Food chemistry options report

Science, Chemistry

Food Chemistry What is food chemistry? Food chemistry is the application of the actual science that goes into the production, development, and actual creation of the foods we frequently consume. In reality, much more thought as well as actual science goes into the food production and consumption that we as a society divulge in so regularly. It is up to the food chemists to design the most efficient and fastest way to make and preserve both the appeal as well as the nutrition of the food. With that being said, not only must the food meet the standards of the consumers, but the chemistry behind it must also be in line with the guidelines set up by organizations such as the FDA. Perhaps the most important factor when looking into a food is it's chemical composition. For example, typical lipids include phospholipids, sterols, and vitamin D which because of their structures remain soluble in organic solvents but insoluble in water. A common lipid makeup of a fatty food contains an intricate mixture of many different molecules. A large part of these lipid makeups are usually a good amount of triacylglycercols which are literally the esters of three fatty acids bonded to a glycerol molecule. Variation in fatty foods are then caused by differences in chain length, degree of unsaturation, and position on the glycerol molecule(ACS). Another prominent factor when considering the different types of fats is that the unique profile of lipids present determines the exact nutritional as well as physiochemical properties. As the discussion of food fat and oils continues, it is important to distinguish that the difference between the two is that a “ fat" is a lipid that is solid at room temperature whereas an “ oil" is a lipid that is liquid at that same temperature. Along with lipids, carbohydrates also have a very different chemical structure that contributes to their unique qualities.

Carbohydrates exist in combinations of carbon, oxygen, and hydrogen which really shows how simple the base structure of a carbohydrate is. In the presence of animals, carbohydrates can be seen as starches whereas in plants they are most commonly noticed as cellulose. Carbohydrates can be most commonly identified in their base state as simple sugars but they can quickly combine to form complex structures as more of the simple sugars combine. A common structure for a simple sugar or monosaccharide is a carbon chain ending with a carbonyl group that also has hydroxyl groups spread out over the molecule. The main difference from some simple sugars to others is the specific orientation of the hydroxyl groups around the simple sugar chain. As the talk of lipids goes more into depth, it is important to distinguish between the different types of fat and in this case the differences between saturated and unsaturated fats. It has long been common knowledge that unsaturated fat is better for you and that saturated fat is just horrible for you but it has never really been explained at all. However, when examining into the actual chemical effects that these two fats can have, it becomes much easier to see why one would be considered so much healthier over the other. As the chemical structure of saturated fats are examined it can be seen that since the molecule is so concentrated with hydrogen atoms, there is no double bonds contained between the atoms. These saturated fats have been known to raise cholesterol levels because of the more dense fat that must be consumed. When the structures of unsaturated fats are looked at, it can be seen that there is a huge difference between it's chemical structure and that of the saturated fat. This difference is shown by the presence of double bonds between some of the atoms. This presence of

double bonds then shows that the atom has a much less concentrated state in comparison to the saturated fats which also explains why it remains at a liquid at room temperature instead of a more dense solid. As a result, these unsaturated fats take much less of an effort by the body to consume since they are less dense which is really what helps them in being considered so much healthier. Shelf life, the length of time a product can be stored without becoming unsuitable for use or consumption(Gyesley S.). There are many factors that go into the preserved shelf life of foods and many of which that have to do with the actual chemical composition of the food in question. These factors include the food's exposure to light, heat, water content, as well as exposures of the food to air in general which can lead to slow but actual chemical changes over time. The main problem associated with the exposure of light onto foods is how strong the affect of light can manage to be. Too much light will cause a loss in the presence of vitamins as well as the overall appearance since the excess of light can lead to a much faster deterioration of the food. There can really be a problem with the amount of water content in packaged foods today too, as that can affect the rate at which that food undergoes chemical changes however if the food comes dry and then begins to pick up moisture it can drastically change the rate at which microbial spoilage will take place. These chemical changes in the food is really what leads to the sharp decline in shelf life as well as the quality of the food and it is influenced in a very strong way by the temperature at which the food is stored. A gallon of milk left out at room temperature spawns microbial growth much faster than one that is left in the refrigerator. It is important to realize how important the preservation of food becomes

after reading about how easily food can spoil. The first of these is one of the most obvious that involves storing dairy products at low temperatures which usually encompasses using a refrigerator. There are also some techniques that change the packaging such as many foods these days that are packaged in reduced oxygen. The growth of the traditional spoilage organisms can be prevented by the application of this new method at a higher rate than ever before. The use of these new packaging techniques really differs from the past when one of the most common forms of preservation in meats was to salt them very heavily. As that is now still an option, it is used way less often because of how unhealthy that has become to be considered by our society today. What is sometimes simply overlooked in foods is the appearance by which they come. Foods have color because of their ability to reflect and absorb the different wavelengths of visible light. When considering where these colors actually come from the answer usually involves one of the natural pigments of either anthocyanins or carotenoids. Anthocyanins are more commonly known to be present among plants. The colors they produce range from pink, red, and purple to blue. Carotenoids are considered to be more of a general pigment as they are virtually found everywhere. These colors involve red, orange, and yellow which are typically most seen through nature. As to the presence of Anthocyanins in plants, it is important to realize that along with it comes the commonly known natural pigment of chlorophyll that is typically found in any plant that shows green. As the conversation onto the appearance of food continues, another aspect of food that would have to be considered is the texture of foods. In liquids, one of the most common ways that is used to change texture or the look is

through the process of emulsion. This involves combining two liquids that would normally be insoluble to each other by means of adding one to the other drop by drop. This process of emulsion can really be sped up by the addition of an emulsifying agent as well which allows for the two liquids to combine faster. When the actual term of “ emulsifier" is used, this just describes the actual substance that allows small droplets of one liquid to become suspended into the other. In conclusion, food chemistry involves a large amount of organic and chemical structure knowledge in order to maintain and improve upon the food production and processing techniques that are already out there. Much more thought is often put into food chemistry then most people would think which shows why it is often not known or understood by the common person. However, as food development and preservation becomes even more prominent in our society today, common food chemistry knowledge should become more well known.