



Institute of Food Research



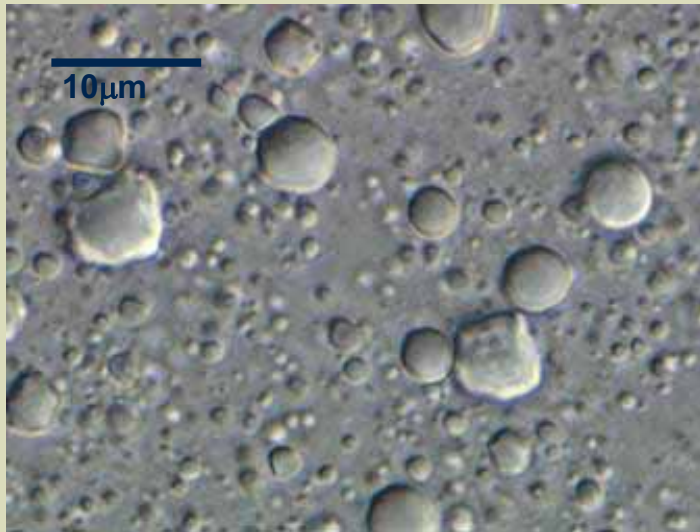
Emulsifiers, Thickeners and Stabilisers

Pete Wilde

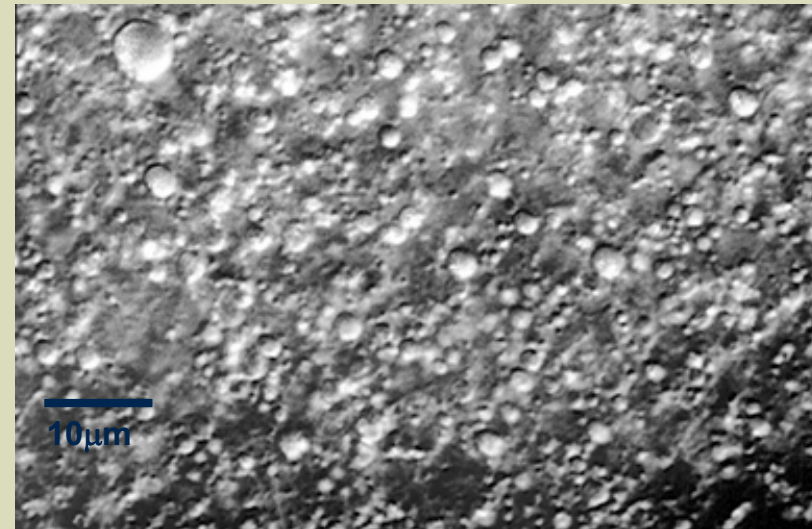
Structuring Food for Health Programme

What's a Food Emulsion?

A food which contains emulsified droplets of oil or water.



Milk



Butter

Yoghurt, mayonnaise, cream, sauces, soups,
dressings, ice cream

What's on the label

INGREDIENTS: CRUSHED SESAME, CORN SYRUP, SUGAR, CHOCOLATE, PARTIALLY HYDROGENATED VEGETABLE OIL (COTTON SEED, SOYA), DRIED EGG ALBUMIN, NATURAL AND ARTIFICIAL FLAVOR. CHOCOLATE CONTAINS: SUGAR, CHOCOLATE, COCOA BUTTER, LECITHIN (AN EMULSIFIER), VANILLIN (AN ARTIFICIAL FLAVOR).

JOY...

...RP. ...KLYN, N.Y. 11237-158

INGREDIENTS: CORNSTARCH, TAPIOCA STARCH, SOY FLOUR, CORN FLOUR, BAKING POWDER (CONTAINS SODIUM ACID PYROPHOSPHATE, SODIUM BICARBONATE, CORNSTARCH, AND MONOCALCIUM PHOSPHATE), SALT (MAY CONTAIN GLUTEN-FREE NATURAL AND ARTIFICIAL FLAVORS, ASCORBIC ACID (VITAMIN C), GARLIC POWDER, AND SOY LECITHIN

INGREDIENTS OF A CHOCOLATE BAR
 Ingredients: Centre (68%) (Glucose solids (23%) (Glucose syrup, Dried glucose syrup), Hydrogenated vegetable oil, Dried skimmed milk, Biscuits (5%) (Wheat flour, Sugar, hydrogenated vegetable oil, Salt, Malt extract, Flavouring, Raising agents (Tartaric acid, Sodium bicarbonate)), Sugar, Fat-reduced cocoa, Glycerol, Dried whey, Emulsifiers (Soya lecithin, E471, E442), Flavourings), Milk chocolate (Milk, Sugar, Cocoa mass, Cocoa butter, Vegetable fat, Emulsifier (E442), Flavourings).

