SIGMA22

THE SIGNATURE MAGAZINE. YOUR RELIABLE SOURCE WHEN IT COMES TO HEMP.

HEMP-BASED MEAT

Discover the possibilities of hemp protein in the development of sustainable meat alternatives.

P. 10

HEMPSEEDS

SUSTAINABLE SUPERFOOD

Hempseeds are super nourishing and a healthy basis for the food of tomorrow.

P. 34

WHITE LABEL

PERSONALISED PRODUCTS

Engage your customers with the power of custom branded products.

P. 48

VAPE

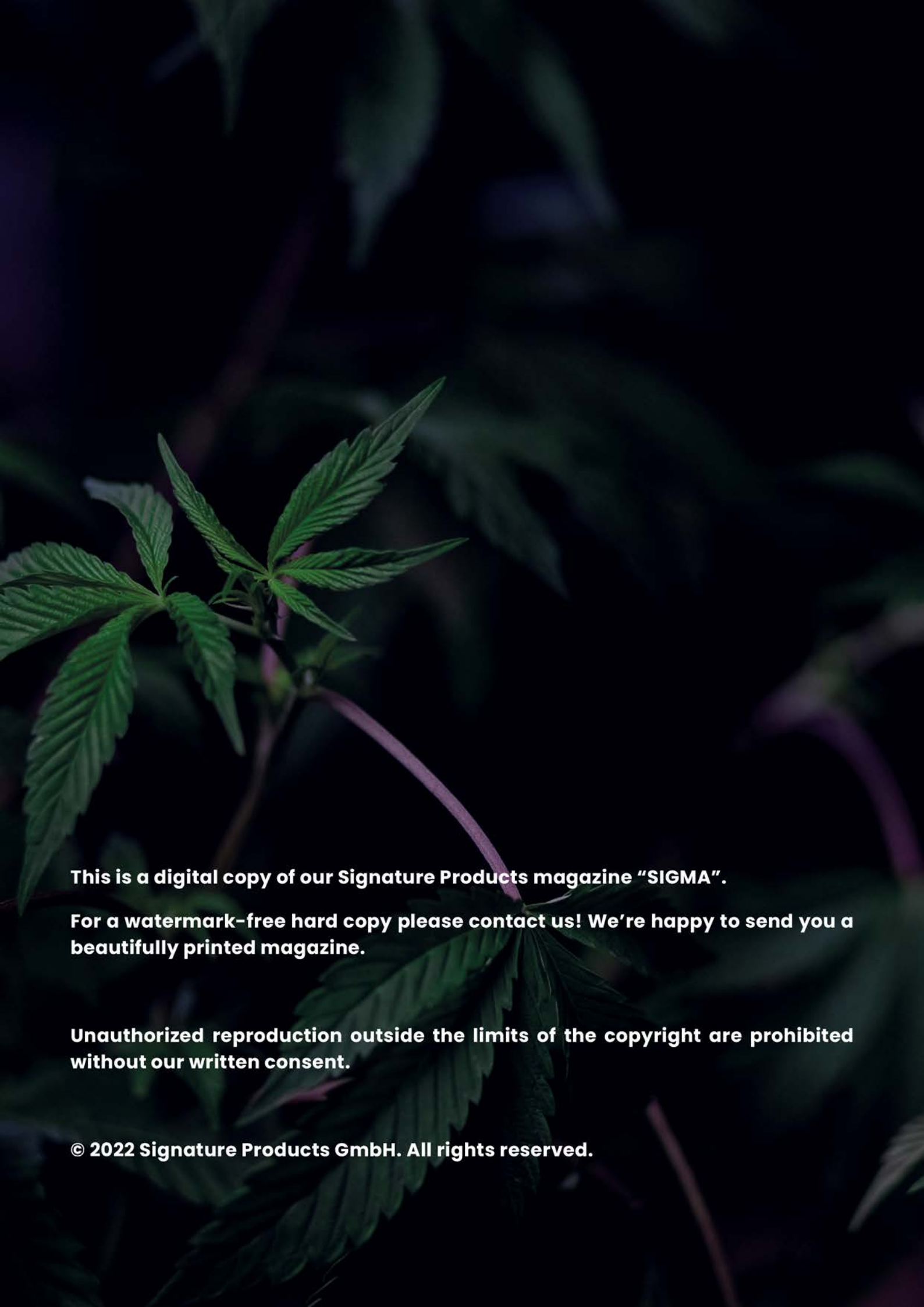
CLEAN CERAMICS

How top quality and safety can be achieved through ceramic heating elements.

P. 54

Signature Products

SIGNATURE PRODUCTS GMBH
KLUMPENSEE 2 | 75177 PFORZHEIM | GERMANY
WWW.SIGNATURE-PRODUCTS.COM



This is a digital copy of our Signature Products magazine “SIGMA”.

For a watermark-free hard copy please contact us! We’re happy to send you a beautifully printed magazine.

Unauthorized reproduction outside the limits of the copyright are prohibited without our written consent.

© 2022 Signature Products GmbH. All rights reserved.

BUILDING THE HEMP MARKET OF TOMORROW

CONTENTS

ABOUT SIGNATURE

Get to know the origin story and the team of Signature Products. Learn about the vision that connects us all and our mission as a hemp supplier. Sustainability and engagement are of utmost importance to us. Read about our engagements and our newest project: the development of hemp-based meat alternatives.

04

HEMP

Dive into a short history of hemp. Starting in Ancient China until today. Discover the many uses of the allrounder hemp and its parts, learn how to cultivate hemp, and get to know some of the most famous hemp varieties.

12

CANNABINOIDS

Who hasn't heard of THC or CBD? But do you also know about CBG, CBN, and their siblings? Get an introduction to cannabinoids and their effect on the human body. After reading this, you'll also know the difference between full-spectrum and broad-spectrum.

20

In this section, you will get to learn about the raw and purest forms of the hemp plant. Raw hemp can come either freshly cut from the field in the form of biomass, stems, fibres, and flowers or dried and pressed into the form of hemp pellets. Depending on their pocessing, the raw materials can be used in many ways, e.g., animal food, heating material etc.

RAW MATERIALS

26

Hemp contains a lot of valuable ingredients such as terpenes and cannabinoids. In this chapter, you will learn the specifics of different hemp extracts and their refinement into distillates and isolates. As cannabinoids are not water-soulble by nature, we'll explain you the process of how cannabinoids can be processed to be soluble in water.

HEMP EXTRACTS

27

Hemp is a valuable source of protein, fat, and fibre as well as other nutritional ingredients. Thus, it finds many applications in the food industry in the form of hempseeds, hemp protein, and hemp oil. Learn more about hemp's nutritional values, the production and quality control processes, and try out some of our Signature recipes.

FOODS

33

48

WHITE & PRIVATE LABEL

Through custom branded products, you can directly engage your customers and drive more awareness for your brand. We show you the advantages of having your own brand and give you a glimpse into our whitelabel process.

56

SERVICES

In addition to our products we offer a wide range of supplementary services and on-demand processing. Whether you're a farmer wanting to extract and/or distill your own biomass or a merchant wanting to register and certify your products as cosmetics or organic. We are always happy to help and support you.

69

CONTACT

If you still have questions or simply want to get in touch with us, you can find the right contact person for your inquiry here.

ABOUT SIGNATURE

Hi, my name is Florian Pichlmaier, the founder and CEO of Signature Products. I want to tell you a short story about me and how Signature Products started.

I was born and raised near Pforzheim, a city in Germany formerly known for its flourishing jewellery industry. Sadly it has long lost its shine due to the wars and industrial crisis. I spent the first 24 years of my life living there, until I finished my bachelor's in business law at the local university. For my master's of law degree, I moved to Chester, England, where I discovered my passion for start-ups and venture capital. Besides attending lectures and studying in the library, I played in the university's rugby team and made a lot of new friends.

One of those friends moved to Phoenix, Nevada, and in 2017, I visited him there. I have sleep problems on long-haul flights (like this flight to the USA). As it turned out, his job was quite stressful and he had just recently tried a CBD oil that he got from a co-worker. He absolutely loved it as it gave him a clear mind. The more I started reading about hemp, and the more I learned from my friend, I slowly discovered the awesomeness of the hemp plant. I was surprised how such a sustainable and multi-purpose plant could have gotten such a bad reputation. The same evening, I tried out CBD oil myself. In the beginning, I was still a bit anxious, but after a short time, I started feeling relaxed. The many thoughts that usually rush through my head started to calm down. I was fascinated and bought some oil for my flight home.

Florian Pichlmaier,
CEO & Co-Founder of Signature Products

Since then I had been using CBD oil to help me concentrate during my lectures and in stressful situations.

I finished my studies and joined KPMG in consulting startups and venture capitals. This job included lots of hard work and commitment, but I still loved it because it fulfilled my constant desire to learn more and dive deeper into the world of business. My new and loyal companion, CBD, was always by my side. I told my colleagues about CBD and why I use it, and they got interested in the "mysterious" oil. After I told them about CBD and how it helps me, they asked me where to get it from. At this moment, I realized that there wasn't really a market for quality hemp and CBD products in Germany yet. I gave samples of CBD oils to a lot of family members, friends, and colleagues. One day, a friend told me how the oil I gave him improved and changed his life, and I felt the urge to do something.

It became clear to me that Germany needed to learn about the greatness of the hemp plant and I reached out to a friend of mine, Tobias, who I knew was always eager to bootstrap a startup. In the beginning, we stumbled upon a few

hurdles when it came to producing and selling the products. Fortunately we soon found passionate people who supported us. While building our company from scratch, I learned more and more about hemp and discovered all it's different applications.

From the beginning, our vision was to provide people with sustainable, high-quality and affordable products that would improve their lives, like the oil once did with mine. Because of this goal, we are not focused on maximising profits or keeping all our knowledge to ourselves. We even decided to share our knowledge with others and help them build their own companies and brands. We support our private label customers and prevent them from making the same mistakes we did in the beginning. It feels awesome to see how the German market started to grow and how, through competition, the prices are getting more and more affordable for everyone.

Does my journey end here? Goal achieved? No! In my opinion, CBD was just a door opener. It started to open the minds of people again, letting them rethink the prejudice they have had about hemp.

My team and I are now on to a new mission. With state funding, we want to solve a part of the world's food problem. Of course, with the help of hemp. The production of conventional meat does not scale up well with the world's increasing population. Current plant-based alternatives on the market are often not very environmentally friendly. We aim to develop a regional hemp value chain and produce the sustainable and nutritional food of the future.

I'm looking forward to all the challenges this new project brings to us and all the new connections and knowledge we can gain from it. I'm proud of all the work my team has done so far and will continue to do in the future. ■

Pforzheim, Germany
Hometown of Signature Products

OUR PHILOSOPHY

Our work as an independent wholesaler is always accompanied and shaped by our vision to improve people's health with regional hemp products. We strive to become the largest and most sustainable hemp supplier in Europe, and to reach this goal, our team works hard every single day. Our most important values in this process are fairness, transparency, sustainability, and offering the highest quality for our products. In order to follow these priorities, every employee and supplier along our value chain is paid and treated fairly. We analyse each of our products for internally defined quality parameters, document all steps of our value chain, and rely on strict quality controls and their implementation. In order to guarantee our customers the highest quality of our products, we only work with the best and most sustainable partners in the industry.

