

FK Protect PlusTM



Film Forming
Protection

Keraplast

keraplast.com



Keratin is a natural wonder.

Keratin proteins are the building blocks of life and are vital to the biology and physiology of every animal on our planet.

Keratin is the key structural material making up hair, wool, feather, nails, horns and the outer layer of skin. It protects the surfaces of internal organs from damage or stress, and it is one of the toughest biological materials in the world.

Keratins play a physical role in maintaining cell structure as well as a biological role helping cells make a range of essential proteins for healthy skin structure.

Chinese herbalists have known about the beneficial properties of keratin for over 500 years, using a substance made from the ground ash of human hair to heal wounds and clot blood. But it wasn't until the 1930s that scientists demonstrated that there are actually many different types of keratin, with different molecular weights and different properties.

At Keraplast, we unlock the power of keratin proteins from regeneratively grown wool so that these can be redeployed as beneficial bioactive ingredients. Our proprietary Functional Keratin® technology platform has evolved from decades of scientific research, including over 20 years of fundamental and applied keratin science. We have the technological capability to accurately and skillfully recover a range of specific keratin proteins, with specific molecular weights, that have specific beneficial properties.

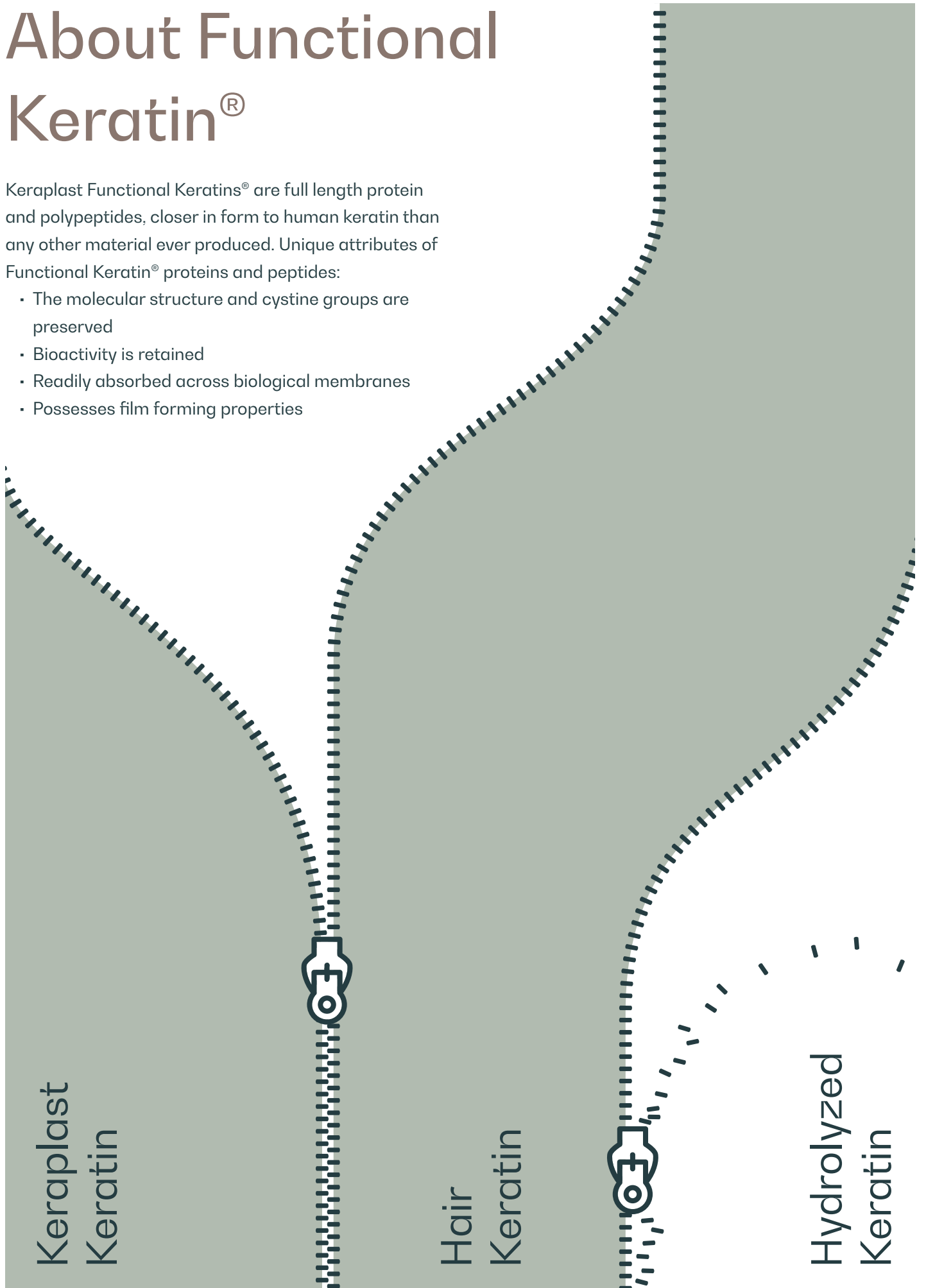
We are world experts in bioactive keratin recovery and formulation.



