

Chemistry AS at Shaftesbury

A summer holiday key skills task

Chemistry Induction task

Chemistry is all around us, yet it is only sometimes that we see it displayed. What we would like you to do is to 'deconstruct' TWO everyday materials and compare and contrast their chemical contents. We suggest you choose two materials that are linked to each other in some way. An example of one 'deconstruction' is shown below.



INGREDIENTS
Vegetable extract
Salt
Yeast extract
Spice extract
Niacin
Vitamin B12
Riboflavin
Folic acid
Thiamin

VEGETABLE EXTRACT
This is chiefly made from peanuts and soya. The process uses hydrochloric acid, followed by neutralising, filtering, decolourising and concentrating.

SALT (sodium chloride)
It raises the risk of high blood pressure and heart disease but it is also vital for the nervous system. Small servings means Marmite contributes little to daily intake.

YEAST EXTRACT (E620, C₅H₇NO₂)
Marmite's defining ingredient is made from brewer's yeast heated to create glutamic acid, which is used by farmers to increase plant growth and boost crop yields.

SPICE EXTRACT (contains celery)
The composition of this is unspecified. But when it emerged that some people are allergic to celery, the EU demanded that it be listed as an ingredient.

NIACIN
(nicotinic acid, vitamin B3, C₆H₅NO₂)
This is a water-soluble organic compound that helps to keep cholesterol low. Deficiency causes sores, diarrhoea and depression.

VITAMIN B12
(cobalamin, C₆₃H₈₈N₁₄O₁₄P)
This vitamin has a cobalt atom with a cyanide group attached. It helps make red blood cells and aids brain and nervous function.

RIBOFLAVIN
(E101, vitamin B2, C₁₇H₂₀N₄O₆)
This is also an essential dietary component, abundant in nuts and meat. It is produced industrially by fermentation using yeast or bacteria.

FOLIC ACID
(folate, vitamin B9, C₁₉H₁₉N₇O₆)
Used in many body processes including the creation and repair of DNA, making it vital during pregnancy. It's added to bread and cereals.

THIAMIN
(vitamin B1, thiamine hydrochloride, C₁₂H₁₇ClN₄OS)
This is an essential nutrient - deficiency causes pain and weakness. All meat, especially pork, is thiamin-rich.

In this example they have used the ingredients list and identified the uses of each. This could easily be extended to show greater chemical structure of the molecules and perhaps a more detailed explanation of either the purpose or effect of some of the chemicals involved.

By choosing a pair of similar materials you can concentrate on what chemicals appear in both and why and how the pair might differ. Feel free to select your own pair, but some ideas are:

Two different Shampoos (e.g. Greasy and Dry hair types / different price range / Synthetic vs Organic)

A shampoo and a conditioner

Two different toothpastes

Painkillers (aspirin, ibuprofen, paracetamol)

Detergents

You may be able to come up with others use your imagination

The task

- The task is to produce a presentation in the form of either an A3 (2 *A4 or larger) poster or multislide powerpoint (which could be displayed on a large screen TV) aimed at year 11 students to show just how much Chemistry there is in our everyday life.
- You are expected to bring your completed task to your first Chemistry lesson.

What we are looking for

- Research skills : Can you read, select and research information about a chemical and gain some understanding of its chemistry. If you don't have internet access then your local Library will! Your task should include a bibliography or list of where your information was obtained from.
- Chemical names and Structures : We want you to become familiar with the ways chemicals can be named and drawn. You do not need to understand the complex naming system, but like a language, at least become familiar with the styles.
- A comparison between a related pair of substances. If they use different chemicals can you discover why? How do they work?
- A degree of thought about the sources of the information (which should be quoted). Remember a company is unlikely to list potential or unproven side effects, whereas those affected may.
- A bit of imagination and interest.

What we don't want

- We do not want a huge cut and paste Wikipedia entry, where there is little evidence of any real understanding of what you have researched.
- A highly detailed post degree explanation that neither you nor any other year 11/12 will understand.
- A list of ingredients with little development of what they are, or do. Your choice of material is critical here in making this bit more or less difficult.
- Unsubstantiated claims or information that has no source referenced. Remember we expect a bibliography.

What to avoid

- Clearly some ingredients will be protected by companies to avoid their product being copied (Perfumes, Pepsi /Coca Cola). Choose items where sufficient details are available to allow further research.
- Products with limited ingredients or the contents are vague because it is not a material that comes into contact with humans or animals. These will give you insufficient scope for comparison and research.
- By all means do pharmaceuticals, but we don't need kitchen chemistry crack cocaine recipes or how to make any other illegal home products. Remember we hope to display your task in a school!
- Marmite! (come up with your own idea)

Where to find information

- Ingredient labels. The statutory labelling of ingredients is a great place to start.

- Many companies have a help line / web site with a lot of detail on usually on the label.
- Good old Google and Wikipedia ,but try more Chemical places as well like
- www.ukfoodguide.net
- www.chemspider.com
- www.howstuffworks.com

You *might* find some of your substances mentioned in <http://www.chm.bris.ac.uk/motm/motm.htm> Bristol University's Molecule of the month page

Don't feel you have to explain everything. Choose those aspects you feel you understand and that might be of interest to a year 11 who is considering Chemistry at A level.

Chemistry is an enormous subject and you have done very little at GCSE. You may find that quickly the language and complexity of material on the internet can be overwhelming. Try to pick out bits that you do understand, or stick to web sites that are aimed at the general public.

Should you require help on any aspects of this task then please email the Head of Chemistry at Shaftesbury using the email address below.

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