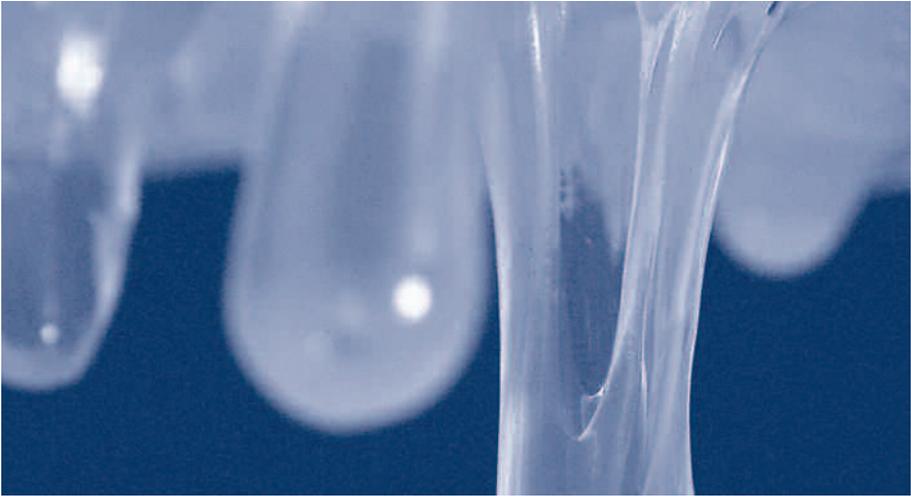


Meeting **natural** expectations



Meeting **natural** expectations



*“Observe always that everything is the result of a change, and get used to thinking that there is nothing Nature loves so well as to change existing forms and to make new ones like them”*

**Marcus Aurelius**

# Executive Summary

## **'Natural' expectations - different things for different people**

An enthusiasm for all things 'natural' is a defining trend of our time and natural approaches and products now seem to be advocated or offered in almost every field of human activity. But what exactly do people believe 'natural' things or approaches will do for them, for humankind, or for the planet?

Reviewing the various possible meanings and implications of the term 'natural' shows how it engenders many different sets of expectations among different groups of people. Many see 'natural' things as much in terms of rejection of non-natural (i.e. man-made) things, as of their own benefits. Man-made things tend to be associated with factories and industry and thus, for some, pollution and capitalism. Man-made is modern: natural is traditional, but is sometimes viewed as beyond modern.

## **Natural risks - smaller, or just more acceptable?**

Some see man-made things as 'interfered with', and thus bringing risks that are somehow greater or less acceptable than the risks posed by natural things. But is this a sound, objective evaluation or does it reflect unease about interfering with the natural order of things, or a feeling that natural risks are somehow easier to accept than man-made ones? To what extent does it actually reflect a lack of confidence in the technology that produces man-made products, in mankind's ability to design safe products, or mistrust in the priorities and motives of the people and corporations who make them? These expectations will tend to reflect values and beliefs as much as hard facts.

## **Natural products are not intrinsically safer**

It is probably a common expectation that natural products will somehow tend to be safer, for people and for the environment, and ultimately more sustainable than man-made things. But the hard evidence offers little to support such a view.

*'Natural' chemicals - meaning the ones that occur in nature - are not routinely and intrinsically safer than man-made 'synthetic' ones.*

Take the world of cleaning products for example: keeping ourselves, our clothes and our environment clean has become both a benchmark of civilisation and a cornerstone of our ever-increasing health and longevity. Cleaning depends on the use of water and a variety of other substances. Choosing 'natural' substances as ingredients is seen by some as an alternative to using 'chemicals'. But all substances are just arrangements of atoms of the same 90-odd chemical elements of which the planet is made. Grouping substances into 'natural' or 'man-made' categories in this way is thus essentially meaningless and misleading.

Objective assessment shows that 'natural' chemicals - meaning the ones that occur in nature - are not routinely and intrinsically safer than man-made 'synthetic' ones. And a given chemical, such as ethanol, which we also drink as alcohol, is certainly not intrinsically safer just because it is made 'naturally'. Toxicity, as Paracelsus had it, is only a matter of dose.

The same also applies to environmental safety. Considering the two key parameters - biodegradability and potential to 'bioaccumulate' - man-made substances can be just as degradable and unlikely to bioaccumulate as natural substances. It all depends how you design them.