To ensure the sustainability of our products, we leave no stone unturned. We support projects like DHL GoGreen, Too Good To Go, and the Eden Reforestation Project, among others. We never lose sight of our goal to be CO_2-neutral or even negative. For more information on our climate and sustainability commitment, see the next section, "Sustainability".

Since people's health and conservation always play an important role in our company, we accept higher financial costs without hesitation. In this sense, we pay attention to regional and organic cultivation for our hemp seeds and hemp protein, and are also certified organic by EU standards.

Although the hemp plant is already several thousand years old, the products derived from it are still young in our market. We have made it our task to educate people about hemp and its health-promoting properties. At the same time we aim to establish high quality standards on the market. To this end, we have initiated an uncompromising exchange with politicians, consumers, and industries of all kinds.

With our products, it's all "Made in Germany". Since we build and observe the entire value chain of our items, from the raw hemp material to the finished product, we can offer our customers quality of the highest level. At every step during production, we know exactly what the product is made of and under what conditions it was produced. In this sense, we are liable for the quality of our products and assume all responsibility for the products we sell. ■

SUSTAINABILITY

Sustainability and the fight against climate change have the highest priority for us and thus has an affect on all areas of our company. We do not simply rely on the fact that the hemp plant itself is extremely sustainable (one tonne of hemp can absorb 1.6 tonnes of CO_2). We aim to compensate for every gram of CO_2 produced along our value chain.

At Signature, we always try to work and manufacture in a way that conserves resources as much as possible. Thus we expect a high level of climate commitment from every single one of our cooperation partners. Through our initiatives and our commitment, we ensure a greener and more sustainable value chain and do our best to leave future generations a planet as diverse as the one we experience every day.

With the goal of CO_2 negativity in mind, we send our parcels nationally and internationally in a climate-neutral way with DHL GoGreen. The principle here is that DHL measures the average CO_2 emissions and offsets them through climate protection projects.

In cooperation with the Eden Reforestation Project, we plant a tree for every product sold. These projects support reforestation in various countries, for example Madagascar, Kenya, and Brazil. It also helps provide fair and stable jobs and consequently a steady income for the local population, who often live under poor conditions.

edenprojects.org
PLANT TREES | SAVE LIVES

When the best-before date of the CBD oils of our market research brand BUDDY is approaching, we sell them on Too Good to Go. This is a platform where companies can advertise and sell, e.g., food that is about to expire at a lower price. By doing so, we avoid products going to waste that can still be used and enjoyed without worries. From a customer's perspective, they receive a heavily discounted yet still high-quality product.

Too Good To Go

We provide farmers with the leftovers of extracted hemp to use as animal feed. Therefore closing the cycle of our value chain and reducing the leftovers of our production to a minimum.

THE SIGNATURE FAMILY

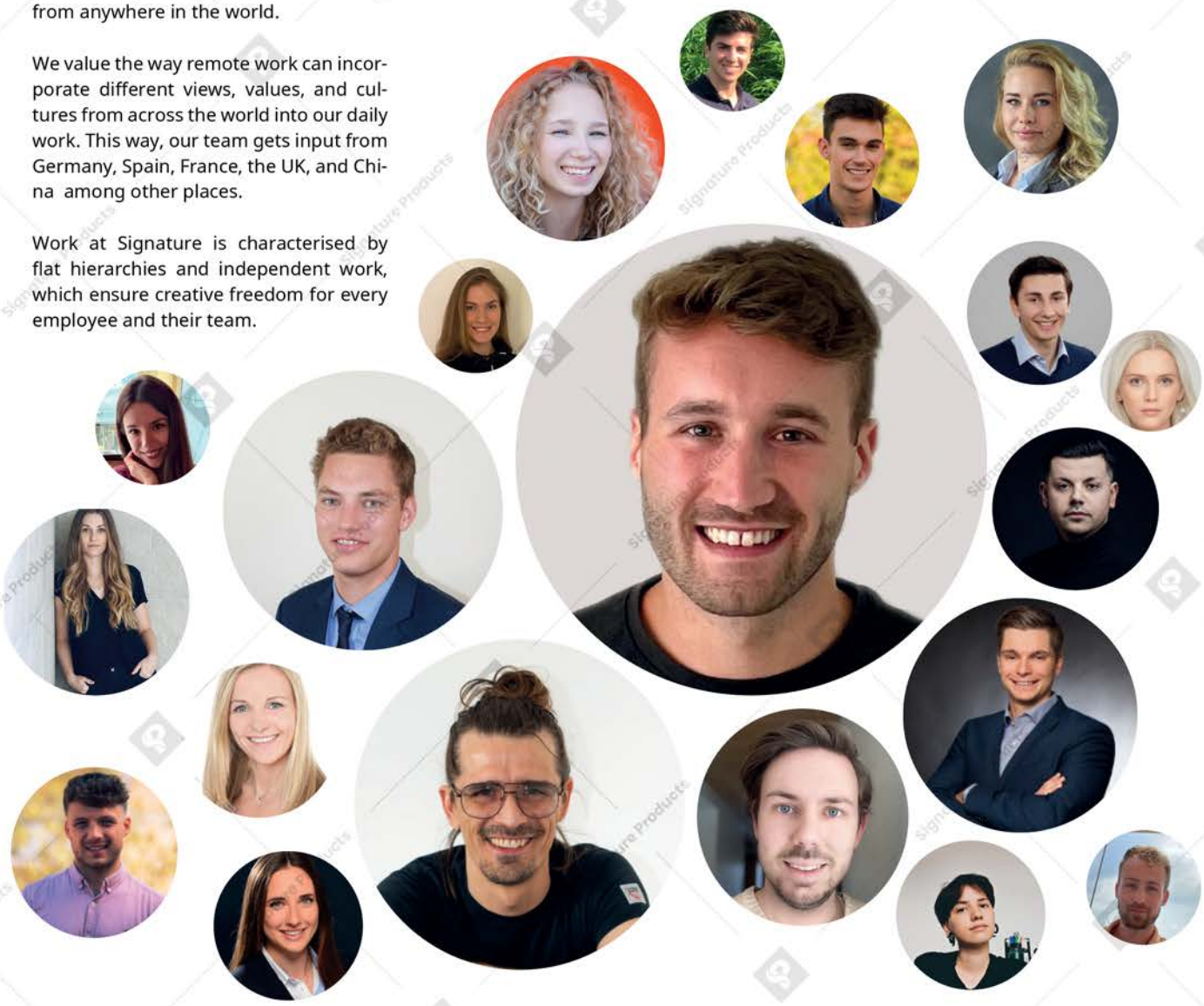
Signature Products was founded in 2019 by Florian and Tobias in Pforzheim, Germany, and our team has now grown to more than 20 employees. Coming from a wide range of industries, such as business law, automotive industry suppliers, IT, and marketing, our creative minds work every day for more well-being in our society. What makes us special is our average young age of around 26 and the possibility to work remotely, from anywhere in the world.

We value the way remote work can incorporate different views, values, and cultures from across the world into our daily work. This way, our team gets input from Germany, Spain, France, the UK, and China among other places.

Work at Signature is characterised by flat hierarchies and independent work, which ensure creative freedom for every employee and their team.

Since we mainly work together digitally, our main challenge is not to neglect interpersonal relations. We make up for this during our regular team events home and abroad.

With industry experts and a lot of unique talents spread across the team, we also organise regular in-house education events and one-on-one mentoring to continuously improve the skills and knowledge of all our employees. We are proud that every single one of our employees is dedicated to what he or she does and value the opinion of every single member of the team. It doesn't matter if you are a working student or executive, everyone's voice matters. ■



OUR COMMITMENT

Our commitment has many different facets. We support a variety of regional, national, and international projects and organisations that aim to reach sustainable goals and improve the hemp market of the future.

EUROPEAN INDUSTRIAL HEMP ASSOCIATION

In the political field, we represent the interests of the German hemp sector at the European level in cooperation with the European Industrial Hemp Association. The EIHA is the only pan-European member organisation in the industrial hemp sector. It was founded 20 years ago with the intention of building a strong network of farmers, producers, and traders of hemp and hemp products in Europe. Inspired by the principle of social, environmental and economic sustainability, the organisation aims to develop a unified and safe common market for high-quality hemp products. Since EIHA also established its presence in Brussels in 2019, the team has been working to gain greater political representation. As a partner of the organisation, we at Signature Products do not only want to be a standard member and benefit from reliable information and the great work of the EIHA. Rather, we want to actively influence the development of the hemp sector through data provision, cooperation, manpower, and lobbying efforts.

DID YOU KNOW?

Our CEO Florian Pichlmaier is a board member of EIHA and supports them with his experience in the food market and the experience he gained working for the EU Commission in Brussels.

BRANCHENVERBAND CANNABISWIRTSCHAFT E.V.

For us, as a "Made in Germany" brand, it is obligatory to enter into a partnership with German companies and associations. We support regional and national associations and initiatives and have entered into a cooperation with the industry association Cannabiswirtschaft e.V. (BvCW). This association represents all industry segments and company sizes within the cannabis industry vis-à-vis politics and administration. It helps with the exchange of information and creates a variety of dialogue opportunities with political institutions, authorities, associations, and foreign representations in Germany. The BvCW has already been able to achieve first successes by exerting a positive influence on several law drafts and parliamentary enquiries.

DHL GOGREEN

In order to make our national and international shipping 100% climate-neutral, we ship our products in cooperation with DHL GoGreen. The parcel service DHL measures the average CO_2 emission for each shipment and offsets it with the help of global climate protection projects. In this way, we ensure a sustainable value chain including shipments and are committed to a green future. We also support the German Post's nationwide sustainability campaign.

ORGANIC CERTIFICATION

Signature Products was one of the first hemp companies in Europe to be certified organic. A product may only be labelled and sold with an organic seal if it can be ensured that it has been produced in accordance with EU organic farming legislation and that the certification chain has never been interrupted. This includes that every company involved in the value chain must also be certified organic itself. With our certification, we make our contribution to bringing better products and raw materials from controlled organic cultivation to the market. Accordingly, we can not only sell certified organic hemp seeds, hemp protein, hemp teas, etc., to customers, but also manufacture organic private-label products "Made in Germany".

