C1 - Plant Oils

1. How does an emulsifier work?

   The hydrophilic head bonds with water, the hydrophobic tail bonds with the oil which stops the oil droplets from joining back up.

2. How do you harden vegetable oils?

   Add hydrogen at 60^{o}C, with a nickel catalyst. This reaction is called hydrogenation.

3. Does hardening fats make them healthier or less healthy?

   Less healthy as the number of C=C double bonds is removed and the fat becomes less poly unsaturated and more saturates.

4. What is an emulsion? Give examples.

   A mixture of two immiscible liquids. Milk, cream, ice cream, mayonnaise, paint, nail varnish, face creams, body lotions, lipstick.

5. How do you test for unsaturation?

   Add bromine water or iodine water. If the bromine/iodine decolourises, C=C double bonds were present.

6. What are the pros and cons of cooking with fats/oils?

   Pro: food cooks quicker as oil has a higher boiling point than water; food looks more appetising as it turns brown and crispy in oil and smells better. Oils add nutrients (vitamins) to food.
   Cons: Energy content is increased, unknown chemical reactions happen.

7. Give a use for hydrogenated oils.

   Spreads and cake, biscuit and pastry making. This is due to hydrogenated oils having a higher melting point than the original oils.

8. How are plant oils extracted during distillation?

   Fractional distillation: boil water. The steam will pass through plant material and evaporate the oil. The vapours are condensed. Oil will float on top of water. The water is run off, leaving the oil behind.

9. How are plant oils produced during pressing?

   Plants are harvested and crushed to break open the cell structures. The plant material is pressed to remove the oil. The oil is dissolved in solvents to remove impurities. The solvent is then evaporated.

10. Describe fermentation.

Glucose from renewable plants is dissolved in water. Yeast is added at 37^{o}C and 1atm pressure; the conditions are anaerobic. The enzyme in yeast turns glucose into ethanol and carbon dioxide. The process is a Batch process; it is slow and produces impure ethanol used mainly for alcoholic drinks. $C_6H_{12}O_6$ --> $2CO_2 + 2C_2H_5OH$

11. Describe how ethanol can be made from octane.

Octane comes from non-renewable crude oil. Octane is cracked to produce ethene and hexane. Octane vapours are passed over a hot catalyst. Ethene is then reacted with steam. This is a hydration reaction that requires a phosphoric acid catalyst. This method is continuous and quick but requires a lot of energy. The ethanol is pure.