### **Beyond safety, the goal is long-term sustainability**

Looking beyond safety to sustainability, natural and synthetic materials have no intrinsic difference in terms of recyclability. Plant-derived, as opposed to petroleum-derived, substances should have the edge in the long run, however, because they are potentially renewable. But 'natural' chemicals, even if renewable, are not routinely and intrinsically more sustainable than synthetic ones since even renewable materials must be sustainably produced.

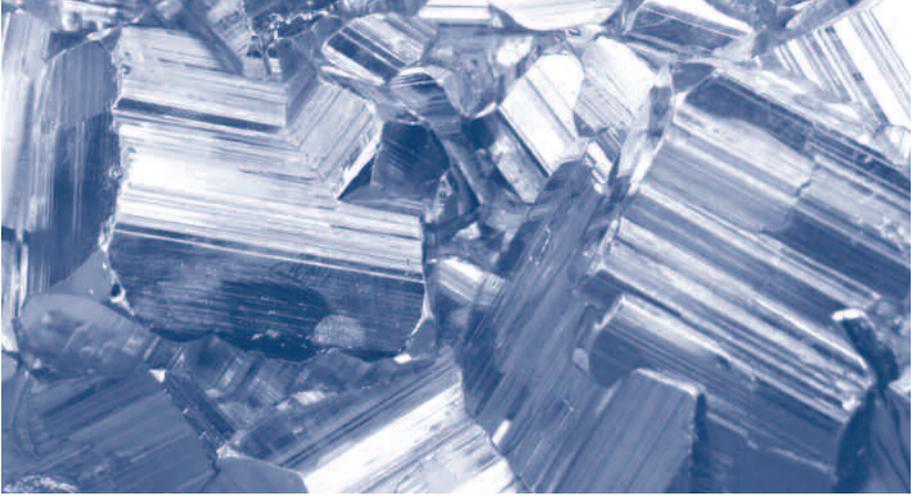
*“Achieving sustainable development is perhaps one of the most difficult and one of the most pressing goals we face.”*

**Mostafa Tolba**, Chairman of the UN Commission on Sustainable Development

A central parameter in the sustainability of the whole cleaning life-cycle is performance - how successfully the product delivers what the consumer expects and how much needs to be used to do that. Dosage drives every other aspect of the sustainability equation - dosing more simply uses more resources and creates more waste. While both natural and man-made substances have a part to play in sustainable cleaning, many man-made ingredients were developed specifically to be better performing versions of 'natural' ones.

### **Subjective assumptions must not cloud our judgement**

Consumers will make choices and demands according to their values and beliefs, and manufacturers must meet those needs. But popular assertions and assumptions about 'natural' must not be allowed to cloud judgement or compromise progress, beyond the constant assurance of safety, towards long-term sustainability. To this, cleaning products manufacturers are completely committed.



*An enthusiasm for all things 'natural' is a defining trend of our time.*

# Introduction – Our natural expectations

An enthusiasm for all things 'natural' is a defining trend of our time and natural approaches and products now seem to be advocated or offered in almost every field of human activity. But what exactly do people believe 'natural' things or approaches will do for them, for humankind, or for the planet?

## The many meanings of natural

One dictionary definition of "natural", for example, starts with: "pertaining to, produced by or according to nature". Straightforward enough, though whether something is "according to nature" can clearly be a more subjective judgment than whether something – a mineral or a plant perhaps – is "produced by nature". Implicitly, the opposite, "non-natural" (not to say unnatural) becomes something which is outside nature, and out of step with, or even working against, nature.

The dictionary goes on: "not the work of man", such that natural becomes the opposite of man-made. Man-made can be thought of as a triumph of technology, or it can be regarded as artificial, synthetic, ersatz, a substitute, not the real thing, such that 'natural' by contrast acquires connotations of superior quality, value, acceptability and so on.

*The expectations people come to have of natural things are both diverse and substantial, and tend to reflect values and beliefs as much as hard facts.*

'Man-made' also implies places for making – factories and industry, which to some will in turn imply pollution and corporations, even capitalism. Natural, by contrast, implies no such places for making and is perhaps seen as inherently small-scale, collaborative, communal and non-polluting.

Man-made is modern. For some people, 'natural' is post-modern, a move forward, while for others it is pre-modern, traditional, a move back to the good old days away from the angst and stress of the modern world. Man-made, the product of technology, is scientific and, some would say, reductionist, clinical. Natural, for them, becomes holistic, empathetic, and alternative.