OUR RESEARCH ON PLANT-BASED FOOD

Signature Products

UNIVERSITÄT HOHENHEIM

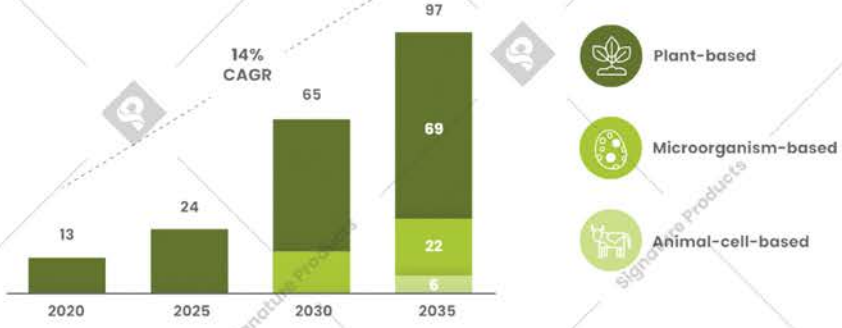
Bioökonomie Baden-Württemberg

Signature Products has received a commitment for a funding programme from the state of Baden-Württemberg for the development of a regional hemp protein value chain. As part of the Bioeconomy Innovation and Investment Programme for Rural Areas (BIPL BW), the Ministry for Rural Areas and Consumer Protection Baden-Württemberg (MLR) is funding the project valued at around 1 million euros. The University of Hohenheim, who is supporting us in the project, will receive about 365,000 euros. The research project now launched under the name TASTINO ("SchniTzel, Hanftofu, PASTa & Co aus dem Reallabor Hanf - proteINbasierte Lebensmittel aus regiOnalem Hanfanbau") complements the research in the area of use and suitability of hemp varieties grown regionally in Baden-Württemberg for the production of protein-rich food products.

The overall objective is to develop innovative processes, technologies, and recipes for the production of protein-rich foods such as tofu, pasta, plant-based meat, etc., from regionally grown hemp. Initially, we will test various business models under real conditions in the form of a so-called real-life laboratory and bring them to market maturity. In close cooperation with farmers, regional processors and representatives of the gastronomy and food retail trade (LEH) in Baden-Württemberg, we will then finally develop various food products based on hemp protein and make them available to the end consumer as regional products in the retail trade. The whole value chain from the raw product (hemp seeds) to the final product (food) will be grown, harvested, and processed in Baden-Württemberg.

With our hemp protein from Germany, we want to contribute to bringing sustainably produced food to the market and draw more attention to the versatility of the hemp plant. The project is intended to help close local material cycles and meet the strong demand for high-quality, protein-based, regionally produced food. In this way, we hope to make a decisive contribution to the future self-sufficiency of the population in Baden-Württemberg and to be able to create diverse, sustainable jobs in various sectors in the field of agriculture and food processing along the value chain.

Consumption of alternative proteins by protein source (million metric tons, base-case scenario)



What motivated us most to initiate this project was global problems such as the rising world population, increasing urbanisation, and the growing income level. These go directly hand in hand with an increasing demand for meat and other animal foods that is not sustainable. Poor dietary habits, irresponsible production patterns, and environmental pollution are some of the inherent problems. A global dietary shift with an increased focus on the intake of plant-based foods instead of animal-based foods could be an important key to improving human as well as planetary health.

More and more people are trying to avoid eating animal protein for health, environmental, and ethical reasons and are looking for alternative solutions with plant-based protein sources. However, the market for these meat substitutes is still relatively small. Currently, Europe, the leader in this sector, has a 40% share of the total global market for meat substitutes, and experts estimate that it will reach about €2.4 billion in 2025.

The hemp plant not only has great medicinal potential, but is increasingly becoming the focus of interest for the production of novel ecologically and sustainably produced, protein-rich foods. Despite its reputation, the intoxicating effect plays no role here: only industrial hemp varieties are grown in the fields of the Hohenheim experimental station Ihinger Hof near Renningen. These are practically free of the psychoactive substance THC.

Hemp-based burger patty as one of the researched plant-based meat alternatives of the TASTINO project.

Hemp seeds have up to 25 % protein, a concentration that is similar to that of egg white. They contain all essential amino acids and thus have a high biological value. In addition, the seeds are easily digestible and have a desirable, chewy, meat-like texture that creates the sensation of biting into meat in the mouth. Signature Products already supplies hemp seeds and hemp proteins to various major customers. Most products that are currently still made from soy or pea protein can also be produced from sustainable and regionally produced hemp proteins in the future. The price of hemp protein is already comparable to, e.g., that of soy. There are many reasons for supporters of the sustainable hemp plant to be optimistic about the future.

In the project, we are cooperating strongly in the area of research with the Institute of Crop Sciences at the University of Hohenheim. The university's Cultivation Systems and Modelling working group, headed by Prof. Dr. S. Graeff-Hönninger, has already been involved in researching various facets of the hemp plant for many years. They are currently researching around 20 hemp varieties on the experimental plots to determine which variety would be best suited for which end product. The research group is interested, e.g., in what the ideal cultivation conditions should be, whether the plants are susceptible to diseases or how high the yield is. They pay special attention to the composition of the seeds, especially their protein and oil concentration.

In the coming year, the area under cultivation is to be doubled, perhaps even tripled. In parallel, the researchers are also investigating social and economic sustainability, consumer acceptance of the products, and the possibilities for creating new jobs. Ultimately, their findings will lead to recommendations for political decision-makers.

Florian Pichlmaier (CEO of Signature Products) and Prof. Dr. Simone Graeff Höninger (University of Hohenheim) on location at the experimental hemp field of the University of Hohenheim in Baden-Württemberg.

Farmers, restaurateurs, or even supermarket operators from Baden-Württemberg who are interested in the project and would like to participate in our research efforts can contact the working group of the university directly. We are looking forward to this project in cooperation with the University of Hohenheim and want to be able to establish Hohenheim as a major hemp location and hope that our resulting delicious regional products will soon be available on the shelves of regional supermarkets. ■

CONTACT UNIVERSITY OF HOHENHEIM:

Apl. Prof. Dr. Simone Graeff-Hönninger
Universität Hohenheim - Arbeitsgruppe Anbausysteme und Modellierung

T +49 (0)711 459 22376
E simone.graeff@uni-hohenheim.de

HEMP

Everyone in the industry knows it: You get asked about your profession, and the answer “We work with hemp” is followed by irritated looks, a shocked expression, and the question: “Hemp? Isn’t that a drug? Isn’t that illegal?” Unfortunately, hemp has more and more fallen into disrepute in recent decades. A reputation that doesn’t do justice to this green all-rounder.

THE HISTORY OF HEMP

First mentions of the positive effect of hemp as a remedy can already be found in ancient texts. For example, in the "Shennong Bencaojing", a Chinese book on medicinal herbs written around 300 BC, there are descriptions of hemp as an active ingredient against malaria, rheumatism, and other diseases. Analyses of present-day hemp plants show a genetic relationship to wild Chinese hemp and suggest an origin of the hemp plant in Asia. Further research also suggests that the ancestors of our industrial hemp were deliberately bred and cultivated as early as 12,000 years ago.

But the hemp plant was not only known for its medicinal benefits in ancient times. The Greeks and Egyptians, in particular, made their clothing from hemp, which was even recorded by the Greek historian Herodot (ca. 450 BC). In addition to clothing, hemp also played an important role because of its strong fibres. It served as one of the most important raw materials in the construction of medieval weapons such as the longbow. Without the robustness that hemp fibres provided to the sinews of these bows, a longbow, which had to withstand draw forces of over 100 pounds, could not have existed at that time.

In the 13th century, hemp found another great use. Since wood was not used for papermaking at that time yet, hemp served as the most important raw material in papermaking. This even led to hemp becoming a witness to significant historical events in the form of hemp paper. The Gutenberg Bible, which was the first book printed with movable components by Johannes Gutenberg around 1453, was printed on hemp paper. The first drafts of the American Declaration of Independence were also probably written on hemp paper. This is hardly surprising since George Washington himself, one of the founding fathers of the USA, grew and traded hemp for its many uses.

Hemp's greatest success, however, was in sailing in the form of ropes and sails. It was precisely the high resistance and low water absorption of the fibres that enabled hemp to prevail over flax and cotton.

Sadly, due to the higher profitability of tobacco cultivation, the cultivation of hemp, especially in Germany, came to an almost complete standstill until the beginning of the First World War. During this time, hemp was rediscovered by the Allies as a raw material for the armaments industry.

In the post-war period, hemp temporarily slipped back into a niche, as it was displaced in many areas by other materials such as synthetic fibres in the textile industry. It is only in recent years that hemp has been experiencing a renaissance, and people are rediscovering the positive medicinal, nutritional, and structural properties of hemp. Hemp is now used as a building material, power food, medicine, and sustainable protein source in meat substitutes. Novel applications of hemp extracts as natural pesticides or pharmaceutical applications are also an active part of hemp research.

HEMP CULTIVATION

LOCATION

Hemp is generally not very demanding in terms of location. However, for good yields, soils that are too dense (e.g., heavy clay soils) or too loose (e.g., sandy soils) should be avoided. Lack of oxygen in the soil has a negative effect on hemp and leads to stunted growth. The pH value of the soil should be neutral to slightly alkaline. In order to cover hemp's nutrient requirements, legumes or clover grass, for example, can be used as a preceding crop. Thanks to its deep roots, which loosen the soil, and its weed-suppressing properties, hemp itself is also ideally suited as a preceding crop. The hemp plant also survives light frost.

SOWING

Only varieties from the EU industrial hemp catalogue may be cultivated. The seeds must be certified, and appropriate certificates must be presented during inspections. Before starting to sow hemp, one should decide on a focus. This can either be on hemp seeds and the oil they contain or on fibre hemp. Due to high transport costs, the latter is often only worthwhile if it is grown close to a processor. This focus limits the choice of variety. The specific variety and location then determine the time and quantity of sowing.

Depending on the variety, sowing then takes place between mid-March and early May, when the soil is dry and warm (above 8°C). Sowing is done with a drill at a depth of 2-6cm, depending on the firmness of the soil. As rapid longitudinal growth is desired when growing fibre hemp, it is planted more densely and requires about 55 to 70 kg of seed per hectare. For seed production, wider plants with stronger flowering are preferred, which require more distance from each other. Here, approx. 12-25 kg of seed per hectare are required.

CARE

Due to the rapid germination of the seeds, the soil is quickly shaded, especially with densely planted fibre hemp. This suppresses weed growth, and herbicides are not necessary. With less densely planted seed hemp, mechanical weed control may be necessary. Due to the terpenes contained in hemp, it has a natural defence against pests. For this reason, no pesticides are required. There is already initial research that uses hemp extracts containing terpenes as a natural pesticide. Thanks to its deep roots, some of which reach down to a depth of three metres, hemp also absorbs nutrients from deeper soil layers. Per hectare, hemp extracts about 80-120 kilograms of nitrogen from the soil. Since excessive nitrogen fertilisation does not lead to increased yields but to more susceptible plants, fertiliser should only be applied in doses after prior soil sampling. Organic fertilisation with liquid manure and dung fits well with the temporal needs of the plant due to the slow release of nitrogen.

