Conventional processed foods leave a bad taste

Laboratory-made flavour additives became widespread during the 1960s with the burgeoning popularity of processed convenience foods. Now it's hard to find a conventionally produced food product that doesn't contain added flavours and flavour enhancers. ***Sue Dengate*** *takes a close look at 'natural' and 'artificial' flavours and discovers that one isn't necessarily better for you than the other.*

Consumers who read food labels are often surprised to see that there are added 'flavours' in most products. If, like many people, you think natural flavours are good and artificial flavours are bad, you need to know more about these additives.

Flavours are used in processed food because overprocessing destroys flavour. When you drink freshly made juice, it needs no added flavours. But by the time apple juice, for example, has been centrifuged, pasteurised, filtered, clarified and cold-stabilised, much of the original flavour has been lost.

Until recently, Australian food labels followed the European tradition of describing flavours as natural, artificial or nature identical. For example, a strawberry-flavoured yoghurt could contain:

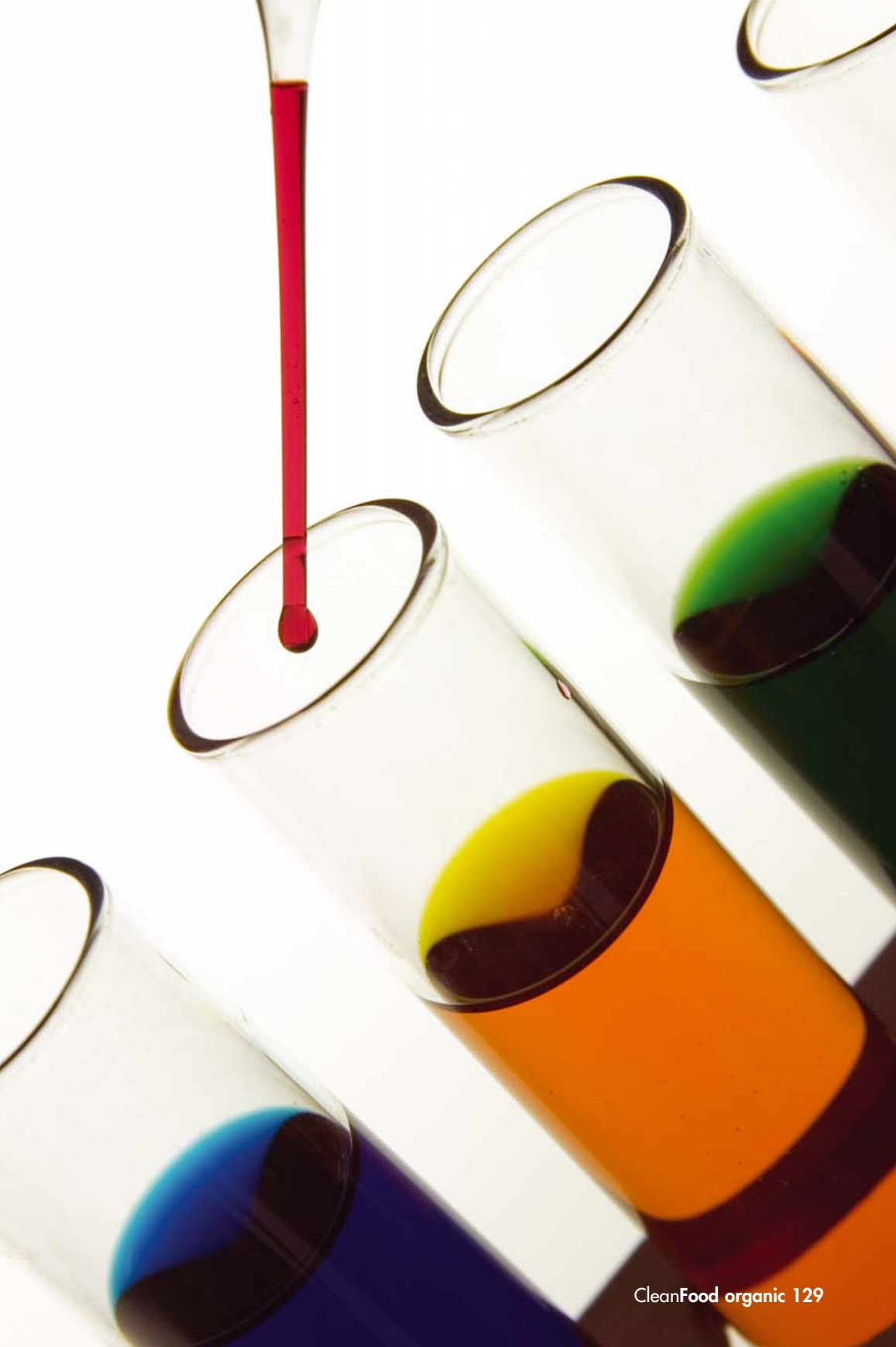
- natural flavouring substances whether derived from strawberries or not
- a nature identical flavouring substance that has been synthetised, but is chemically identical to a substance found in nature, or
- an artificial flavour that has been synthesised and has not yet been identified in any natural product.