About Functional Keratin®

Keraplast Functional Keratins® are full length protein and polypeptides, closer in form to human keratin than any other material ever produced. Unique attributes of Functional Keratin® proteins and peptides:

- The molecular structure and cystine groups are preserved
- Bioactivity is retained
- Readily absorbed across biological membranes
- Possesses film forming properties



Keraplast
Keratin

Hair
Keratin

Hydrolyzed
Keratin



How Functional Keratin[®] Works

Functional Keratin[®] has high cystine content

- Strong homology with human keratin, a core component of skin
- Maintains structure of hair, nails and skin
- Repairs damage

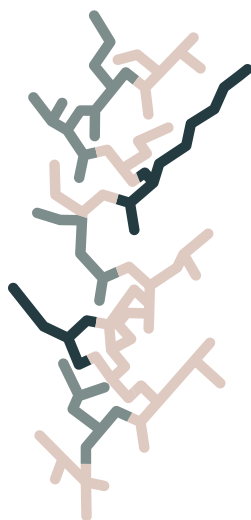
Functional Keratin[®] has specific amino acid sequences binding to hair strongly

- Similar to a zip structure
- Electrostatic bonding
- Hydrophilic and hydrophobic bonding

Superior to poorly functioning hydrolyzed keratin in the market Molecular Weight 1,000 Da (Peptide) to 60,000 Da (Film Former)

- Biological activity well established
- Anti-aging, anti-pollution activity well established
- Collagen production demonstrated
- Protects and controls the amino acid cystine