HARVEST

The hemp harvest takes place with the help of special machines. For seed harvesting, the seeds are harvested in September using special combine harvesters. These only harvest the upper part of the plant because the more fibres are harvested, the more likely they are to wrap around the rotating parts and thus clog the machine. Under optimal conditions, up to two tonnes of hemp seeds can be harvested per hectare. Afterwards, the remaining fibrous stalks can also be harvested. Pure fibre hemp is already harvested at the end of July when it flowers. The hemp is cut close to the ground and left on the field to dry. This happens over a duration of two to four weeks, and the binding agents (pectin) in the plant are decomposed. The hemp now takes on a brown colour. Only after this roasting is it possible to separate the hemp fibres from the shives. The dried hemp straw is then pressed into bales and stored in a dry place.

CULTIVATION OF INDUSTRIAL HEMP IN GERMANY

After the prohibition of hemp cultivation in 1982, the cultivation of industrial hemp has been allowed again in Germany in 1996. However, only under strict conditions: Anyone who wants to cultivate commercial hemp in Germany must be a farmer according to the Law on the Old-Age Security of Farmers (ALG). Cultivation is generally prohibited for private individuals. The cultivation itself is controlled by the Federal Agency for Agriculture and Food (BLE). If a farmer cultivates hemp, even as an intercrop, this must be registered with the BLE. The exact details include the size and location of the cultivated area, the variety used and the expected date of flowering. The flowering of the hemp plant is under special scrutiny, as this is when the THC content in the plant is highest. The beginning of flowering must be communicated to the BLE so that they can take samples in the field to determine the THC content. Harvesting may not begin until these samples are verified and the farmer has received clearance from the BLE.

DID YOU KNOW?

In the past years, the amount of farmers cultivating hemp and the acreage of industrial hemp in Germany has grown by 50% per year. In 2019, there were 575 farmers growing industrial hemp on 4,580 hectars.

In the same year in all of Europe, 34,960 hectares have been cultivated resulting in approx. 152,820 tonnes of hemp. The largest producer of hemp in EU was France, accounting for 70% of the total production in 2019.

HEMP VARIETIES

In Europe, only varieties from the EU hemp catalogue may be used for the cultivation of hemp. This catalogue is always updated by March of each year at the latest. As of 2021, the catalogue contains 75 varieties, two of which are banned in Germany (due to their high THC levels). In Germany, the list of varieties is published by the Federal Institute for Agriculture and Food (BLE).

With this wide range of varieties, it is important to know the respective advantages and disadvantages of the individual varieties, as well as their main type of use. Further criteria for selecting the appropriate seed are also the place of cultivation, desired cannabinoid content of the flowers, as well as the oil and protein content of the seeds.

The varieties USO 31 and FERIMON, for example, are widely grown in Northern Europe for both seed and fibre production. USO 31 flowers quite early and has a naturally low THC content. Varieties like FEDORA 17 offer not only a high seed yield but also a high CBD content. As a late flowering variety, FUTURA 83 is especially popular for biomass production.

As a rule, the seeds of most varieties thrive better in more southern regions and deliver higher yields, whereas northern regions prefer to focus on fibre production.

VARIETY	USO 31	FERIMON
SPECIALITY	High fibre content	High yielding seed crop & high fibre content
MAIN USE	Seeds, Straw	Seeds, Straw
BLOSSOM TIME	Early	Early
THC CONTENT	THC Low	THC Medium

STRUCTURE OF THE HEMP PLANT

The hemp plant (its biological name is "Cannabis sativa") belongs to the Cannabaceae family and is thus closely related to hop. As a rule, the plants reach four to six metres, depending on the variety. In order to be stable in winds despite this height, the plant develops roots up to three metres deep. As a monocarpic plant, hemp dies after its flowering period. Hemp usually stands upright as a single stem, which only branches shortly before the flowers. The hemp leaves are up to 15cm long and hand-shaped, and their edges are roughly serrated. There are glands on the underside of the leaves. Hemp plants are mostly dioecious. This means that there are separate male and female hemp plants. The male plants can be recognised quite early by their pollen sacs thanks to their faster growth. Female plants form buds that are easily recognisable thanks to their small hairs.

FEDORA 17	FELINA 32	FUTURA 75/83	DIOICA 88	SANTHICA 70	FIBROR 70
High yield	High CBD content	High straw yields	High CBD content	High fibre yields, THC-free	Simple defibration
Seeds, Straw	Seeds, Straw	Straw	Straw	Fibre	Fibre
Early	Medium early	Late	Very late	Medium early	Late
Medium	Medium	Medium	Medium	None	Medium

What is special about hemp is that every part of the hemp plant can be processed and used. The seeds of the hemp plant are not only a protein-rich food or a tasty snack for in between meals, but when pressed, they also give off a fine oil that is rich in omega-3. The seed cake that remains after pressing can either be ground into hemp flour or used as seed cake for animal feed. If you soak hulled hemp seeds in water and then mix this mixture finely, you can produce delicious hemp milk after sieving off the suspended matter.

But it is not only the seeds of the hemp plant that are sought after. The stalks of the plant are also used in many ways. The fibres of the stalks play an important role in the production of ropes and textiles, but also serve as insulation material for buildings. The husk of the stalks can be used to make hemp paper or ecological animal litter.

The leaves and flowers of the plant contain most cannabinoids. From them, the basic substance for CBD oils is extracted. In the medicinal use of the hemp plant, the active substances are also mainly found in the flowers of the plant. However, the roots of the hemp plant were also used as a medicine and natural remedy in ancient times.

ANIMAL BEDDING
MULCH/ COMPOST
MEDICINE/ RECREATION

ORGANIC COMPOST
ROPE
FIBRE BOARD
ANIMAL BEDDING
INSULATION
TEXTILES
PAPER

FLOUR
BEER
ANIMAL FEED
SEED CAKE

MILK/DAIRY
BAKERY
GRANOLA
PROTEIN POWDER
HEMP NUT

FUEL
PAINT
COOKING OIL
DIETARY SUPPLEMENT
BODY CARE PRODUCTS
OIL

MEDICINE
ORGANIC COMPOST

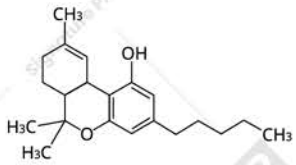
CANNABINOIDS

Cannabinoids are a group of molecules (transformation products of so-called terpene phenols) found mainly in hemp plants (Cannabis sativa and Cannabis indica). Different cannabinoids show different pharmacological effects in humans and animals. They interact with the body's own endocannabinoid system, which is otherwise controlled by the body's own cannabinoids, the endocannabinoids. In the medical field, cannabinoids are already used for spasticity, loss of appetite, dizziness, vomiting, chemotherapy, and epilepsy.

Currently, the main source of natural cannabinoids is the hemp plant. Cannabis sativa alone contains 113 cannabinoids that have not yet been discovered in any other plant. However, some cannabinoids can also be found in other plants, such as citrus fruits. In addition to cannabinoids, cannabis sativa also contains about 120 terpenes, which serve as natural pesticides and odorants, and 21 flavonoids, which have antioxidant properties.

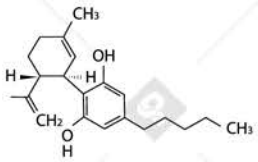
CANNABINOID VARIETIES

Among the best-known cannabinoids are those that have been studied for the longest time and are used therapeutically. Besides these, we now know about 113 isolated cannabinoids from the hemp plant, and they can all affect the human body differently.



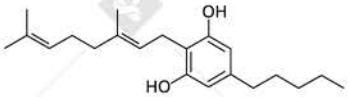
THC

Most famous is the psychoactive Δ9-tetrahydrocannabinol. Also known by its abbreviation THC. Due to its psychoactive effect, THC is classified as a narcotic and prohibited in many countries. This is also the main reason why the cultivation of hemp is strictly monitored. THC is found in high concentrations in the hemp plant, especially in the unfertilised, female flowers. Other components of the plant, such as the seeds, do not contain THC. The intake of THC has various therapeutic effects. These include relief of pain caused by inflammation, relief of spasticity, relief of nausea and vomiting, and facilitation of sleep. However, ingestion also leads to a state of intoxication with heightened mood and talkativeness. It also impairs concentration, psychomotor performance and can lead to panic and anxiety. Regular use can lead to withdrawal symptoms after discontinuation. In Germany, THC has been approved as a medicine since 2017 and can be prescribed, e.g., in the form of cannabis flowers.



CBD

The best-known cannabinoid besides THC is cannabidiol (CBD). It shows many pharmacological effects similar to THC but is less potent and does not have a psychoactive effect. Neither intoxication nor dependence could be proven. It is said to have anticonvulsant, anti-inflammatory, and anti-anxiety effects. Many other effects are also attributed to CBD, but are still under active research. Medically, it is already used to treat spasticity and epilepsy. In recent years, there has been an increasing trend to consume CBD dissolved in oils. Consumers often refer to its relaxing and antispasmodic effect. CBD has also been included in the EU guidelines for approved cosmetic ingredients (CosIng). Since then, CBD has also found its way into creams, serums, massage oils, and other cosmetics.