While you can still find these terms on some product labels in Australian supermarkets, the labelling regulations changed in 2002 so, technically, the term 'natural flavours' does not now comply with the code.

Under the new regulations, flavours must be declared in the ingredient list as either 'flavour' or 'flavouring', or as a specific name or description of the flavouring, such as 'vanilla'. There's no mention of natural or artificial, and although the food manufacturers know whether they are using artificial flavouring substances, the consumer does not. Should you be concerned?

Butter flavour and lung disease

The butter flavour diacetyl – used in products such as microwave popcorn – has been linked to a rare and deadly respiratory disease known as Popcorn Workers Lung. Its victims include young, healthy, non-smoking flavouring industry workers who have been exposed to vapours when diacetyl is heated. So far three workers have died, and many are awaiting lung transplants. It has been known since 1989 that diacetyl vapour is irritating to the throat and lungs and laboratory studies in the 1990s showed that diacetyl vapours were highly toxic to laboratory rats, with effects likened to 'inhaling acid' by scientists. At this stage, no one knows whether consumers exposed to diacetyl fumes in their own homes are at risk. Dr David Michaels, who heads the George Washington University School of Public Health's Project on Scientific Knowledge and Public Policy, says that diacetyl was approved for food use based on studies that examined consumption, not



inhalation. 'There is compelling evidence that breathing diacetyl vapors causes lung disease and there is no evidence of a safe exposure level,' says Michaels, who has asked the Food and Drug Administration to remove diacetyl from the list of safe additives.

Tasting with your nose

Flavours and smells are irretrievably linked because flavours are recognised mainly through the sense of smell. That is why you may notice that you can't taste food properly when you have a cold. You can test this for yourself by holding your nose while consuming a food with a strong aroma such as chocolate or coffee – you will have trouble identifying the characteristic chocolate or coffee flavour, although you can still distinguish the basic flavour, such as sweet, sour, salty or bitter. Up to ninety per cent of your perception of taste actually comes from your sense of smell, so the flavour of a food can easily be changed by keeping the same base flavour while altering the aroma, a technique often used in processed foods. There can be hundreds of volatile organic compounds (VOCs) – chemicals that are in a gaseous state at room temperature – involved in a complex aroma. The giant chemical companies that make flavour additives generally also make fragrances for perfumes, personal care and household cleaning products.

How flavour additives can affect your health

The first step to understanding how flavour and fragrance additives can affect your health is to realise that all foods consist of natural chemicals. For example, an apple contains over 1000 natural flavouring chemicals, some of which are known to cause health problems for some people in big enough doses. Eating is a chemical

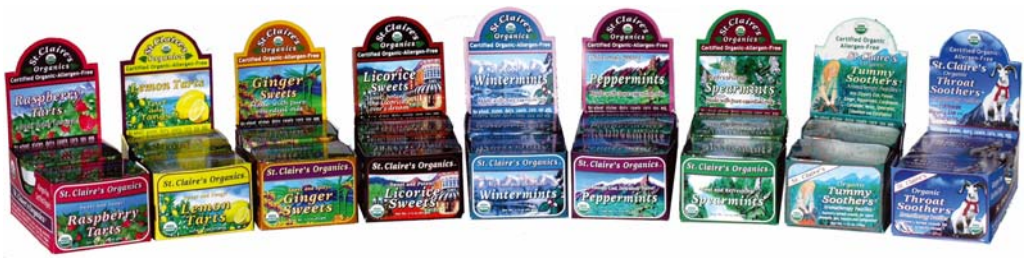
Flavour facts

In his superb bestselling book *Fast Food Nation* author Eric Schlosser says, 'Natural and artificial flavours are now manufactured at the same chemical plants, places that few people would associate with Mother Nature. Calling any of these flavours "natural" requires a flexible attitude toward the English language and a fair amount of irony.'