Dried Parsley, Colours (Plain Caramel, Ribonavinin), INSTANT MINESTRONE SOUP WITH CROUTONS Modified Potato Starch, Croutons (12%) (Wheat Flour; Hydrogenated Vegetable Oil; Salt; Yeast), Maize Starch, Flavourings (with Flavour Enhancer: Disodium Guanylate), Sugar, Dried Pasta (8%) (Durum Wheat Semolina; Salt), Tomato Powder, Flavour Enhancer (Monosodium Glutamate), Salt, Onion Powder, Dried Vegetables (3%) (Carrot; Peas; Onion), Colours (Beetroot Red; Mixed Carotenes), Celery Extract, Dried Herbs, Acidity Regulator (Sodium Diacetate), Ground Black Pepper, Citric Acid.
 INSTANT VEGETABLE SOUP WITH CROUTONS

3. Bring to the boil stirring continuously.
 4. Reduce the heat and simmer for 8 minutes or until chicken is thoroughly cooked, stirring occasionally.
 5. Ensure piping hot and serve immediately.

Ingredients (greatest first):
 Sugar, Modified Maize Starch, Spices and Herbs (Coriander, Curry, Garlic, Turmeric, Ginger, Fenugreek, Cardamom, Fennel, Chili, Allspice, Basil, Black Pepper, Mustard, Clove, Paprika), Dried Onion, Coconut Milk Powder (Fat-free), Maltodextrin, Milk Protein, Mustard Flour, Salt, Tomato Powder (Acidic), Cream, Skimmed Milk Powder, Instant Potatoes, Cream Powder (2%), Whey Powder (from milk), Citric Acid, Spice Extract, Wheat Flour.

CONTAINS TRACES OF EGG
 NO ARTIFICIAL COLOURS

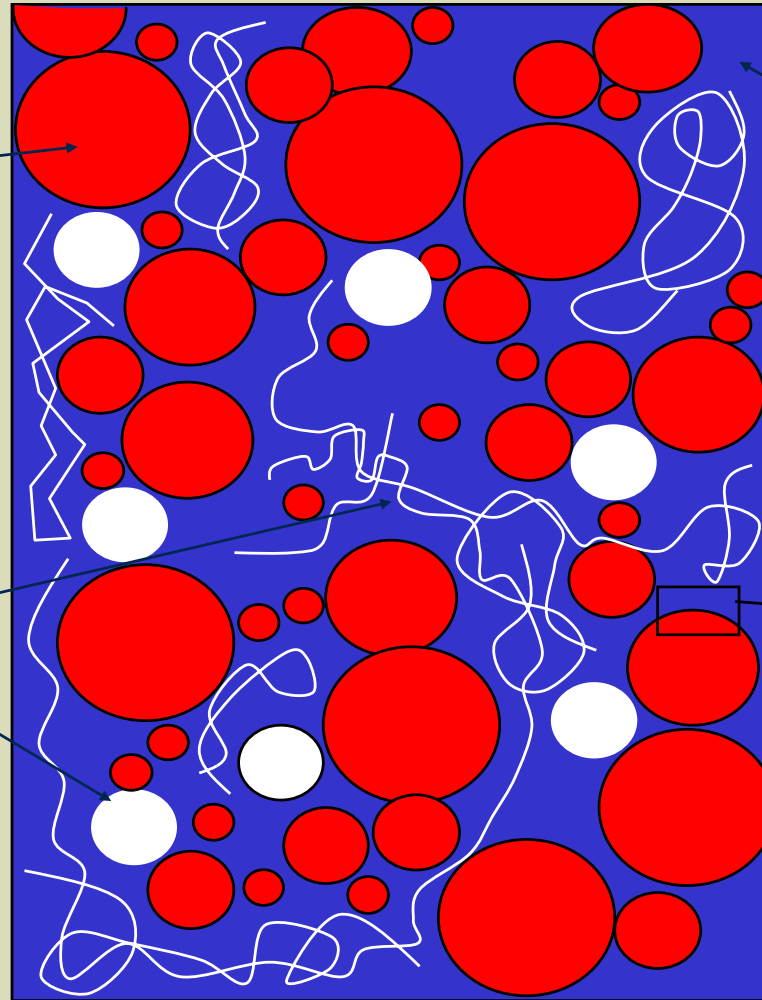
BEST BEFORE END:
 AUG07
 L6051B65221-06

Emulsion Structure

Typical oil in water emulsion (eg mayonnaise)