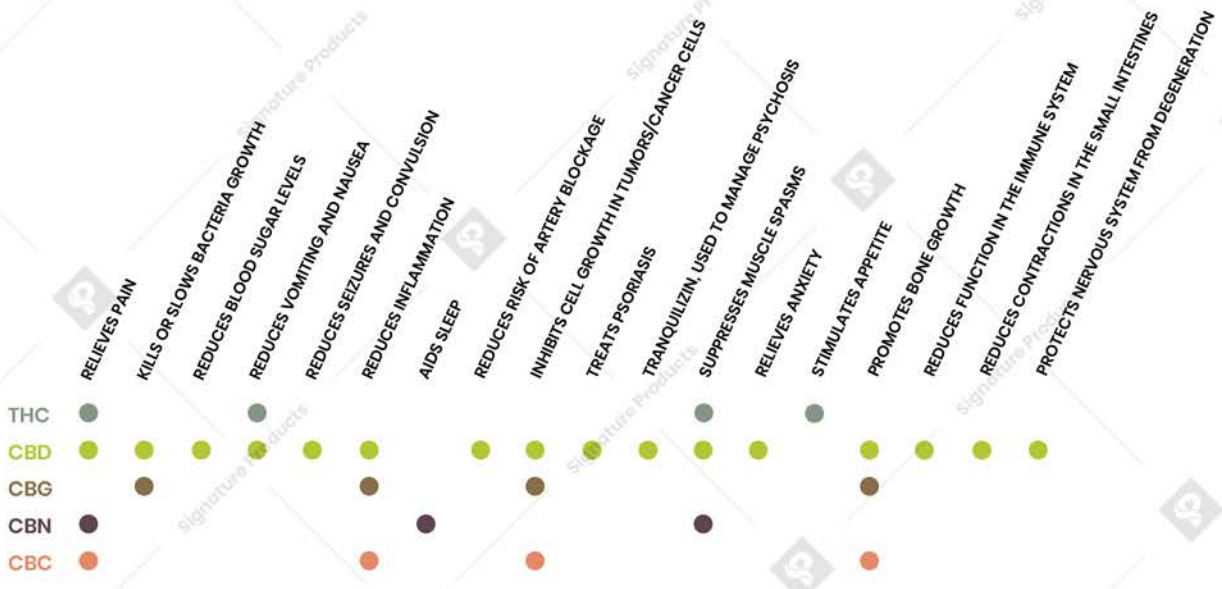


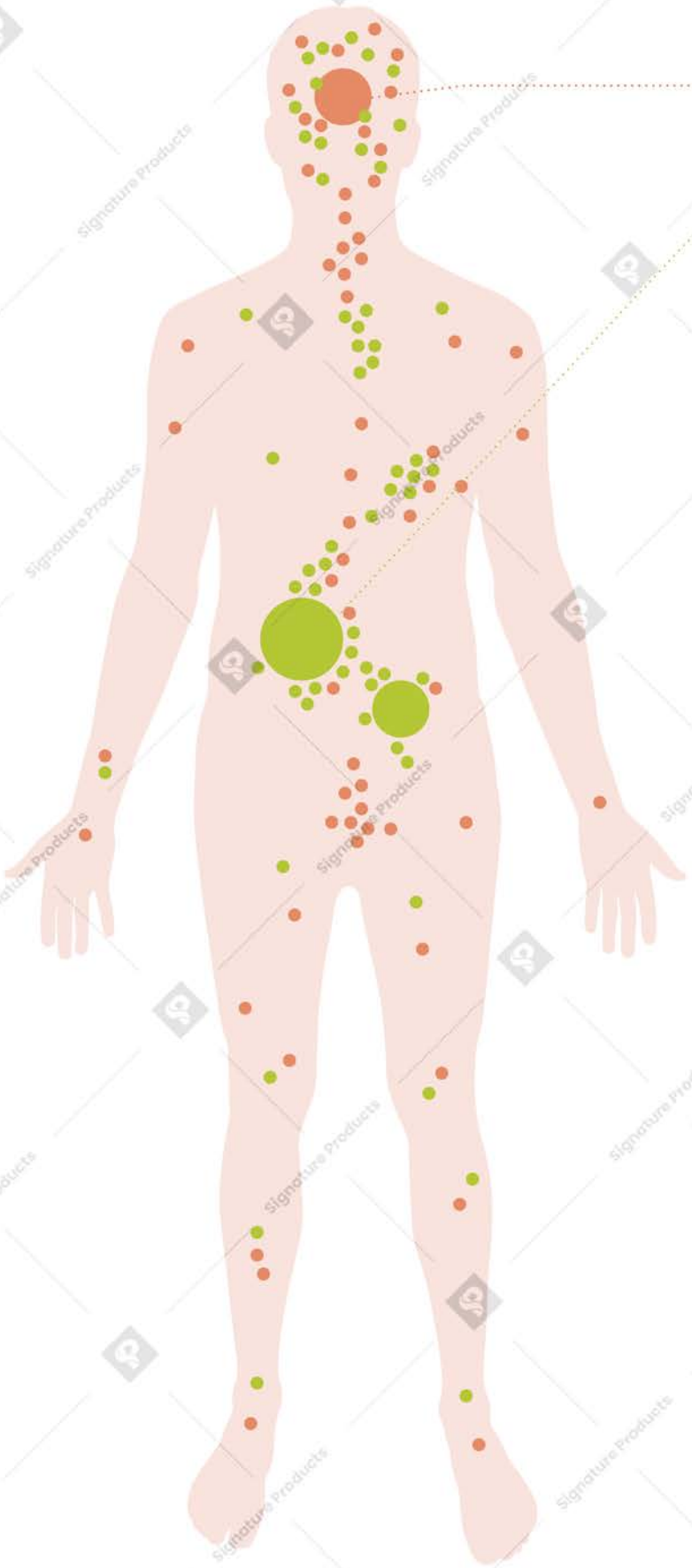
CBG

Another cannabinoid besides CBD that is also approved for cosmetics is cannabigerol (CBG). It is also said to have an antibacterial and anti-inflammatory effect as well as positive effects on cell and bone growth. Detailed research and medical studies on CBG have only just begun. However, great potential is seen in the treatment of a variety of cancers, sleep disorders, and pain relief.

OTHER

Besides THC, CBD, and CBG, there is a wide variety of other cannabinoids, all with their own effects on the body and the endocannabinoid system. However, many of these cannabinoids still lack the appropriate research and scientific evidence of their effects and pharmacological actions. Especially CBN (cannabinol) and CBC (cannabichromene) should be mentioned here as newcomers and emerging trends.





WHAT IS THE CANNABINOID SYSTEM?

The endocannabinoid system is part of the nervous system and includes the cannabinoid receptors CB1 and CB2.

CB1 receptors are mainly located in the central nervous system as well as in the heart, gastrointestinal tract, pulmonary, endocrine, lymphatic, and reproductive organs.

CB2 receptors are a component of the immune system and control various immune reactions by influencing T lymphocytes, but they are also found on osteoblasts and osteoclasts (cells for the formation/degradation of bone tissue). However, similar to CB1, they could also be detected in the central and peripheral nervous system and thus also trigger effects here.

HOW DO CANNABINOIDS WORK?

CBD, for example, docks with the CB1 receptors in the body's own cannabinoid system as an indirect antagonist (activates the receptors through similarity to endogenous substances), but at the same time has agonistic effects on CB2 receptors (inhibits the receptors against endogenous substances). The exact mechanism is not yet clear, as its effect can activate and deactivate several signalling pathways. The body's own cannabinoids are inhibited in their reuptake and degradation. This increases their concentration. CBD seems to have a stronger agonistic effect on CB2 receptors than an antagonistic effect on CB1 receptors.

Another connection between CBD and the GABA receptor is suspected, as it has been described pharmacologically that GABA (γ-aminobutyric acid), for example, binds more markedly to it in combination. GABA is the most important inhibitory endogenous messenger substance; among other things, it has an anxiety-relieving, calming effect. This could explain the phenomenon of better sleep quality and deep dreams often associated with CBD consumption, often with or through longer REM phases.

Furthermore, various signalling pathways via GPR55, vanilloid and glycine, PPAR and serotonin receptors could be identified. The agonistic effect of CBD at the serotonin-sensitive 5-HT1A receptor could cause an anxiety-relieving, potentially neuroprotective and antidepressant effect. This is currently being tested in clinical trials.

The different signalling pathways probably also have effects on pain and taste perception via the vanilloid receptor. The anticonvulsant properties described above are presumably induced via the glycine receptor, while inhibition of GPR-55 could induce anti-inflammatory and osteoblast-activating responses. ■

FULL-SPECTRUM, BROAD-SPECTRUM

These buzzwords appear mainly in connection with cannabinoid extracts. A full-spectrum extract is one that contains the full cannabinoid spectrum of the original plant. This means that no cannabinoids are filtered out or cut off. Depending on the source material, most full-spectrum extracts therefore always contain a certain amount of THC. If one wants to be on the safe side and use a THC-free extract, the THC (and also other cannabinoids) are often cut out by further processing after extraction. The resulting extract is therefore no longer a full-spectrum extract but only a so-called broad-spectrum extract.

RAW MATERIALS

HEMP PELLETS

Hemp pellets can be produced either from hemp press cake (from hemp seeds), hemp stems, or from the whole biomass. The first step in the production process, regardless of whether the basic material is hemp biomass or hemp press cake, is drying the hemp. The mass is then shredded and finally pressed into a pellet form.

Hemp pellets made from hemp press cake activate the metabolism and promote muscle building. A hemp press cake is a by-product of hemp seed oil production and is produced during the cold pressing of hemp seeds. Thanks to a protein content of approx. 20% and a fat content of approx. 8%, hemp pellets made from hemp press cake are well suited as a nutritious animal feed.

Hemp pellets made from hemp biomass consist of 100% hemp biomass and are also very suitable as mixed feed. Hemp pellets made from hemp biomass still contain a small number of cannabinoids, which are said to have many positive properties.

Hemp pellets, in general, are rich in omega 3, 6, and 9 fatty acids and free of additives. Regular analyses of cannabinoids, heavy metals, and pesticides guarantee a high-quality and flawless product.

Besides being excellent as animal feed, e.g., for horses, they can also be used as heating material or for the production of smokable products.

HEMP BIOMASS

Hemp biomass is dried, industrial hemp in extraction quality. In this stage, the hemp still contains its leaves, stems, and other components of the plant and has a high concentration of cannabinoid-rich bud material. It is also the basis for most cannabinoid oils, isolates, and distillates. In this case, its value is strongly coupled to the cannabinoid concentration in the plants.

Furthermore, it can be used as nutritious animal feed, but also for the production of smokable products, for example, as a filler for hemp cigarettes.

The hemp biomass is produced by drying and crushing larger parts of the plant into a smaller, more usable size. In Europe, hemp is usually ready for harvesting towards the end of September.

To ensure perfect and consistent quality, cannabinoid, heavy metal, and pesticide analyses are made of each batch.

The biomass is usually packed in big bags so it can be transported in bulk to the extraction plant for further processing.

HEMP EXTRACTS

CRUDE OIL

The word "crude" is associated with a form in its natural or raw state, without having undergone any additional processing or refinement.

Crude oil is a direct extract that is filtered out after extraction. During, e.g., ethanol extraction, the hemp plant lies in ethanol for a few days. During this time, the alcohol absorbs parts of the plant, such as cannabinoids and terpenes. By heating and then evaporating the ethanol, those parts remain as crude oil. For more information on ethanol extraction, see the section on different extraction methods.

Crude oil has a natural terpene and cannabinoid profile and, compared to oils based on isolate or distillate, might have a better potency thanks to the entourage effect. The entourage effect suggests that all compounds of a plant in combination might have a more positive effect when consumed than one compound in isolation.

The production process of crude oil is very complex and multi-layered. It starts with the selection of hemp biomass or hemp flowers with preferably high cannabinoid content. The material is then dried and shredded. In the next step, it is extracted and filtered with the help of, e.g., ethanol or CO_2 to filter out interfering terpenes that would cause a bitter taste. In this step, the hemp material is also decarboxylated. This is a chemical process in which a carbon dioxide molecule is split off.

The advantages of crude oil are, among others, that it contains the full spectrum of the hemp plant and benefits from the entourage effect. Furthermore, natural terpenes are still present in the oil.

Our special crude oil is not to be confused with other crude oils, which are unfiltered and therefore black. The taste of our crude oil can be described as very mild, in contrast to other oils that are said to have a bitter taste. Due to the terpenes present, our crude oil tastes more hempy, nutty, and also more natural.

Typically, crude oil qualifies less as a lifestyle product, but is rather aimed at nature-loving people and for applications in the medical field.