Flavours – What the labels don't tell you

The fact is that most processed foods contain flavouring additives that have been made in giant chemical factories. There are more than two thousand approved flavouring chemicals that don't have to be described on food labels because they are considered to be closely guarded trade secrets. When the word 'flavours' appears on an ingredient list, it means those flavours have been made in a laboratory even if this could be described as natural by the definition above. Natural flavours, nature identical flavours and artificial flavours could contain exactly the same chemicals although consumers can't tell what's in them because of the secrecy surrounding flavour formulas.

If you studied high school chemistry, you may have made artificial banana flavour as part of the curriculum. It's done by combining amyl alcohol and acetic acid in the laboratory using sulphuric acid as a catalyst without a banana in sight. You will probably remember the result – a chemical called amyl acetate, which smells surprisingly like ripe bananas because it's the dominant flavour chemical in bananas. If a solvent is used to extract this chemical from bananas, the resulting amyl acetate is then regarded as a natural flavour, despite being the same chemical as the amyl acetate made without bananas. Other flavour chemicals include ethyl propionate for a fruity flavour, cinnamic aldehyde for cinnamon, diacetyl for butter (see box) and there are several thousand more.



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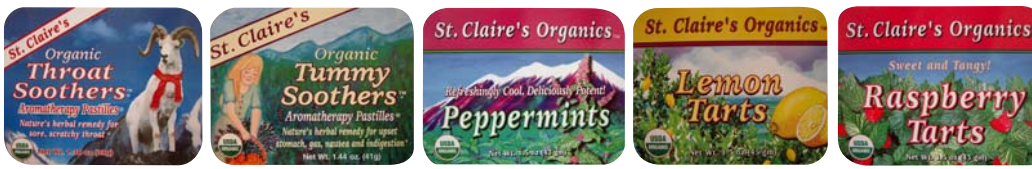


"The giant chemical companies that make flavour additives generally also make fragrances for perfumes, personal care and household cleaning products."

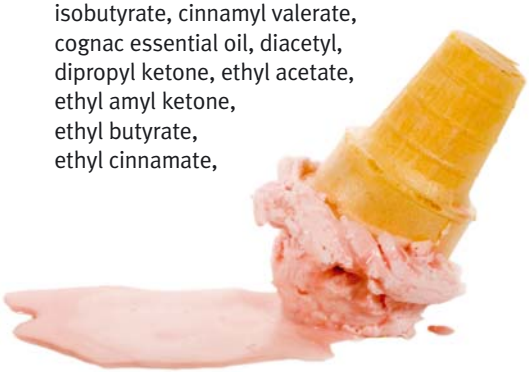
balancing act. We have to balance the benefits of nutrients such as vitamins and minerals against the side effects of natural pesticides and other chemicals that may contribute to various conditions.

It's the dose that matters

The problem for the consumer is not how the flavour additive is made, but the size of the dose consumed. Because manufactured flavours such as artificial strawberry are so cheap, it is easy to add a lot more than you would ever eat in one serve of a natural food. While few people are affected by the food chemicals in one strawberry, when consumers – especially children – consume concentrated doses of some of the chemicals listed below, and particularly if they consume them many times every day in different foods, they can be affected in a variety of ways.

The taste of strawberries

According to Schlosser, a typical artificial strawberry flavour – in foods such as yoghurts – will probably contain such chemicals as amyl acetate, amyl butyrate, amyl valerate, anethol, anisyl formate, benzyl acetate, benzyl isobutyrate, butyric acid, cinnamyl isobutyrate, cinnamyl valerate, cognac essential oil, diacetyl, dipropyl ketone, ethyl acetate, ethyl amyl ketone, ethyl butyrate, ethyl cinnamate, ethyl haptanoate, ethyl heptylate, ethyl lactate, ethyl methylphenylglycidate, ethyl nitrate, ethyl propionate, ethyl valerate, heliotropin, hydroxyphrenyl-2-butanone, alpha-ionone, isobutyl anthranilate, isobutyl butyrate, lemon essential oil, maltol, 4-methylacetophenone, methyl anthranilate, methyl benzoate, methyl cinnamate, methyl heptine carbonate, methyl naphthyl ketone, methyl salicylate, mint essential oil, neroli essential oil, nerolin, neryl isobutyrate, orris butter, phenethyl alcohol, rose, rum ether, gamma-undecalactone, vanillin and solvent. Chemically, there isn't actually much difference between the list of chemicals in a real strawberry or in an artificial strawberry flavour.



