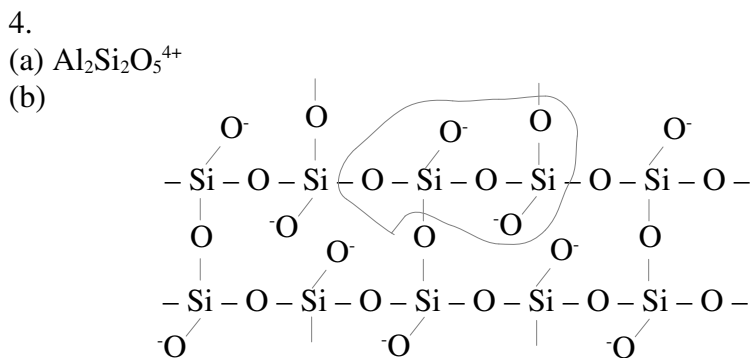


(b) Addition



(b) Polyamide

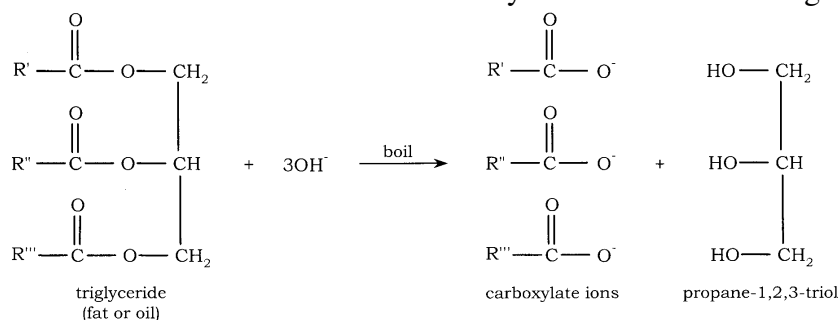
3. Thermoplastic softens when heated, thermoset doesn't (optionally: therefore thermoplastics are more suited to recycling). Thermoplastics have little or no covalent cross-linking, thermosets have a high degree of cross-linking, leading to a more rigid structure. [for 3 marks rather than 2, must mention recycling or covalent]

(c) $\text{Si}_2\text{O}_5^{2-}$ (d) $\text{K}_2\text{Mg}_2(\text{Si}_2\text{O}_5)_3$

5. Cations adsorbed to the surface of soil are in equilibrium with ions dissolved in the soil water. Ions are available to plants as long as they are aqueous and can be absorbed by roots. As the aqueous ions are absorbed (taken from the soil) according to LCP the adsorbed ions are released into the soil water to oppose the change (restore equilibrium).

6. You would use octane, as benzene is a non-polar compound and so is octane (they both exhibit dispersion forces as their secondary forces). Polar compounds such as water exhibit stronger secondary forces (hydrogen bonding) and are not strongly attracted to benzene and will therefore be unable to remove the stain.

7. Triglycerides are hydrolysed in an alkaline solution, producing carboxylate ions. Sodium ions in some form are added and combine with the carboxylate ions to form a long chain sodium carboxylate salt (soap).



8. Sodium palmitate is soluble in water whereas palmitic acid is not. A soap works by dissolving so that it has a negatively charged end which attracts to water while the long non-polar end attracts to grease. Since palmitic acid cannot dissolve it will not have a charged end and therefore will not be sufficiently attracted to the water to perform the soap action.

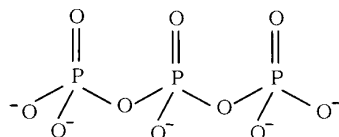
9.

(a) Any two of:

- They produce slightly alkaline conditions, which are favourable for detergent action.
- They remove free hard water ions from the water by forming water-soluble complex ions with them.
- They act as deflocculants to keep clay particles in suspension so they don't settle back on whatever is being washed.

(b) Increases algae growth / leads to eutrophication

(c)



10. Hydrogen peroxide oxidises compounds and decolourises them. It also decomposes into oxygen which oxidises under acidic or basic conditions, decolourising stains.

Include one of the following equations:

$\text{H}_2\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \rightarrow 2\text{H}_2\text{O}$ (hydrogen peroxide being reduced and therefore performing oxidising action)

$2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ (hydrogen peroxide decomposing to produce oxygen)

$\text{O}_2 + 4\text{H}^+ + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}$ (oxygen being reduced under acidic conditions i.e. performing oxidising action)

$\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$ (oxygen being reduced under basic conditions i.e. performing oxidising action)