DISTILLATES

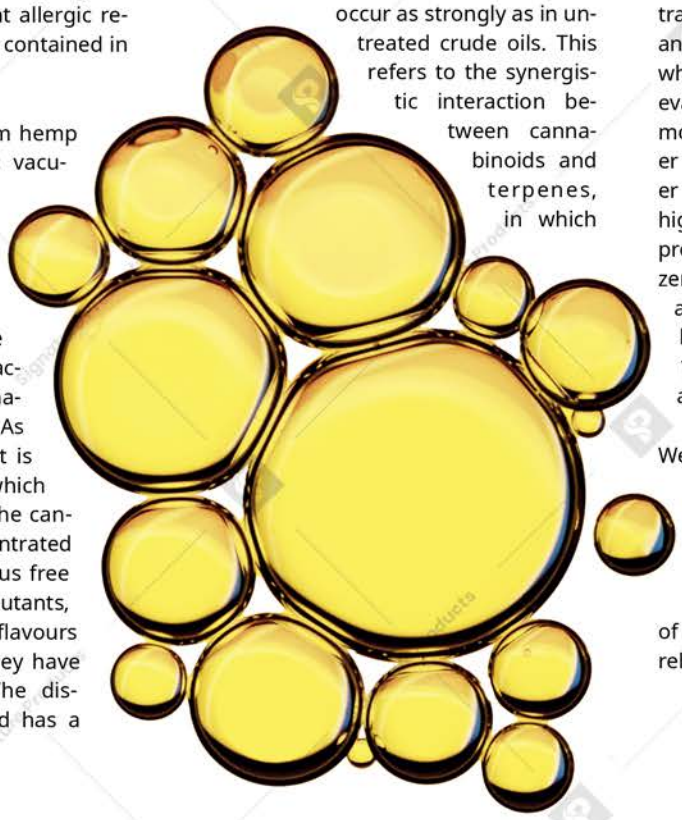
Cannabis distillates are among the purest cannabinoid concentrates, as they have a particularly high potency of individual cannabinoids. A series of extraction and purification processes transform the raw hemp material into the distillate found in a significant number of cannabinoid-based products.

Unlike non-distilled extracts, distillates contain essentially no substances or unwanted residues. Cannabinoid distillates have a higher concentration of cannabinoids than pure extracts. Optionally, they are completely THC-free or have a minimal THC residue of less than 0.2%. There is, e.g., no THC in broad-spectrum distillates, while full-spectrum distillates still have a small amount of THC and other cannabinoids.

Distillation is based on different boiling points of different substances. By boiling at specific temperatures and then cooling down the steam to make it liquid again, specific components can be isolated.

A distillate can also be added to edibles without spoiling their taste. This avoids complicated and time-consuming cooking processes. It is also becoming increasingly important as an ingredient in creams and oils. Due to its high potency, the distillate can also be administered in medical applications to patients who need a particularly high dose of cannabinoids. In some cases, the use of pure substances can also prevent allergic reactions to other substances contained in the plant.

Distillates are obtained from hemp extracts using heat and a vacuum. Cannabidiol (CBD) and other cannabinoids and terpenes are separated from less desirable compounds such as fats, waxes, and pigments. The base extract is heated under a vacuum until the desired cannabinoid begins to evaporate. As soon as the vapour rises, it is collected in a condenser, which cools down and liquidizes the cannabinoids again. The concentrated substance that results is thus free of unwanted solvents, pollutants, and the naturally occurring flavours of the cannabis plant as they have different boiling points. The distillate is slightly yellow and has a sticky consistency.



Distillates enable manufacturers of hemp products to offer highly concentrated cannabinoids with residues of terpenes and flavonoids supporting the entourage effect. If the extract of a cannabis plant does not contain enough naturally occurring CBD, distillates or isolates can be used to achieve a more optimal ratio. The disadvantage here is that the so-called "entourage effect" might not occur as strongly as in untreated crude oils. This refers to the synergistic interaction between cannabinoids and terpenes, in which the effect of each individual compound involved is enhanced. If all other cannabinoids are removed from the substance, the potential benefits of the entourage effect do not occur.

The different boiling or evaporation temperatures play an essential role in the distillation process of the respective components of cannabis and hemp extracts. For example, THC boils at 155°C and thus evaporates earlier than CBD, which boils at 165°C. Most terpenes evaporate at lower temperatures, while most minor cannabinoids boil at higher temperatures. Fats, waxes, and other unwanted compounds always boil at higher temperatures, but these can also produce unwanted compounds like benzene. To prevent this, we distil CBD in a high vacuum, where we use much lower temperatures between 0°C and 100°C. In this way, we prevent burns and the formation of toxic chemicals.

We offer a wide range of cannabinoid distillates of major and minor cannabinoids. By carrying out quality checks and laboratory analyses before and after distillation, we ensure that we maintain a complete overview of our products and can also provide the relevant quality certifications.

ISOLATES

Isolates are high-dose substances and are mostly offered in powder or crystalline form. An efficient extraction system makes it possible to isolate cannabinoids from the hemp plant in their purest form. The resulting substance, with a purity level of approx. 99%, consists almost exclusively of the desired active ingredient.

Among CBD oils, broad-spectrum oils are some of the main products where isolates are used. These oils often only contain CBD isolates as an active and cheap ingredient. In contrast to more expensive full-spectrum products, CBD isolates do not contain any additional cannabinoids, terpenes, or other phytochemical compounds. Therefore, they are also more limited in their effect and have fewer health benefits.

The hemp industry often works with isolated pure substances, which are added to products in the course of the manufacturing process. They are well suited for a variety of consumption methods and are also mixed into beverages and edibles, among other things. Isolates make it easier for the manufacturer to precisely maintain the desired dose of a cannabinoid in their product, so that they do not fall victim to natural deviations. Furthermore, they can guarantee that there is no psychoactive THC in their product if they use, e.g., a pure CBD isolate.

One disadvantage of consuming pure CBD isolates is that, according to studies, no entourage effect is produced. This refers to the synergistic interaction between cannabinoids and terpenes, where the effect of each compound involved is enhanced. If all other cannabinoids are removed from the substance, the potential benefits of the entourage effect do not occur.

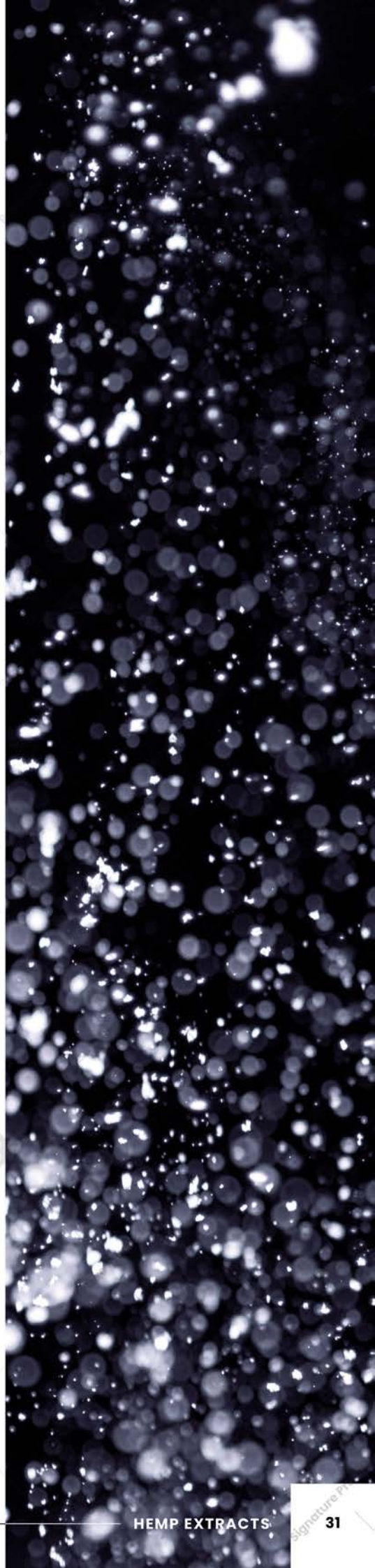
A distinction is made between natural, synthetically produced and liposomal (water-soluble) isolates. Natural isolates are produced from the hemp plant. For this, the hemp biomass is extracted, and a hemp extract is obtained. In the next production step, which is called "winterisation", lipids (fats) and plant waxes are removed from the hemp extract by cooling chemical compounds. The winterised oil is then distilled, which removes chlorophyll, terpenes, and unwanted impurities. The final product is an odourless and tasteless cannabinoid isolate in its purest form with a purity level of 99%.

Synthetic cannabinoid isolates are produced by chemical synthesis. They are an active pharmaceutical ingredient that comes in the form of an ultra-pure, crystalline powder. At the molecular level, the isolates are chemically identical to the natural, plant-derived cannabinoids. Natural or synthetic isolates are used as a basis for the production of "water-soluble" cannabinoids. Their molecules are chemically modified, making them water-soluble. More information on water-soluble cannabinoids is provided in a following dedicated section.

We control the entire production process and carry out regular quality checks. Every batch of our major and minor cannabinoid isolates is lab-tested so we can provide the relevant quality certifications and ensure a constant level of quality.

DID YOU KNOW?

Natural CBD and CBG isolates are finding more and more applications in cosmetics since they have been added to the EU "Cosmetic Ingredient Database" (Cosing). Formerly only expensive synthetic isolates have been allowed.



TERPENES

Terpenes are a large group of organic compounds that occur naturally in some insects, in fruits and vegetables, and in almost all plants - including cannabis plants - and influence their flavour profile and aroma. Terpenes are secreted by the same plant glands (trichomes) of the cannabis plant that produce CBD and THC. So far, more than 20,000 different terpenes have been identified, about 200 of which have also been discovered in the cannabis plant.

The basic chemical structure of all terpenes is similar, but they vary greatly in taste, smell, and medicinal properties. All natural flavours in food originally come from terpenes. They produce the flavour of fruits and vegetables, herbs and spices, and are responsible for the scent wafting from trees and blossoming flowers. Thus, they play an important role in the formation of flavours and smells that we encounter every day.

Terpenes not only give hemp a pleasant smell, but also effectively protect it from insects. For this reason, pesticides and herbicides are not needed for commercial hemp cultivation. They also support the positive effect of the cannabinoids in full-spectrum substances through the so-called entourage effect. This refers to the synergistic interaction between cannabinoids and terpenes, in which, according to researchers, the effect of each individual compound involved is enhanced.

Terpenes also play a very important role in many other plants, providing them with natural protection against bacteria and fungi, insects, and other environmental stresses. They can also attract insects, such as bees, to pollinate the plant. Some plants also release terpenes in stressful situations. Insects use terpenes mainly to communicate with their conspecifics and to attract them to a food source.