Effects induced by additives

Health

- headaches or migraines
- rashes (hives, eczema, dermatitis, other itchy rashes)
- stomach aches, bloating, reflux, constipation, bedwetting, sneaky poos
- asthma, frequent cough, stuffy or runny nose
- frequent colds, flu, ear infections
- joint pains, swelling of the joints
- heart palpitations, fast heart beat, pseudo heart attack

Behaviour

- sleep disturbance (difficulty falling asleep, frequent night waking, night terrors, restless legs)
- restlessness (loud voice, irritable, easily distracted, demanding, easily bored)
- irritability (touchy or easily annoyed, loses temper, throws tantrums)
- oppositional defiance (temper outbursts, often says no, refuses requests, defies rules, angry)
- inattention (forgetful, disorganised, foggy brain, dreamy)
- anxiety (lethargic, depressed, panic attacks)
- unhappiness (grizzly, miserable, cries frequently)

Salicylates

Among the flavours in strawberries you can see a chemical called methyl salicylate. Salicylates – in most fruit, some vegetables, herbs, spices and other plant products – are some of the chemicals most likely to affect sensitive consumers. When the use of manufactured flavour additives became widespread in the 1960s, due to the burgeoning popularity of processed food, Californian allergist Dr Benjamin Feingold discovered that 'allergy' symptoms caused by these additives were actually symptoms of salicylate sensitivity. Then chief of the Allergy Department at the Kaiser Foundation Hospitals, Dr Feingold was the first to report adverse health effects of these additives in a medical journal. In his article entitled 'Recognition of food additives as a cause of symptoms of allergy', he included the 1610 synthetic flavours and 502 natural flavours listed at that time.

In 1985, a comprehensive analysis of the salicylate contents of foods showed that there were salicylates in even more foods than Dr Feingold realised (see below). In general, the stronger the flavour of a food, the higher the salicylates. Flavourings such as vanilla are eaten in much smaller quantities than whole foods, so the amount of salicylates in vanilla flavour as eaten in a product such as ice-cream is very low, and much safer for some consumers than a strong fruit, mint, spicy or herbal flavour.

Salicylate contents of foods

Food	mg salicylate per 100gm
Worcestershire sauce	64.3
Mixed herbs, dry	55.6
Cinnamon powder	15.2
Peppermints, range up to	7.6
Tomato sauce, range up to	2.5
Orange	2.4
Vanilla essence	1.4
Strawberries	1.4
Pears, peeled	0.0

Source: A. Swain et al., J Am Diet Assoc, *1985, 85(8): 950-960*

The effects on our kids

Parents are most likely to see the effects of added flavours from children's syrup medications, which can contain extremely high levels of flavouring. One mother described how her normally additive-free two year old became 'argumentative, rude, defiant, violent, uncontrollable, and began waking in the night for up to 3 hours' while taking a course of antibiotic syrup for tonsillitis. Another recalled the effect of a colour-free flavoured pain reliever on her toddler: 'he became incredibly agitated – head banging, aggressive, thrashing … inconsolable … we rushed to the doctor (because we were to hop on an international flight the next day!) and he sent us off for urgent blood and urine tests. While waiting for the tests about 3 hours later my son suddenly regained his composure and became calm.'

The 30-minute rule

Confusion about the effects of food additives is largely due to the time delay before effects become obvious. Unlike peanut and other true food protein allergies, which can occur within minutes, reactions to food chemicals can occur up to three days later. Salicylate research has shown that consumers are unlikely to identify the cause of their symptoms unless the reaction occurs within 30 minutes.

Flavour enhancers

Another group of chemicals that occur naturally but can be concentrated or created by processing are the glutamates, often found in tasty foods (see table p134). As with salicylates or any other chemicals, the more you eat, the more likely you are to be affected. A few people are not affected at all, some are only affected when they eat extremely high doses and others are so sensitive that they will be affected even by small amounts. For example, as a concentrate, Monosodium glutamate (MSG) can easily be added to any foods in much greater quantities than in nature. A study of

Flavour facts

Nothing artificial?
If you've ever wondered how manufacturers can say 'no artificial colours or flavours' on products such as flavoured noodles, which contain MSG (listed as flavour enhancer 621), the answer is that 'flavours' and 'flavour enhancers' are different classes of additives according to food regulators, flavours being 'intense preparations' added to impart taste and/or odour, whereas a flavour enhancer enhances the existing taste.

59 normal volunteers found all except one reacted to MSG added to home-made chicken soup, with the most sensitive to the smallest amount (3 grams) and most subjects reacting to higher doses. Although the doses of glutamates in natural foods are tiny compared to added MSG, some sensitive consumers are affected by them.