## Not interfered with by man

The dictionary again: "not interfered with by man". It is hard to read this without sensing something not right, even danger, in that which has been "interfered" with. Sure enough, being 'man-made' is one of the top ten attributes that the public associate with increased risk. A risk from something man-made seems also to be less acceptable: when man-made things cause harm, there is someone to blame; natural things or events seem to be more easily accepted as fate, or 'acts of God'. The dictionary takes this even further: natural means "happening in the usual course, normal, kindly". Does this then engender the feeling that nature is beneficent and natural things are intrinsically safe?

While we do not derive our feelings from dictionaries, it is clear that the expectations people come to have of natural things are both diverse and substantial, and are regularly

attached to natural products or approaches of one type or another, sometimes explicitly, but often implicitly. Inevitably, in the absence of definitive explanation, people will tend to assume natural offerings will meet all these expectations, yet in how many cases are these realistic or even achievable? How many are only illusions?

Commercial enterprises need to understand these questions as much as anyone, for people are going to buy what they feel meets their needs and aspirations. Even in the prosaic world of cleaning and cleaning products, 'natural' is seen by a growing number of customers and consumers as a positive attribute, and can even become a specified characteristic for some organisational purchasers.

So, what can and does 'natural' mean in such a context? What expectations can it meet, what can it not? Sometimes might it even lay a false trail away from the fundamental aspirations that lie behind the enthusiasm for natural things?



*A preference for natural things might also be a question of trust.*

## Tangible benefits or feel-good factor?

In choosing 'natural' products, to what extent do people believe they are selecting something that has tangible superiority? Do they feel the product will be better in terms of performance, safety, environmental impact or aesthetics for example, or are they primarily buying something which they associate with a particular set of values, or which delivers some intangible 'feel-good' factor?

Take for example the tendency to associate man-made products with factories and 'industry'. In reality, any products produced for the mass market inevitably need factories. Even natural, wholly unprocessed products, need packing. Sometimes we call the places that produce natural products different things - dairies, rather than milk products factories; vineyards and wineries, rather than alcohol plants. These labels can certainly conjure up very different stereotypes - smoking chimneys, spewing waste pipes, urban ugliness, big business and downtrodden labour rather than rustic tradition and harmony. Some people may thus choose a 'natural' product because they feel it is somehow made in the 'right' way. A badly-run dairy, however, could well be worse in all aspects than a properly-run plastics plant - an unsafe product, creating damaging pollution, made in unsafe working conditions with little regard for social responsibility. Inevitably, mass production tends to mean bigger localised impacts, whether the product is 'natural' or not. If factories are an issue, does this mean that 'natural' products are inevitably going to be small-scale, and for niche or elite markets?

*Are people perhaps drawn to natural choices because, if things do go wrong, the harm is somehow easier to accept?*

A preference for natural things might also be a question of trust. If 'natural' things are 'not interfered with by man', is this about mistrust in the technology that produces man-made products? Is this mistrust in mankind's ability to design safe products, or mistrust in the priorities and motives of the people and corporations who make them?

This may be deeper still - not just a feeling that man-made things are more risky, but a philosophical or even religious persuasion that it is wrong, and asking for trouble, to interfere with the natural order of things. Yet the whole of mankind's progress from cave dwellers and hunter-gatherers, who lived short, squalid lives, wholly at the mercy of nature, has been achieved by interfering - by making tools, by learning how the world works and by learning how to shape and control it. Human health and life expectancy is at an all-time high, and still rising, so mankind's interference must surely be considered an overall success?

Ultimately, to what extent are people perhaps drawn to natural choices because, if things do go wrong, the harm is somehow easier to accept? Those who study the way we react and respond to risk, highlight that this is driven as much by the degree of 'outrage' - the sense of unacceptability of the risk - as by any objective assessment of its likelihood and potential consequences. People certainly seem more willing to live with natural risks, even when these are avoidable; witness the low level of concern or action about high levels of natural radon gas in houses which causes many cases of cancer. It would be interesting to know to what extent the aversion to vaccination is about the acceptability of damage caused by a man-made vaccine rather than a natural disease.



*Keeping ourselves, our clothes and our environment clean has become a benchmark of civilisation.*

# Natural approaches to cleaning

Keeping clean is a natural instinct for most animals. For we humans, keeping ourselves, our clothes and our environment clean – free from harmful, deleterious or undesirable organisms and substances – has become both a benchmark of civilisation and a cornerstone of our ever-increasing health and longevity.