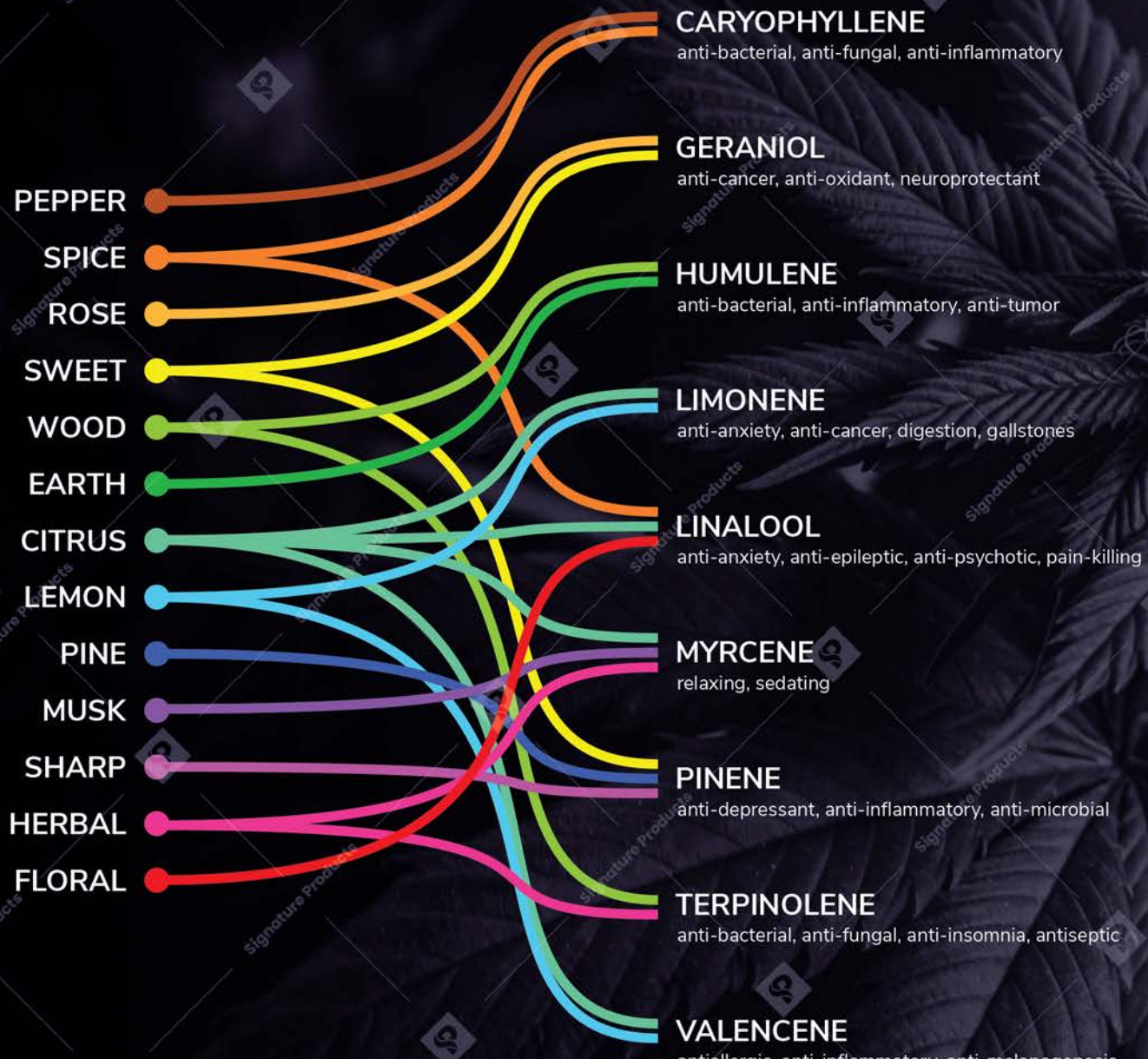
Individual health-promoting effects are attributed to each terpene, but these have not yet been sufficiently researched. The terpene myrcene is found in many hemp plants, but also in citrus fruits, mangoes, laurel, thyme, parsley, sweet basil, and hops and has a slight citrus and clove aroma. Peels of citrus fruits, coriander, celery, and aniseed have a zesty citrus flavour and are rich in limonene, a terpene that is most abundant in plants. Linalool has a sweet sugar and spice flavour and is found in hemp, mint, rose, oregano, ginger, basil, and cinnamon, among others. In aromatherapy, it is often used before going to sleep because of its stress-relieving effects.

Caryophyllenes have a spicy, peppery aroma and are mainly found in rosemary, black pepper,w hops, basil, cloves, oregano, and figs. Eucalyptol gives off a cooling, refreshing scent and is found in eucalyptus leaves, mint, tea tree, mugwort, and sage, among others. Pinene is often found in pine, sage, dill, basil and rosemary, among others, and is responsible for their pleasant earthy to spicy aroma. Terpineol smells like an earthy mixture of pine and cloves and is often added to soaps and perfumes because of its pleasant smell. Terpineol extracted from cannabis is also said to have antioxidant properties. The terpene geraniol, which is found in cannabis, lemons, and geraniums, gives off a pleasant floral smell and is therefore often added to body oils and perfumes.

Terpenes are the main component of essential oils and are often used in aromatherapy because they are easily absorbed through the skin. It is also assumed that certain odours can positively influence our mood, stimulate creativity, or have a relaxing effect. As odour and flavour substances, they are not only found in natural foods, but also in cosmetic products. In addition, terpenes can prevent the spread of bacteria, which is why they are also suitable as natural preservatives for food.

With the individual terpenes in combination, any imaginable taste can be imitated. Manufacturers are now very creative and add the flavour compounds to a variety of products in an attempt to mimic or enhance the terpene profiles of cannabis flowers or cannabinoid oils.

PRIMARY HEMP TERPENES



WATER-SOLUBLE CANNABINOIDS

First of all, cannabinoids are not water-soluble by nature, but there are processes to get cannabinoids such as CBD into a water-soluble form that can be mixed. CBD oil is only absorbed by the body to a small extent because it is hydrophobic and thus repelled by water. However, eating foods with fatty acids or high levels of "good fats" - triglycerides, such as medium-chain triglycerides (MCTs) - can allow CBD to be absorbed more quickly by the body.

Research has found ways to improve CBD absorption by making it more bioavailable. Bioavailability can be defined as the amount of a substance that enters the bloodstream. Higher bioavailability results in the CBD becoming very effective even at lower dosages. CBD in its traditional oil form resists absorption into the bloodstream, which delays the onset of its effect on the user. There are many different processes for producing water-soluble cannabinoids. They can be offered as a nano- or microemulsion or as a liposomal concentrate.

NANO- & MICROPARTICLE EMULSIONS

One process involves refining, e.g., CBD into microparticles and emulsifying them, converting them into a more absorbable form. CBD molecules can be further atomised in the form of nanoemulsions. This makes them even easier to absorb and allows them to interact directly with the body's tissues and enzymes. Compared to microemulsions, they require ten times less the number of surfactants, which are responsible for the dispersibility of the CBD oil in the body. However, the term "water-soluble" is inaccurate, as CBD molecules never dissolve completely in water, but can only be converted into a more water-compatible form.

LIPOSOMAL MICELLES

Liposomal cannabinoids are cannabinoid molecules that are surrounded by fat molecules. Those so-called micelles, also used in washing detergents, form small spheres that are lipophilic on the inside and water-soluble on the outside. This way, they can more easily fuse with cells and release the contained cannabinoids.

Water-soluble CBD can be taken in all kinds of forms: the product range extends from edibles to drinks, sprays, and powders and thus offers great flexibility in intake. As it can be easily mixed into water-based drinks, in most cases manufacturers do not need to make any changes to their existing formulations. The powder is almost flavour-free and can be added to smoothies, for example, without changing their taste or texture.

With water-soluble products, the body absorbs more cannabinoids than it would with an oil-based product. Especially when taken orally, absorption takes place more quickly, which leads to higher effectiveness. ■

SOMETHING DELICIOUS IS COMING ...

Our hemp-based and vegan meat-replacement products are close...
Stay tuned for Q2/2022

HEMP SEEDS

Hemp seeds come from the hemp plant and, depending on their processing, are called hemp nuts or hemp hearts or hulled hemp seeds. The seeds are so-called oleaginous fruits, similar to, e.g., pumpkin seeds. They are grown specifically for the food market as they contain only trace amounts of THC. They are available from us, both certified organic and conventional, either from EU or non-EU origin.

VARIETIES

We produce hulled, unhulled, and roasted hemp seeds. They have a subtle nutty flavour, a crunchy texture, and are very similar to the shape of buckwheat. As part of the hemp plant, the seeds are technically a nut that can be eaten raw, roasted, or cooked but can also be processed into milk, flour, and butter. Hemp seed milk, for example, can be used as an alternative to milk in drinks and recipes. The hulled seeds can also be pressed into hemp seed oil. The remaining press cake can, in turn, be converted into hemp protein powder. When the hemp seeds are roasted, a savoury umami flavour develops, somewhat similar to that of bacon and fried prawns.

Our crunchy, roasted hemp seeds are refined with selected ingredients such as organic cane sugar, organic vanilla, organic cocoa, or organic coffee. As a garnish, hemp seeds go well with almost any dish, from soup to stir-fry. They are good for refining sweet as well as hearty dishes and can be easily integrated into daily meals, e.g., as trail mix or as snacks for children, athletes, and cinema-goers. They also go well as a crunchy topping, e.g., for fruit, salads, or pasta, and provide an extra energy boost. People with gluten sensitivity can use hemp seeds as a substitute for breadcrumbs to coat chicken or fish. They can also be used as ingredients in pancakes and baked goods.

NUTRIENTS

Of the three most common hemp products on the market - seeds, oil, and protein powder - hemp seeds offer the widest range of nutritional benefits per serving. Hemp seeds are naturally gluten-free, have a very high nutritional value, and offer a good source of protein for vegans, vegetarians, or people who are allergic to soy or nuts. More than 25 percent of their total calories consist of high-quality protein. This is significantly more than similar foods like chia seeds and flax seeds, which provide about 16-18 percent. They are also easier to digest compared to other protein sources such as meat, eggs, cow's milk, or cheese. The two best-known proteins are edes-

tin and albumin, which contain a large amount of amino acids that are essential for the body. In addition, hemp seeds are also high in unsaturated fatty acids and have a much more optimal omega-6 to omega-3 ratio than most other industrial food oils. These acids have a number of health benefits, including regulating the immune system, eliminating skin conditions, and promoting cell growth. In addition, the seeds are also rich in vitamins (A, E, B, D, K) and minerals (potassium, sulphur, iron, magnesium, silicon, zinc, manganese and others) and contain all the essential amino acids. Hemp seeds also contain both soluble and insoluble dietary fibres, which in combination can support healthy digestion and a strong immune system. However, hulled hemp seeds have a significantly lower fibre content because the fibre-rich hull has been removed.