Glutamate contents of foods

Food	Portion size	mg glutamate per serve
Chinese soup	1 bowl	5000.00
Tomato juice	1 cup	0.83
Mushrooms	1/4 cup	0.09
Parmesan cheese	2 tbsp	0.05

Sources: H. Schaumberg et al., Science, *1969, 163;826-82*
U.S. Food and Drug Administration

MSG

MSG was the first of the flavour enhancers. It was originally developed from a kombu seaweed extract by a Japanese scientist in the early 1900s and launched in the US in 1948, where it rapidly became a multi-billion dollar business used to intensify the flavour of tasty takeaways, snacks, soups, sauces and meat-based meals. There were early reports in medical journals of Chinese Restaurant Syndrome, a condition occurring within 30 minutes of MSG ingestion and characterised by headache, a burning feeling, facial pressure and chest pain, sometimes with diarrhoea, and occasionally with sweating and palpitations that could be mistaken for a heart attack. Later, there were reports of MSG-induced asthma. Due to extensive industry promotion of MSG as safe, targeted in particular at health professionals, adverse effects of MSG are now considered controversial in the medical literature although recognised by consumers and allergy clinics worldwide.

Consumers are frequently confused because manufacturers can hide sources of MSG in other ingredients. For instance, all the following ingredients may contain high levels of glutamates, which don't appear as MSG on the label: hydrolysed vegetable protein (HVP), vegetable protein extract (derived from wheat, soy beans or other vegetables), hydrolysed plant protein (HPP), yeast extract, vegetable extract, soy sauce, Worcestershire sauce and soy extract. There are many ways of describing these on a label. If a delicious 'all natural' spread, sauce, stock or seasoning seems to be made largely from soy bean, wheat or vegetable protein of any description, you would have to suspect that it has been broken down with acid in a laboratory to create free glutamates.

The new flavour enhancers

In the 1990s, a new set of flavour-enhancing chemicals called nucleotides were introduced. These additives (disodium guanylate 627, disodium inosinate 631, and ribonucleotides 635, a combination of the previous two) were developed to boost the flavour enhancing effects of MSG by up to 15 times and, like MSG, are made in giant factories where they are synthetised from yeasts and regarded as natural. They can appear in products labelled 'No MSG' although usually there is some natural form of MSG such as yeast extract present. Since the introduction of nucleotide flavour enhancers, the Food Intolerance Network has received more adverse consumer reports about these additives than any other, with some consumers complaining about 'years of hell'. Some people who have

tolerated moderate amounts of MSG all their lives can have dramatic reactions to ribonucleotides, with a variety of symptoms from itchy skin rashes (Ribo Rash), swelling of the lips, tongue or eyes, anxiety, heart palpitations, panic attacks, headaches, heartburn or muscle spasms to sleep disturbance or behavioural disturbance in children. Effects can become apparent any time from within minutes to 48 hours later or several days later and can last for up to a week or more, sometimes coming and going during that time.

The 30-minute rule again applies. Consumers who have a reaction soon after eating are more likely to work out what is affecting them. A woman who avoided MSG because of irritable bowel symptoms wrote: 'I found some corn chips that advertised "No MSG" and bought them a few times before connecting them with a very uncomfortable feeling of restlessness, agitation and panic, heart palpitations, hot flushes and a "buzzing" sensation; I thought I was having a panic attack. Since recognising the link [with nucleotide flavour enhancers] I bought the chips once more to test the idea that this was the cause; after about five chips I started to feel the "buzzing" and threw the rest of the packet away.'

"If a delicious 'all natural' spread, sauce, stock or seasoning seems to be made largely from soy bean, wheat or vegetable protein of any description, you would have to suspect that it has been broken down with acid in a laboratory to create free glutamates."

Because of the delayed onset, some consumers have suffered from distressing symptoms for up to ten years before discovering the cause of their problems. For example, a dose of 635 in soup for Friday lunch can result in symptoms at midnight on Saturday, leaving consumers looking for something to blame in Saturday's dinner. Flavour enhancers are used extensively in takeaways, packet snacks and ready meals, but also in less obvious food choices such as vegieburgers, fresh or cooked stuffed or seasoned chicken, sausages and marinated meats or manufactured crabsticks in sushi. These additives have even tripped up conscious food consumers in apparently healthy foods such as vegetable stocks and stock cubes.