The 'dirt' to be removed by cleaning generally comprises organic (i.e. carbon-based) matter and mineral soils, the microbes that live and breed in them, and the various stains and discolourations left behind. Normally, much of this dirt is sufficiently firmly attached to the body, to fabrics or other items that it cannot simply be shaken off or brushed away by mechanical action alone. Water helps, but it cannot on its own detach, dissolve or suspend most organic matter or soil so that it can be rinsed away: it needs the physical and chemical action of other substances, often with the aid of heat, to do this, and to break down or remove stains.

A key invention, around 5,000 years ago, was soap – a substance fortuitously formed by the chemical reaction of wood ash and animal fat. This first 'surface-active' agent or 'surfactant' was able to suspend both organic and mineral dirt in water. Today's soaps, detergents and cleaning products are still based around surfactants, but much improved. Modern products also contain a variety of other substances to remove stains, prevent yellowing, and help the surfactant do its job.

## The focus must be 'sustainability'

Today, however, the focus of cleaning product manufacturers has moved on beyond simply doing the job, and doing it well, to doing it sustainably. The new Charter for Sustainable Cleaning is not just about the sustainability of their products, from cradle to grave, but about the sustainability of the whole cleaning process. Improving sustainability thus means ensuring and constantly improving safety for those who make products, as well as those who use them and for the environment. It means reducing all other environmental impacts while maintaining and developing the societal benefits and economic contributions of the activity.

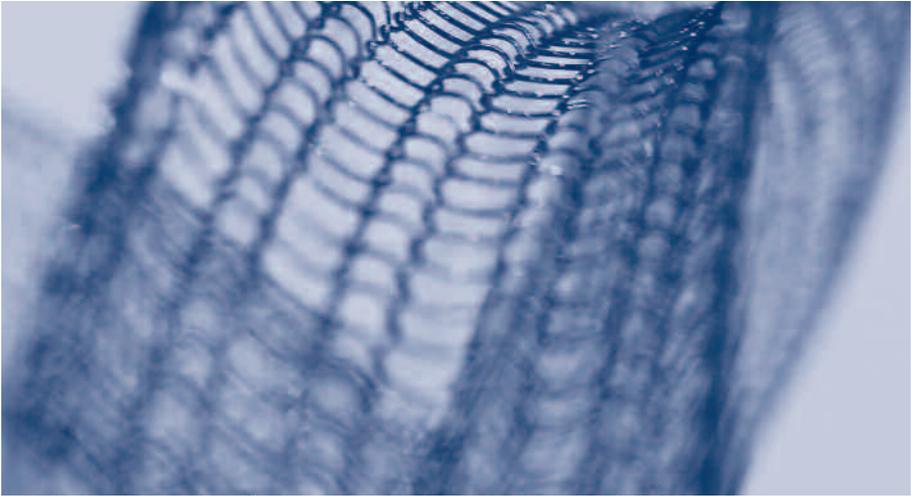
*The focus of cleaning product manufacturers has moved on beyond simply doing the job, and doing it well, to doing it sustainably.*

What contribution can 'natural' products and approaches make here? Do they inevitably help? Are natural things inherently more sustainable, or can they give illusions of progress while driving things in the wrong direction?

While safety must always remain assured, life-cycle assessments show that the major impacts of the cleaning process come from the resources consumed (in terms of ingredients, packaging, energy, and water) and from the amount of waste generated. The cleaning product itself must thus contribute not only in terms of being safe, but in terms of being effective and efficient. It must be well-designed to minimise resource use and waste per wash, and use appropriate ingredients and packaging materials that can themselves be produced and disposed of sustainably.

Ingredients that might be described as in one way or another 'natural' are frequently used in cleaning products. Sometimes the use of these ingredients is made the basis of describing the complete product as 'natural', or more natural, potentially engendering the whole range of expectations that can be associated with that word. What the expectations are will inevitably depend not only upon the presentation of the product, but upon the knowledge, beliefs and values of the customer. So, too, can the extent to which the customer feels the expectations are met, for example if the customer is primarily looking for 'feel-good' factors.

The extent to which such natural ingredients may help deliver the tangible benefits of safety and sustainability, will, however, depend upon the real, tangible, differences between the natural and man-made ingredients concerned. Understanding these is central to answering this question.



*"...the raw materials of a planet dropped from an unseen quarry, which the vast chemistry of nature would anon work up, or work down, into the smiling and verdant plains and valleys of earth."*

**Henry David Thoreau, Ecologist**

# The safety of natural and man-made ingredients

Instinctively, we feel that substances can be subdivided into those that are natural and those that are not. Surely, milk is made of wholly different stuff to polythene? In reality, of course, that's not the case. Not just these, but all substantive things, are made from the same, very limited, set of stuff - the atoms of the 90-odd chemical elements of which the whole earth and all living things are also made.