Functional Keratin

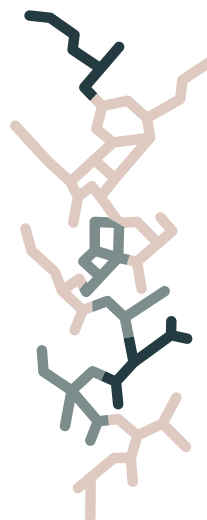


+ve to -ve

hydrophobic

+ve to δ -ve

Hair Keratin

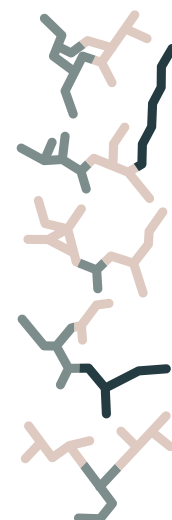


+ve to -ve
disrupted

weakened
hydrophobic

+ve to δ -ve
disrupted

Hydrolyzed Keratin





Functional Keratin® Vs Hydrolyzed Keratin Fragments

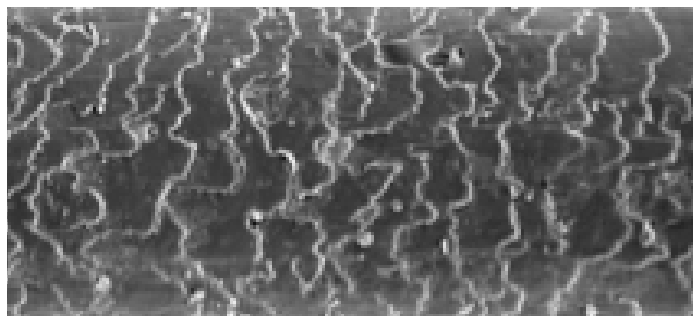
	Functional Keratin®	INCI Hydrolyzed Keratins
Functional Protein	Y	N
Proprietary amino acid sequences matched to skin structure	Y	N
Full length protein and peptides that form a sacrificial shield to prevent skin damage	Y	N
Stimulates mTOR pathway within cells, increasing synthesis of structural proteins	Y	N
Reduces redness associated with inflammation of sensitive skin	Y	N
Contains highly potent anti-oxidants to protect against pollutants and UV induced free radical damage	Y	N
Data showing quantitative and qualitative improvements in hair and skin	Y	N
Guaranteed sourced from pure NZ Wool, no harm to animals	Y	N
Patent protected	Y	N



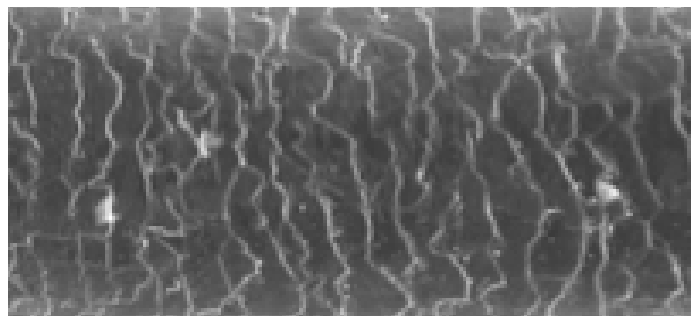
Shielding The Hair With A Sacrificial Layer

Keraplast FK Protect Plus™ is extracted from wool using a mild process which results in a high MW soluble keratin protein. This natural form of protein can arrange itself into stable, cohesive films on the hair taking advantage of three dimensional interactions of amino acids within the native protein chains.

FK Protect Plus™ has a strong antioxidant potential (222 micromol TEAC/100ml) arising from its unique active cystine component. The antioxidant activity enables it to scavenge free radicals at the point of formation. This protects against the force multiplying damage of UV combined with pollution.



Untreated hair fibre



Hair fibre treated with Keraplast FK Protect Plus™



Three Ways It Works

1

Keraplast FK Protect Plus™ forms a film over the hair to protect the fiber exterior from environmental aggressors such as pollution components and UV.

2

The film can seal in the moisture of healthy hair, locking in its natural water content and retaining flexibility.

3

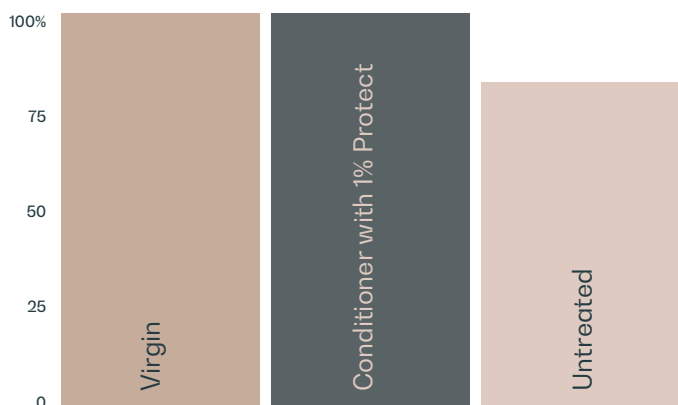
The fiber surface is smoothed by addition of a continuous, glossy protein layer conveying conditioning benefits.