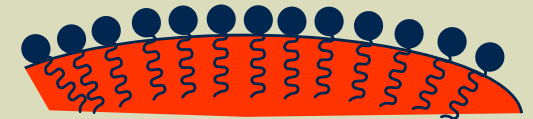
Oil

Water



Thickeners,
Stabilisers,
Gums

Emulsifiers



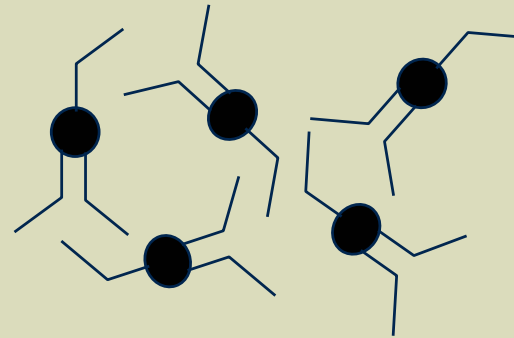
Oil or Fat

Solid and liquid fats/oils give food different textures

Oil



Unsaturated fatty acids

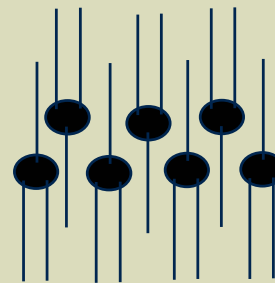


Low melting point
Liquid at room temp

Fat



Saturated fatty acids



high melting point
Solid at room temp

Saturated – saturated with hydrogen bonds

Hydrogenated vegetable oil – unsaturated oil which has been treated to turn it into a solid fat

Emulsifiers

Amphiphilic molecules (contain both hydrophobic and hydrophilic parts)

Adsorb to interface between oil and water

Reduce surface tension to allow oil to be emulsified into small droplets

Prevent coalescence of droplets

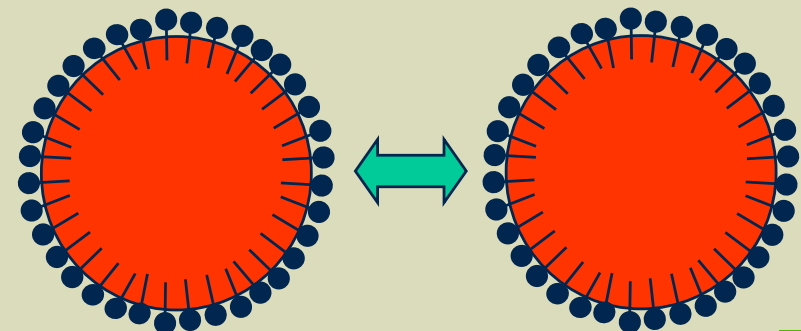
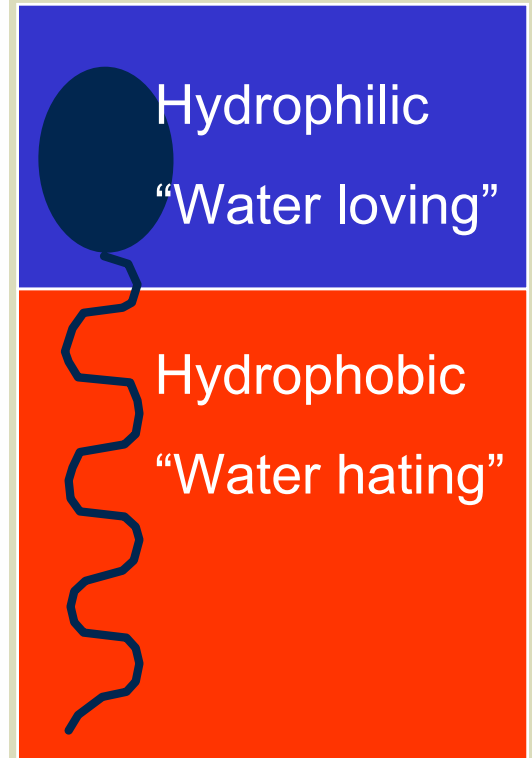
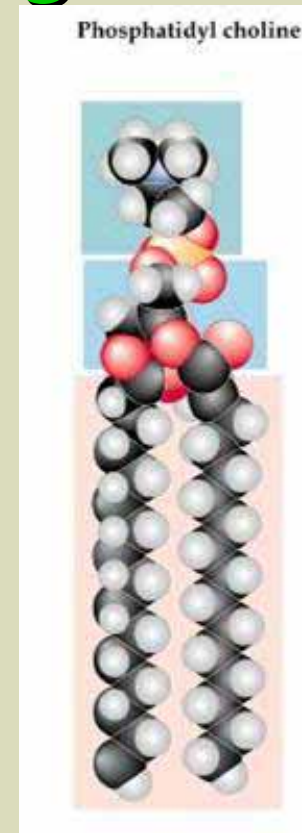
Typical emulsifiers are:

lecithins (E322) from soya bean or egg yolk

Chemically modified oils

mono- and di-glycerides of fatty acids (E471),

esters of monoglycerides of fatty acids (E472a-f)



Proteins

Many proteins are also amphiphilic and can perform a similar function to emulsifiers.

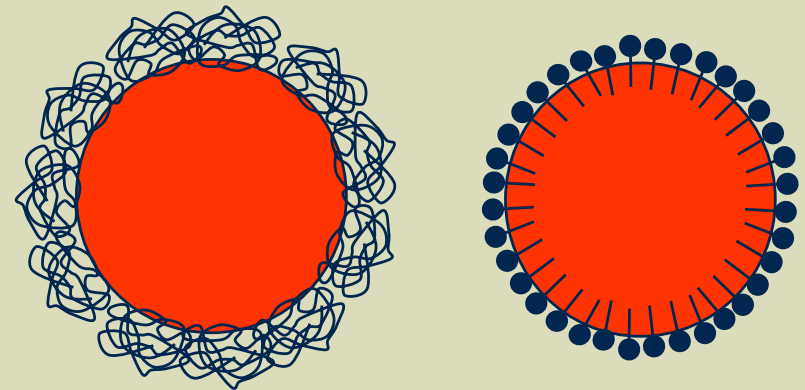
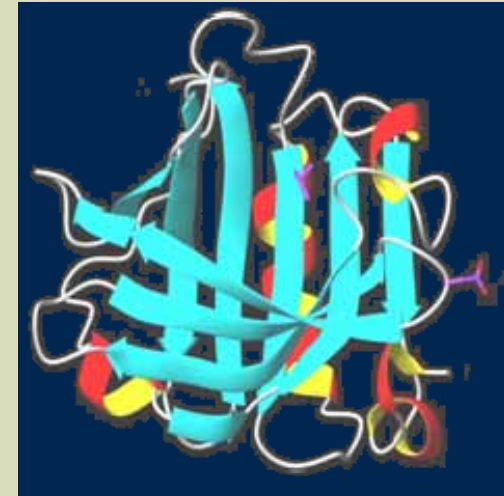
Can form very stable emulsions as surface layer is thicker and stronger

Skim Milk Powder – contains protein milk fat and lactose.