Polythene is a relatively simple substance, almost entirely composed of long chain molecules containing only carbon and hydrogen atoms. There are small amounts of other substances in polythene, added to make it stable for example. Milk on the other hand is a very complex mixture. It mainly comprises three different types of molecules - proteins, carbohydrates and fats - emulsified in water. Each of these contains carbon and hydrogen atoms, but also oxygen and sometimes nitrogen. The proteins, themselves long chain molecules, will also contain some phosphorus and sulphur atoms. Numerous other elements such as iron, zinc, cobalt and manganese also occur in vitamins, enzymes and other substances that are part of the whole, if rather variable, mixture we know as milk.

Now that we understand the structure of matter, all things can be described in this way, in terms of their chemical composition. We can even go a level down, to atomic physics, and discuss the composition of the atoms in terms of protons, electrons and neutrons. For living and once-living things we also can go a level up, and talk in biological terms of cells and membranes, organisms and animals.

When thinking of safety of substances and products, most harm arises from toxicity, from allergy or from infection. Toxicity and allergy are the products of chemical interaction - between the molecules in a substance and the molecules in the animal which is exposed. Infection arises initially from biological interaction, between one living thing - a microbe - and another, but in this case too the damage is done, ultimately, by a chemical interaction.

*All things are chemicals... That is not the way most people think of it though*

Perhaps it's not surprising then that we tend to associate toxicity with 'chemicals'? But what is a 'chemical'? Clearly, from a scientific viewpoint, all things are chemicals - arrangements of atoms and molecules that everything is made of. That is not the way most people think of it though. The dictionary once again gives some clues: chemical (adjective) relating to chemistry: (noun) a substance obtained by chemical means or used in chemical operations. Interestingly, the scientific dictionary contains no entry for a chemical as a thing, a noun, because all things are chemicals.

Since all things, ultimately, are the products of chemical reactions perhaps the key difference about a 'chemical' as the public sees it is that it is the product of human interference, of human directed chemistry. Does it all come down to trust again, that man-made chemicals are more risky because of the people, and corporations, who make them? What objective differences are there between natural and man-made chemicals?

One thing is clear: the toxicity and other potentially hazardous properties of any pure substance are totally independent of how it is made. Ethanol - alcohol - is just the same whether it is produced naturally when yeasts get to work on ripe berries in the autumn (and the robins get drunk); by people using 'natural' fermentation processes, as in brewing or winemaking; or by chemists using synthetic processes in a laboratory or factory. The molecules of ethanol are absolutely identical in each case. There aren't different natural atoms and synthetic atoms to make them of. Ethanol classically illustrates the fundamental law of toxicology that all substances are toxic depending on the dose, hence the mild psychoactive effects seen at low doses and the hangover if you overindulge. Chronic exposure by ingestion of high doses has demonstrable deleterious effects in humans, not least cirrhosis of the liver. It is a reproductive toxicant i.e. it can damage unborn babies if mothers drink it during pregnancy.

### Are impurities the difference?

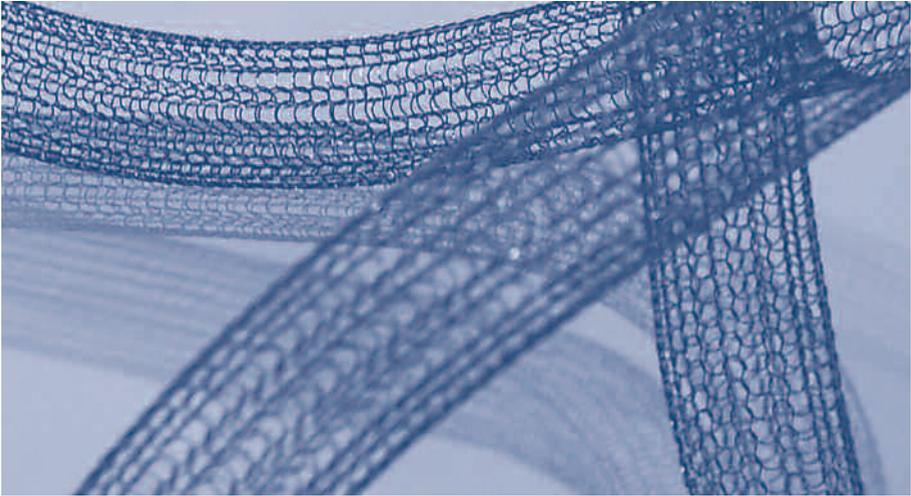
One potential difference between natural and man-made sources of the same substance, which could affect its safety, lies in the impurities that may be present. All substances contain impurities, and modern analytical techniques can find traces of most things in most things. Instinct might suggest that natural impurities are less likely to be harmful than impurities resulting from man-made chemistry, but the hard evidence doesn't back this up.