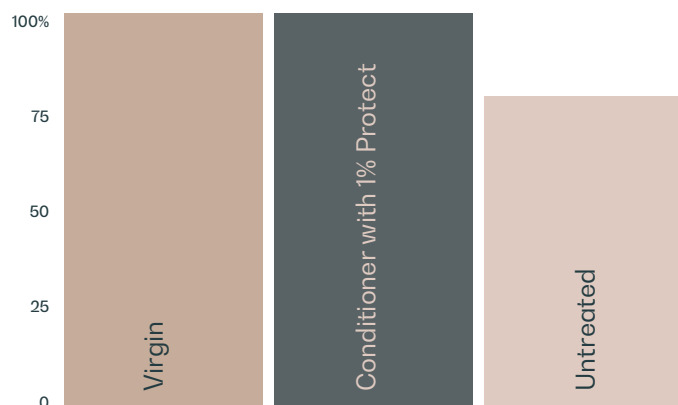
FK Protect Plus™ Mechanism Of Action

- Scavenging of radicals through interaction with the sulfur amino acid cystine
- Naturally high cystine content (4.3 mol%)
- Combined with film forming ability of the high molecular weight intermediate filament proteins
- This scavenging ability is central to the sacrificial shield effect.

Keraplast FK Protect Plus™ has shown to protect against key pollutants and cigarette smoke



Sulfur Dioxide



Ozone

20%

Improvement in hair surface health exposed to SO₂, compared to no treatment

25%

Improvement in hair surface health exposed to O₃ compared to no treatment



Mechanism of Protection

The film forming and excellent substantivity of the high molecular weight keratin creates a cohesive and continuous film on the hair. It acts like a galvanizing agent forming a reactive protective layer. The high natural cystine content allows it to quench free radicals caused by pollution and UV before they propagate.

Key Claims

Adding Keraplast FK Protect Plus™ at a level of 2.5% into Shampoo and Conditioner has been shown to

- Prevent pollution damage
- Protect the hair
- 36% improvement in shine
- Improve condition
- 67% prevention of color fade



Protection against pollution & PM2.5 & PM10

FK Protect Plus™ keratin protein layer protects the hair when applied prior to exposure to pollution. Cigarette smoke contains a wide range of harmful chemicals including heavy metals, formaldehyde and particulates.

It is therefore a very good test for how hair responds to airborne pollution.

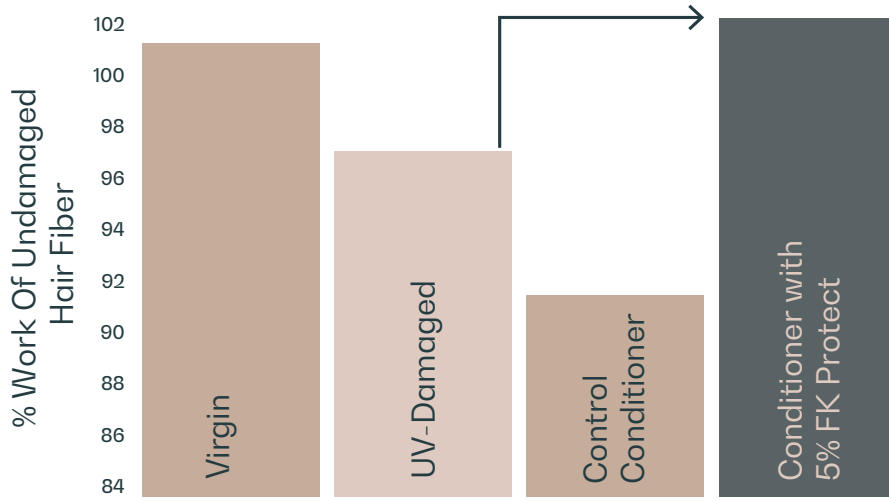
Results show significantly more healthy hair when FK Protect Plus™ is used prior to exposure.

The presence of PM2.5 and PM10 in urban areas is a serious problem. These particulates deliver harmful heavy metals and PAHs to the surface of the hair and skin. FK Protect Plus™ anti-pollution efficacy originates from its radical scavenging ability arising from its naturally high cysteine component (222umol TEAC/100ml).