Whey protein – protein by product from cheese making

Sodium Caseinate – Protein from curd fraction of acidified milk

Soy protein – Protein extract from soy bean



Gums, Stabilisers & Thickeners

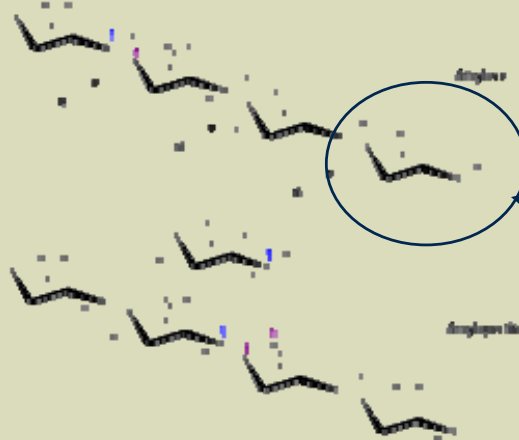
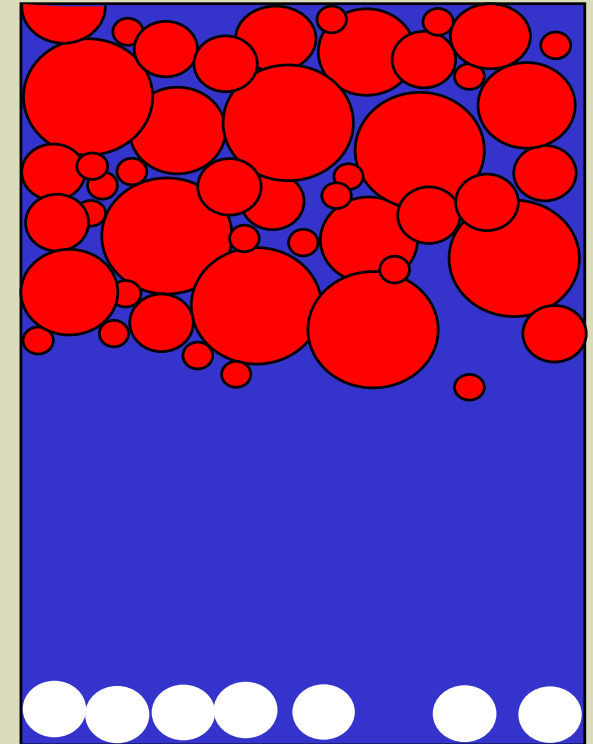
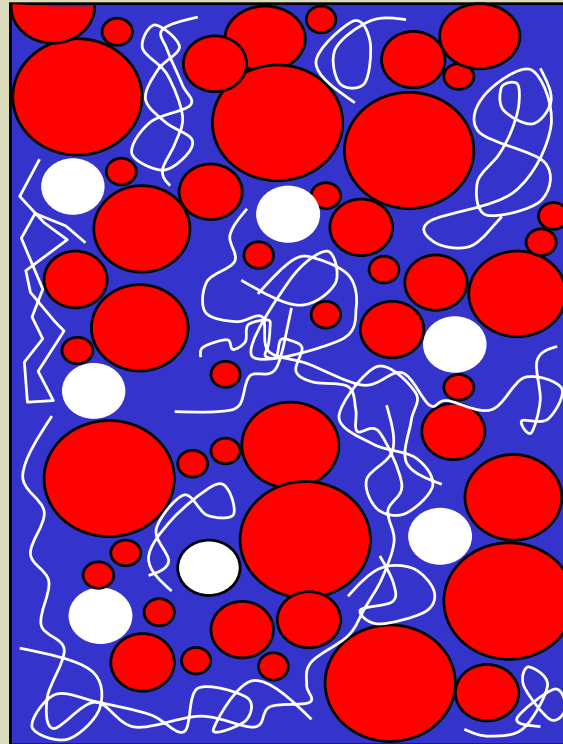
Polysaccharides usually from plants

Form a gel network that traps droplets and particles

Slows down creaming and sedimentation

Adds texture to low fat foods

Some gums can be formed into droplets to mimic the mouthfeel of fat droplets in low fat foods



Single sugar (glucose)

Gums, Stabilisers & Thickeners

Starch – from wheat and other grains, legumes and potato, can sometimes be chemically modified to improve properties

Pectin (E440) – from fruit often used for thickening jam

Gum arabic (E414), extracted from an exudate from the stems and branches Acacia trees

Locust bean gum (E410), from the seed (kernels) of the carob tree. good for ice creams as it restricts ice crystal growth

Guar gum (E412); from the seed of the *Cyamopsis tetragonoloba*, where it acts as a food and water store. Similar to locust bean gum in functionality

Carrageenan (E407), **alginates (E400-4)**, Extracted from seaweed

Cellulose (E466). Cellulose is found in plants as microfibrils is mostly prepared from wood pulp, can also be modified

Xanthan gum (E415). microbial polysaccharide It is naturally produced to stick the bacteria to the leaves of cabbage-like plants.

Acacia



Carob bean



And Finally

Food ingredients presented are approved and safe – in moderation, as part of a healthy diet.



Scientists at IFR are trying to understand the role of some of these ingredients in foods so we can improve their nutritional quality .



Thank you