Of the millions of different chemical substances that have been isolated and characterised, those synthesised by chemists are not systematically more toxic than those synthesised by nature. The most toxic substance known is not "dioxin": it isn't even man-made. Currently, the 'most toxic' title probably goes to botulinus toxin, a natural chemical produced by *Clostridium botulinum* bacteria. And though there are man-made substances that nature doesn't seem to have made - xenobiotics as they are sometimes collectively described - there are many more natural chemicals that humans haven't yet succeeded in making.

Whether substances are taken from nature, from fermentation vats, or from chemical reactors, they invariably contain impurities, and need purifying. Crude products from nature are generally much more complex mixtures than those produced synthetically, and we often know much less about what the individual substances present are, and what their hazards are. This is even true of things we eat and drink: roasted coffee for example contains over 1000 different identified substances. Of the few dozen components that have been tested on animals for potential to cause cancer, two-thirds test positive.

Does this matter? We know coffee is safe, don't we? It certainly seems we're comfortable about that as coffee continues to be drunk worldwide in great quantities. Are we comfortable because we can see that tested repeatedly on the people who drink it everyday, there is no evidence it brings higher cancer rates, or do we simply trust it because it's natural? Yet how natural is it? Roasting coffee sets off a lot of complex chemical reactions on the original constituents of the bean, and comparatively ill-understood chemistry at that. Does our comfort thus come from the fact that it is somehow a 'traditional', if not a 'natural', process, or that it doesn't take place in a factory - at least not a chemical factory?

The upshot of all this is that we cannot predict whether a product is going to be safe, or not, or even more likely to be safe, simply by asking whether it is 'natural' or whether its ingredients are 'natural'. That can only be determined systematically.



*“Next time somebody tells you that something is true, why not say to them: “What kind of evidence is there for that?”*

**Richard Dawkins**, Oxford University.

# Safety for the environment

Our instincts would similarly suggest that natural substances would be safe for the environment and its animals, plants, and eco-systems, since that's where natural substances come from. Again, these instincts aren't borne out by the evidence: nature produces many substances that are highly toxic to various forms of life. Pyrethrum, from chrysanthemums, and rotenone, from the roots of certain plants of the pea family, are highly toxic to both insects and fish. Many metals, which all occur in the earth, are highly toxic to many animals, even if some are at the same time essential in low doses for their life.

Potential for environmental harm depends not only on toxicity, but on two other key characteristics. The first is (bio)degradability, the ease with which a substance is broken down in the environment, by the action of microbes or otherwise. While man-made substances and products have sometimes been designed to be highly stable, so as to be durable and long lasting (PVC for example), and are thus very slow to break down in the environment, this is not in any way an intrinsic feature of man-made molecules. The semi-precious stone amber, for example, comes from plants (it is a fossilised tree resin) yet it is so resistant to degradation in the environment that it has survived for millions of years and washes up on beaches to this day. Man-made substances can be just as degradable as natural substances - it all depends how you design them.

The second factor is bioaccumulation, the extent to which the substance might concentrate or build up in environmental organisms - birds, fish and people for example. This depends on the extent to which a substance dissolves in oil or fat in preference to water - its lipophilicity - and on the ease with it can be metabolised - broken down - and/or excreted by the organism concerned.

Nature is full of highly lipophilic substances, not least the natural oils and fats that are key components of plants and animals alike. Many man-made substances are lipophilic too, and so will be detectable in fish or animals which have come into contact with them. Substances only build up in the body if they are being absorbed faster than they are being broken down or excreted. While it often takes modern analytical techniques capable of finding one drop of gin in a train of rail tankers of tonic to find these things, the effect is sometimes strikingly visible. For example if people consume excessive quantities of carrot juice, the natural yellow carotene pigment is only slowly metabolised in the body so the excess is deposited in the tissues and the skin turns orange. Whether it is doing any harm by being there is a separate question of course.