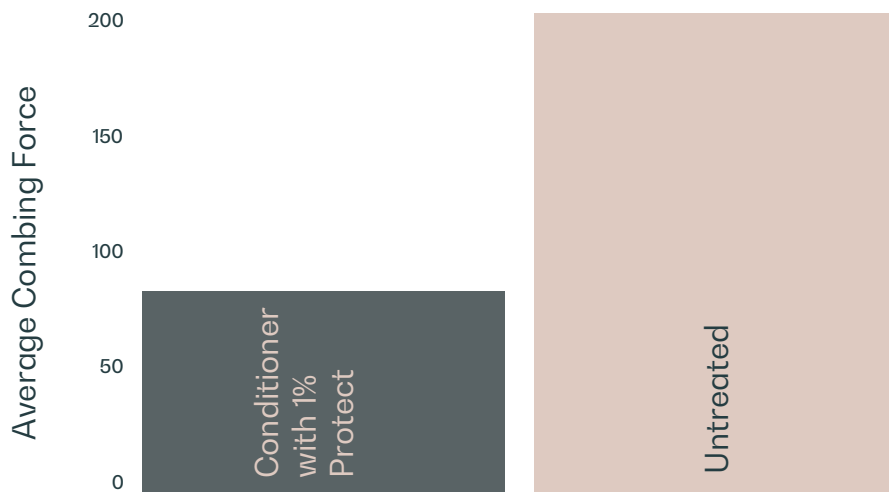
Keraplast FK Protect Plus™ – galvanizing agent for the hair

Function	FK Protect Plus™ contains high molecular weight Functional Keratin® to shield and protect the hair from environmental aggressions such as UV and pollution. The film locks in moisture and conditions the hair.
Composition	Intermediate filament protein + medium and low molecular weight hydrolyzed keratins.
Physical Form	Pale yellow to light brown semi-viscous liquid.
Inci Name	Aqua (and) Keratin (and) Hydrolyzed Keratin (and) Oxidized Keratin.
Applications	Shampoos, conditioners, styling products and intensive/post-chemical treatments.
Formulations	Can be formulated into a broad range of hair care systems. Some care required in combination with cationic species. Higher pH is preferred at high inclusion levels.
Typical Usage Levels	0.5 - 5.0% as supplied.



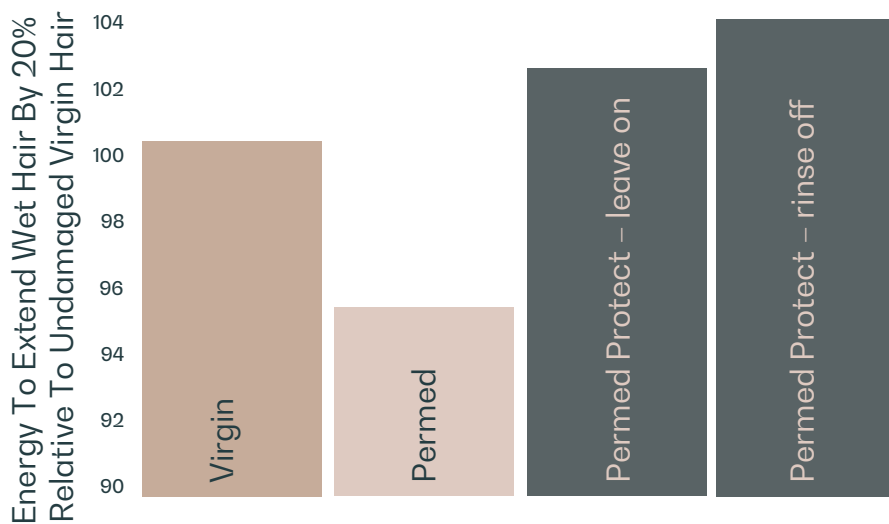
Energy to Extend Hair UV Protection

Mechanical properties maintained when Protect is applied to hair prior to UV exposure to sunlight.



Combing Force Smoking

62% easier to comb following exposure to cigarette smoke compared to no treatment



Energy to Extend Hair Perming Hair

About Keraplast

Keraplast is a world-leading biotechnology company. We recover bioactive keratin proteins from regeneratively farmed New Zealand wool and blend these bioactive proteins together to create unique, branded ingredients that are used in the world's leading beauty and personal care products.

We approach the future curiously, pushing ourselves forward whilst contributing to something larger than ourselves. Something that truly matters. Enhancing the future of food and wellness.

We have a long-term vision to be a regenerative business, giving back more than we take. Our ambition is to propel the company beyond sustainability and into regeneration: shifting from a business that “does less harm” into a business that “does more good”.

We know that this will be hard, but we also know that this is right. We are up for the challenge



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