Additives at a glance

There are currently over 2000 flavour additives and 400 additives that must be described by name or number on labels. Of the non-flavour additives, about 60 have been linked to health and behavioural effects. People vary in their sensitivity and although colours are often associated with irritability, sulphites with asthma, and ribonucleotides with rash, any additive can be associated with any side effect.

Flavours

- over 2000 secret manufactured flavour additives that don't have to be identified by name or number

Flavour enhancers

- glutamates (620–625; MSG is 621)
- nucleotides (627 disodium guanylate, 631 disodium inosinate, 635 ribonucleotides)
- HVP, HPP and other concentrated natural forms of glutamates

Colours

- artificial colours and natural colour annatto (160b)

Preservatives

- sorbates (200–203), benzoates (210–213), sulphites (220–228), propionates (280–282), nitrates and nitrites (249–252)

Synthetic antioxidants

- antioxidants 310–312 (gallates), antioxidants 319–321 (TBHQ, BHA, BHT)

Who should avoid additives?

When processed food became a growth industry in the 1960s artificial flavours were widely used, but in the last twenty years – due to the consumer perception that natural flavours are healthier – there has been a move towards manufactured natural flavours. As with many other industrial chemicals, most flavour additives have never been properly tested for their effects on humans and fall into the category of GRAS ('generally recognised as safe').

It is possible to avoid added flavours and flavour enhancers by avoiding highly processed foods. To stick with the doses provided in nature, you can add fresh strawberries to plain yoghurt or choose products with low or no flavours. Organic products will be some of the safest. For example, yoghurts are more likely to contain only real fruit as flavouring or will often specify 'vanilla' as the only flavouring additive. Organic chocolate tastes quite different from highly flavoured supermarket lines. If 'flavour' is listed, you are likely to find it refers to vanilla or essential orange oil. There are some people for whom even that will be too much. Children and adults who are sensitive to the smallest amounts of food chemicals – including those in unprocessed natural foods – will feel better if they avoid the higher salicylate fruit like oranges and stick to lower salicylate fruit such as pears.

If you have ever seen an obvious reaction to any additives or foods, even once, it is worth learning more about food intolerance. Whatever you see is usually just the tip of the iceberg. The effects of natural food chemicals can creep up slowly and leave you wondering why your child isn't doing as well as you expected, or why you rarely feel as healthy as you should. Although children are the most vulnerable, adults can be affected too.

For more information and references, see www.fedupwithfoodadditives.info/factsheets/Factflavour.htm ■

Flavour facts

- As we have seen, there is no significant difference between many artificial flavours and their natural counterparts: it is the size of the dose that can cause problems
- Some consumers are more sensitive than others
- Some will not be affected at all
- Some will be affected only by large doses of food chemicals such as salicylates in strawberry-flavoured sweets or medication
- Those who are more sensitive will be affected when, for example, strawberries are concentrated in products such as strawberry yoghurt

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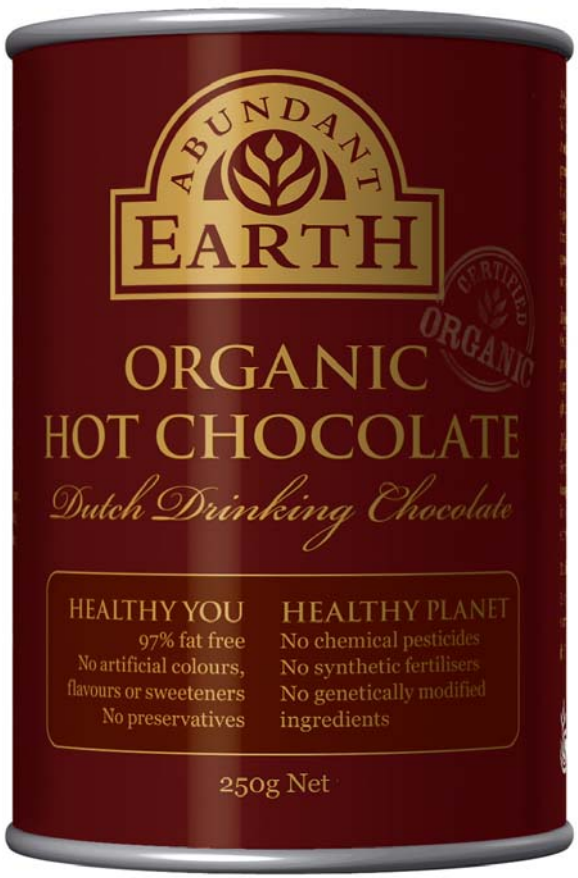

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