Man-made substances are not intrinsically more likely to bioaccumulate than natural ones, though some lipophilic, man-made substances that were designed to be highly stable, such as PCBs (polychlorinated biphenyls) and some chlorinated pesticides, have become a concern because they are lost from the body only extremely slowly. Dioxins have caused similar concern, and they are also highly toxic, but they are produced naturally in forest fires, as well as being unwanted trace by-products of certain chemical reactions. Now that industrial emissions have been dramatically reduced, the age-old processes of burning wood, coal and rubbish, and cremating people, have become some of the largest remaining sources.

Natural substances can thus not sensibly be said to be intrinsically safer for the environment than man-made ones: there are highly hazardous as well as innocuous examples of each. But can natural substances be more sustainable? One important consideration here is that plant-derived raw materials, for example, are potentially renewable whereas reserves of petroleum materials are essentially finite (at least in the short term). This, and other factors which influence sustainability, need to be considered in relation to specific products and their uses.



*“We must learn what sustainability means in practice if we are to apply it to our daily lives and restore the health and vitality of our planet.”* **Sir David Attenborough**

# Natural products and sustainable cleaning

The sustainability of the basic human need for getting things clean revolves not only around the raw materials, finished ingredients and packaging used to make and deliver the products, but also around the energy and water used, and waste created, across the whole life-cycle.

While in one sense all raw materials are natural in that even crude petroleum and natural gas were created by natural processes without human intervention, plant-based materials and natural minerals have also been used to make cleaning products for centuries, and continue to be to this day.

One important use of plant-based material is to form the long chains of carbon atoms which are part of all surfactant molecules. Mostly, chains ranging from 10 to 18 carbon atoms are needed, though other lengths bring subtle differences to molecules and have some specialist uses. Such chains occur in the molecules of various natural fats and oils, including palm and coconut oils for example, as well as animal fat in the form of tallow. The fats cannot be used unmodified - try washing your shirt with cooking oil. The chains have first to be cut free, for example from the glycerine molecules to which they are commonly attached in fats, and then reattached to a group of atoms that makes them work as a surfactant. Alternatively, the chains can be made from petroleum by breaking up the carbon structures that make up crude oil and stitching them together again into straight chains of the desired length.

*'Natural' chemicals, even if renewable, are not necessarily more sustainable than synthetic ones since even renewable materials must be sustainably produced.*

Both ways of making surfactants - from plant oils or from petroleum - involve chemical processing, whether to cut free or to build up the carbon chains as may be, and then to stitch them to the other half of the surfactant molecule which itself must be chemically synthesised. To make some common types of surfactant, the chains themselves must also be chemically modified. While the carbon chains have for decades been referred to in the industry as 'natural' and 'synthetic' respectively, the finished surfactants are barely distinguishable. Certainly, neither is safer than the other.

## **Naturals are often renewable**

The one feature that could make the natural source more sustainable is that plant oils are renewable, whilst petroleum is not. Trees can be grown, and the oil harvested, indefinitely. But many other factors come into play here. Trees need land to grow and currently the parts of the world most suited to growing palms and coconuts, the tropical regions, are also home to precious rainforest. There is already concern that current demands for palm oil, only a minor percentage of which goes into cleaning products (most going for food), are being met unsustainably by clearing rainforest, and truly sustainable plantations need to be developed before use could be substantially expanded.

Many other factors affect the comparative sustainability of plant-based and petroleum-based surfactants, and weighing up the total picture including energy use during processing and transport, wastes and emissions shows there's currently little to choose between them. In the long run, renewable sources will have the edge, but they must be sustainably produced. Petroleum supplies are finite, but currently only 0.1% of global crude oil production goes into surfactants; less than 10% is harvested for its chemical structures; 90% is simply burned.

Recycling can also improve sustainability, provided the energy use and other inputs are not excessive. Currently, only one major detergent ingredient has real potential to be recycled, but plastic such as the polythene used in bottles and packaging is now recycled extensively. Packaging also makes extensive use of both plastic and fibre (for new cardboard) that has already been recycled. Natural and synthetic materials have no intrinsic difference in terms of recyclability.

### **Performance is the key**

One vital characteristic of a cleaning product that fundamentally affects sustainability is performance - how successfully the product delivers what the consumer expects and how much needs to be used to do that. Dosage drives every other aspect of the sustainability equation - dosing more just uses more resources and creates more waste. A poorly performing product doesn't just disappoint: it may lead to items, particularly clothes and fabrics, being discarded prematurely. Also, while a few consumers will accept below par performance, most will not and this may lead to overdosing. Poor performance thus directly undermines sustainability.

