

## Starter:

1. Saturated fats are liquids at room temperature. True/False.  
[1 mark]
2. Plasticity of fats means that all fats become oils at the same temperature. True/False [1 mark]
3. What does it mean that fat is immiscible? [1 mark]
4. Suggest two reasons for which fat is creamed with sugar (aerated) when making a sponge cake [2 marks]

# Starter- write out the following missing gap exercise

Fill in the gaps in the text below, using the keywords below. Note that each keyword may be used once, more than once or not at all.

(5 marks)

|                     |                   |                   |                  |                      |
|---------------------|-------------------|-------------------|------------------|----------------------|
| <i>oil</i>          | <i>vinegar</i>    | <i>water</i>      | <i>egg</i>       | <i>thiamine</i>      |
| <i>separating</i>   | <i>curdling</i>   | <i>emulsifier</i> | <i>stabilise</i> | <i>ascorbic acid</i> |
| <i>thawing</i>      | <i>lecithin</i>   | <i>salt</i>       | <i>thicken</i>   | <i>water-in-oil</i>  |
| <i>oil-in-water</i> | <i>mayonnaise</i> | <i>milk</i>       | <i>ketchup</i>   |                      |

- i) Emulsification is a process of mixing (1)\_\_\_\_\_ and (2)\_\_\_\_\_ together.
- ii) To (1)\_\_\_\_\_ the mixture and prevent it from (2)\_\_\_\_\_, an (3)\_\_\_\_\_ can be used.
- iii) One of them is \_\_\_\_\_, which naturally occurs in egg yolk.
- iv) For this reason, egg yolk is added to (1)\_\_\_\_\_, which is an example of (2)\_\_\_\_\_ emulsion.
- v) An example of (1)\_\_\_\_\_ emulsion is (2)\_\_\_\_\_.

# Revision- Food Science- Fats and Oils

Learning Objectives:

Recall information about fats and oils

Address any misconceptions

Apply knowledge to exam questions

# In depth look- Shortening

- ▶ Definition- SHORTENING= is the process in which fat coats the flour particles, preventing absorption of water, resulting in a crumbly mixture.
- ▶ Fat gives foods- such as biscuits and pastry a crumbly/flaky texture.
- ▶ When fat and flour combine it does 3 things: gives flour a waterproof coating, prevents water being absorbed, reduces development of gluten.
- ▶ If a quiche (made from shortcrust pastry) has shrunk in the oven and there was fat that had leaked on to the tray, what would you advise the person to do next time?



# In depth look- Aeration

- ▶ Aeration is when air has been trapped into a mixture.
- ▶ When the fat and sugar are beaten together (creaming), they enclose tiny bubbles of air. The bubbles of air make a stable foam, which can be baked to give the springy texture in baked goods.
- ▶ Caster sugar is used rather than granulated because it has a finer texture when creamed with fat and helps aeration.



# In depth look- Plasticity

- ▶ Definition- PLASTICITY= is the ability of a solid fat to soften over a range of temperatures.
- ▶ The plasticity of a fat can depend on whether it is saturated or unsaturated.
- ▶ Saturated fats tend to have a good range of plasticity.
- ▶ A fat chosen for shortening must have good plasticity as it needs to spread and coat a large area of flour, coating in a waterproof layer- oil will make the flour clump- creating a sandy textured product.
- ▶ Fats can be processed to change their chemical structure to alter their melting point- straight from fridge spreads, chocolate.

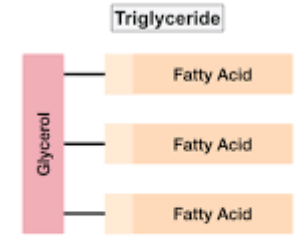
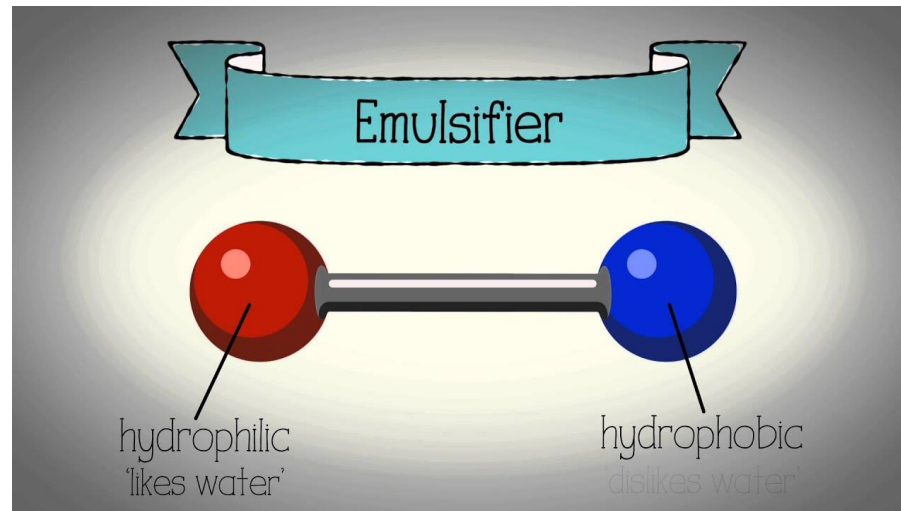


Fig 1. The Structure of a Triglyceride.



# In depth look- Emulsification

- ▶ Definition- Immiscible= two liquids that do not mix (oil and water)
- ▶ An emulsion is a liquid where two liquids are suspended together .  
There are two types: an oil in water emulsion- milk/ salad dressing  
a water in oil- butter and fat spreads
- ▶ How do emulsifiers work?
- ▶ Examples: lecithin  
(soya and egg yolks)



## Plenary- Exam question

Explain how the chemical structure of fats affects their physical state. (4 marks)

Describe the process of shortening. (4 marks)  
Name one kind of pastry which uses shortening. (1 mark)

The cook prepared two kinds of pastry: one was made with plain flour and lard, and the other was made with plain flour and butter. State which one of the pastries will be crumblier and explain why. (2 marks)

# Mark Scheme

The answer may include a reference to:

*(1 mark for each correct, max. 4 marks)*

- Fats are built from a glycerol head and three chains of fatty acids.
- If all the chemical bonds in the fatty acid chains are single (saturated fats), the fat will have a solid texture at room temperature.
- If a fat has one double chemical bond in the fatty acid chain (monounsaturated fats), it will be liquid at room temperature, but will solidify in a fridge.
- If a fat has more than one double bond in the fatty acid chain (polyunsaturated fats), it will be liquid both in the fridge and at room temperature.
- The more double chemical bonds, the more liquid the fat will be (it will be then called an oil).
- Accept other suitable answers.

i) The answer may include a reference to:

*(1 mark for each correct statement, max. 4 marks)*

- Shortening happens when we add fat to flour.
- Fat molecules coat starch granules.
- Fat molecules are hydrophobic, which means that they will prevent the starch from contact with water.
- As the flour has no contact with water, gluten cannot be formed.
- Because of that, the pastry is crumbly instead of soft and elastic.

ii) Any one from: shortcrust, flaky pastry, puff pastry, rough puff, or any other correct answer *(1 mark for any correct, max. 1 mark)*

The answer may include a reference to:

*(1 mark for stating which of the two pastries will be crumblier, and 1 mark for explanation why, max. 2 marks)*

- Plain flour and lard will be crumblier.
- Butter contains around 15% of water, so some (little) amount of gluten will be developed.
- As a result, the buttery pastry will be less crumbly (and more elastic) than the one made with lard.
- Lard is almost 100% of fat so the flour will have no contact with water at all.