*Many man-made ingredients were developed specifically to be better performing versions of 'natural' ones*

While both natural and man-made substances have a part to play in sustainable cleaning, many man-made ingredients were developed specifically to be better performing versions of 'natural' ones. The modern surfactants that outperform and have replaced traditional soap in almost all applications are just one example. Enzymes, modified by biochemistry from naturally-occurring originals, to be stable inside a washing machine and work well at low temperatures, are another. These ingredients help improve sustainability by allowing very efficient cleaning, with reduced use of other ingredients, at low temperatures, which saves energy.



*"Frequently consider the connection of all things in the universe."* **Marcus Aurelius**

# Conclusions - Meeting our natural expectations

The expectations that can become attached to 'natural' products are many and varied. As these expectations will tend to reflect values and beliefs as much as hard facts, there will be many different sets of expectations among different groups of people. This disparity alone makes it unlikely that any product can ever meet the full range of expectations that different people may have of it.

Looking deeper, however, many people identify with 'natural' things because they see them as more likely to deliver tangible benefits, not least safety for users and for the environment. Increasingly, these benefits are seen as part of the wider, if less easily defined, benefit of sustainability on which, driven by concerns over planetary threats such as global warming, society is becoming focused as never before.

While nothing, natural or otherwise, is entirely without risk of course - even water - ensuring safety is a constant and dominant focus for the Cleaning Products Industry. It has been so for many decades, and the EU REACH (Registration, Evaluation and Authorisation of Chemicals) legislation should further reinforce this into the future.

Initiatives that help improve sustainability can also be traced back in the industry for a time that some may find surprising - well before the term was coined in the late 80s. Even then, important improvements by reducing dosing and packaging, by reducing wash temperatures and consigning the energy-profligate boil-wash to history were already in hand. In the late '90s, the AISE Code of Good Environmental Practice brought a focus to continue such advances across the whole industry. In 2004, there came a step change: the Charter for Sustainable Cleaning broadened this approach, setting the industry on a course of continuous improvement which holistically addresses each and every aspect of the life cycle of the whole cleaning process.

'Natural' ingredients and packaging materials are already an integral part of the industry's operations. They will surely be increasingly employed in the journey towards sustainability, though this will almost always be because of their potential as renewable resources than to improve safety. Ironically, the regulatory framework that ensures safety is much looser for 'natural' materials than for 'chemicals'. The hurdle 'natural' ingredients have to surmount is that of performance, for a poorly performing product tends to work against sustainability in the hands of all but the self-denying.

So, those who are attracted to natural products because they want their cleaning to be safe and sustainable are unlikely to be disappointed, whatever they buy. But what of the other attributes people see in natural products?

Those who prefer products supplied from small-scale, local operations that they see as far removed from factories, industries and corporations will simply exercise those choices. And so will those who prefer their products perfumed with plant extracts because they seem more pleasant to use. But those who think their cleaning can be done with something other than chemicals are destined for disappointment. Unless one goes back to banging clothes on rocks, which most modern clothing would not survive, other substances have to be used. Wherever the raw materials come from, they have to be chemically processed - interfered with - to make them work, and purified to ensure they are safe.

If some people feel uncomfortable with this, the root of the problem may be a lack of trust - a lack of confidence. While it is perhaps an inalienable part of our psychological make-up that natural risks seem more acceptable than man-made risks, the standards of safety are surely such that this should have no real bearing.

*Confusions and lack of confidence about natural or man-made products must not be allowed to divert attention from progress to a sustainable future.*

This lack of confidence does matter, however. Society needs to work in concert to build a sustainable future. Surprising though it may seem, sustainable cleaning really does have to be a partnership, between the people who make the products and those who use them. The plain fact is that however eco-efficient a product may be, much of its life-cycle impact is determined only at the moment it is used. Whether in the home or in community cleaning, using the right dosages, low temperatures and full loads makes or breaks the sustainability of the whole process.

This partnership is already being built. Natural substances have a role to play. But confusions and lack of confidence about natural or man-made products and ingredients must not be allowed to cloud issues and divert attention from progress, beyond the constant assurance of safety, to an increasingly sustainable future. Such issues need to be part of a widening dialogue between producers, users, stakeholders and communicators about how we jointly deliver sustainable cleaning.

# Notes

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The AISE Charter for Sustainable Cleaning launched in 2004 is a common, voluntary approach of the soaps, detergents and maintenance products industry, aiming to promote and demonstrate continual improvement in the industry's sustainability profile