SUPERFOOD

In many cultures, the seeds have been processed for oral and topical applications for centuries to treat and prevent certain health problems. Eating hemp seeds can help repair and moisturise dry and damaged skin, as well as support the growth of healthy hair and nails. Furthermore, the seeds can also help with muscle cramps and promote muscle regeneration. Thanks to their high protein content, hemp seeds also act as appetite suppressants, as protein is difficult for the human body to break down and therefore provides a feeling of satiety for longer. The magnesium can support brain function, while the B vitamins can help regulate the production of stress hormones. Hemp is also one of the few oil plants whose seeds contain gamma-linolenic acid (GLA). This has been linked to several health benefits and can have anti-inflammatory, wound-healing, and concentration-enhancing effects in the body. Human studies linking the consumption of hemp seeds to specific health outcomes are only a few. However, a growing number of recent studies support many of these claims.

CREAMY HEMP PORRIDGE

INGREDIENTS (1 PORTION)

- 40 grams oats
- 250 ml oat milk
- 1 ripe mashed banana
- a pinch of salt
- optional toppings
- 1 tbsp shelled or unshelled hemp seeds
- 1 tbsp nut butter (peanut/ hazelnut/ almond)
- 1 tsp cocoa nibs
- fresh seasonal fruit

PREPARATION

Heat up the oat milk in a small pot and bring it to a boil. Add the oats and the mashed banana. Stir and let cook on low heat for about 5 minutes. Add more oat milk if needed. Turn off the heat and stir the porridge for a couple of minutes. Transfer to a bowl and add your favourite toppings.

PRODUCTION PROCESS

The seed varieties grown in the industry to produce hemp seeds are characterised by short stems, large seed heads, and high branch density. They are generally considered ready for harvesting when the seeds begin to break. Combine harvesters are then used to remove the necessary plant parts for seed processing. After harvesting, the unhulled hemp seeds are carefully cleaned and dried. The seeds are then often separated according to their size, variety, and water content and treated differently. This allows processors to allocate their batches of sorted seeds according to their applications during further processing. For food processing, the outer shell of the hemp seeds is removed, leaving the soft, tough centre. Hulling is done by a mechanical process that does not require heating. We work very carefully in this process to minimise damage to the inner seeds and thus preserve their quality. The final product is then packed either in bulk or in doypacks, for example. From each batch, we do a cannabinoid (including THC), heavy metal, and pesticide analysis.

Quality control of freshly harvested hemp seeds: After visual inspection, cannabinoid, heavy metal, and pesticide analyses are conducted and evaluated.

HEMP PROTEIN

Hemp protein, or hemp flour, is obtained from the seeds of the hemp plant. As a vegan protein source with a nutty, slightly earthy taste, it is ideal for athletes for natural muscle-building. But also for all other people who look after their natural protein and vitamin balance and want to do something good for their body. Hemp protein has a high bio-availability and contains a wealth of nutrients that are vi-tal for humans.

PRODUCTION

The green hemp protein is a by-product of hemp oil production. The oil is pressed from the unpeeled seeds of the hemp plant and a press cake is produced from the dry remains of the seeds. This residue is finally further processed, ground, and sieved, and in the end the hemp protein powder remains. The white hemp protein is produced out of peeled hemp seeds. White hemp protein has a higher protein content and is better suitable for food production.

NUTRIENTS

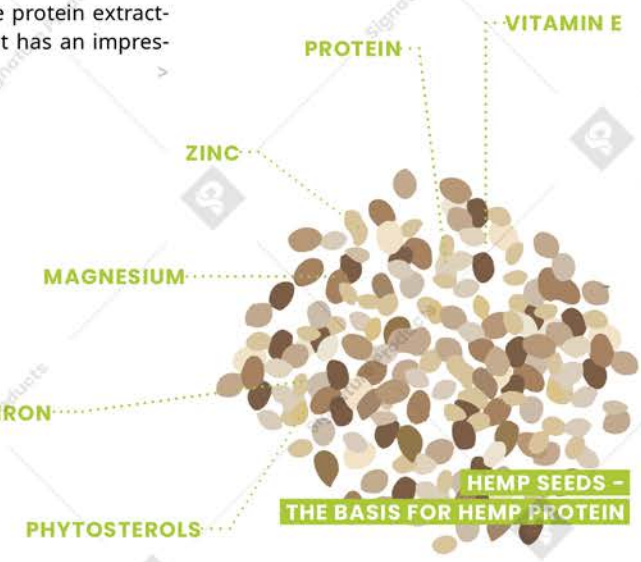
Hemp protein consists of up to 70% protein and contains all the amino acids that are important for the body. Amino acids are the basic building blocks for proteins and are therefore fundamental for our body. Besides building muscles, they can also form organs, skin, and hair. Enzymes also consist of amino acids, which in turn are needed for all biochemical processes.

About 65% of the proteins contained in hemp protein consist of the natural, easily digestible protein edestin, a so-called storage protein. The name storage protein comes from the fact that edestin can store nutrients for muscle growth. This is why hemp protein is very popular among bodybuilders. The remaining 35% is albumin, a high-quality protein whose structure is similar to that of the protein in a chicken egg. About 50% of the protein content in blood plasma consists of albumin. It is also considered a transport protein for magnesium and calcium, for example.

The amino acids contained in hemp protein include branched-chain amino acids, which are also very important for building muscle. These so-called BCAAs (Branched Chain Amino Acids) are valine, leucine, and isoleucine. They are classified as essential amino acids, which means that our body cannot produce them itself. Instead, it depends on us to supply them to it through our food. In addition to building muscles, the BCAAs also help with rapid regeneration after exercise, another reason why hemp protein is very interesting for sportsmen and sportswomen.

Due to a high proportion of the amino acid L-arginine, hemp protein is said to have blood pressure-lowering and potency-promoting properties. L-arginine therefore not only supports our blood pressure, but also our circulatory system. Since the protein composition of hemp protein is very similar to that of the human body, it is said to have a high value or high bioavailability. In effect, this means that the proteins can be absorbed very well by the human body and ultimately converted into the body's own proteins. The high bioavailability also means that fewer waste products have to be metabolised. Consequently, compared to the consumption of other protein sources, the kidneys and liver, among others, are less stressed.

Vitamins, minerals, and trace elements contained in hemp protein include vitamin E, magnesium, iron, zinc, and potassium. Furthermore, hemp protein is rich in omega-3 and omega-6 fatty acids. These are in an ideal ratio of 1:3 to each other, which results in anti-inflammatory properties. The dietary fibres contained in hemp protein promote digestion, and the chlorophyll it contains helps with detoxification and can support the fight against skin problems. With up to 700 mg of magnesium per 100 g, hemp protein contains an impressive amount of the vital mineral. A sufficient magnesium supply can counteract the following diseases: diabetes, cardiovascular diseases, and migraine. Thus, the protein extracted from the hemp plant has an impressive nutrient profile. >



CHOCOLATE PROTEIN SHAKE

Our "Signature Products" protein shake is a shake that supplies your body with all the essential amino acids and a high amount of protein.

It provides a great source of energy to start your day. It's not only vegan but also lactose-free so you don't need to worry about any intolerances.

The smoothie has a nice chocolate - banana taste and blends into a cinnamon finish.

Tip: Instead of soy milk, you can also try out different plant-based milks such as hemp milk.

INGREDIENTS (1 SHAKE)

- 100 ml soy milk
- 100 ml water
- 1 teaspoon of baking cocoa powder
- 30 g of Signature Products 50% or 70% protein powder
- 1 ripe banana
- a pinch of cinnamon
- a pinch of turmeric
- a pinch of salt

PREPARATION

Blend everything together until smooth and enjoy.

HEMP VS. OTHER PROTEINS

Hemp protein also performs very well compared to other, conventional protein sources. Whey protein also has a high biological value and is thus quickly and effectively absorbed by the body. Apart from the fact that whey is not suitable for people who are on a purely plant-based diet, it also comes with some other disadvantages. For example, it can promote fatigue and digestive problems due to the frequent lack of fibre. For this reason, there is also a risk of intestinal toxicity when consuming whey protein. This can cause the protein to remain in the digestive system for too long. Eventually leading to the opposite effect of taking protein powders: muscle breakdown, as the body is no longer able to continue muscle metabolism.

Several studies have shown that acne can also be promoted by the intake of whey protein. In recent years, the reputation of animal proteins has continued to deteriorate, and they have been directly linked to increased blood pressure and a higher risk of type II diabetes.

Hemp protein also shines when compared to other plant-based protein sources. Many essential amino acids are present in the vegan rice-based protein source, but not all of them as they are in hemp protein. Soy protein also has a high vitamin and mineral content, but can promote allergies and cross-allergies. In addition, the essential amino acid methionine, which is important for bone formation, is only present in small quantities. Although soy has a higher protein content than hemp flour, it also has so-called trypsin inhibitors. Trypsin is a very important digestive enzyme that breaks down large protein compounds into smaller parts. It thus digests proteins. The trypsin inhibitors ("inhibitor" Latin for "prevent") now prevent this important step of protein digestion.

Hemp protein is a great, highly nutritious addition to smoothies, protein shakes, and mueslis. It can also be used as an excellent ingredient in baked goods, as a base for meat substitutes, or as an alternative to soy and milk protein. ■

DISADVANTAGES OF PROTEINS FROM PEAS, SOY, WHEY, AND RICE.

WHEY PROTEIN

Health | Whey has traditionally been a prized protein source because of its high nutritional value and its fast absorption. But whey protein is an allergen. Anyone who is allergic or sensitive to dairy shouldn't include whey protein in their diet.

Taste | Raw whey protein powder has a slightly chalky taste with a hint of cheese and milk. It doesn't taste very good on its own, which is why it's usually flavored.

Environmental Impact | Whey protein is an animal protein derived from cow's milk. Animal agriculture has a harmful effect on the climate: It causes enormous amounts of harmful greenhouse gas emissions.

SOY PROTEIN

Protein Deigestibility | The protein digestibility of soya depends on its form. Soya protein isolate has a digestibility rating that is equivalent to animal-based protein. Protein gained from raw, whole soyabeans contains a high number of trypsin inhibitors, which make it hard for the body to absorb the protein.

Digestive System | Today much of the soya grown is genetically modified. Since most are heated during production, the protein's ability to act as an enzyme is inhibited. Many people suffer from various digestive disturbances like bloating.

Environmental Benefit | Most of the soya that's currently grown is genetically modified, which means that synthetic chemicals and fertilisers are typically used to efficiently grow soyabeans. Soya is grown in areas that used to be forests and using heavy machinery—and those methods generate greenhouse gases, compact soil, and can lead to soil erosion.

RICE PROTEIN

Protein Quality | Rice is not considered to be a complete protein. It does not contain all of the essential amino acids because it lacks lysine. This means that to have all the building blocks of protein, you would need to combine rice protein with another protein source.

Environmental Impact | Microbes in flooded rice paddies produce methane, some of which is emitted into the atmosphere. Rice cultivation is responsible for about 10 percent of global greenhouse gas emissions from agriculture.

PEA PROTEIN

Meal Replacement | Since pea protein is lacking in fiber and fat it won't do a great job keeping you full for a long time.

BENEFITS OF HEMP PROTEIN

Micronutrient Content | Hemp protein, on the other hand, additionally has a great micronutrient content with high amounts of minerals and antioxidants such as magnesium, calcium, iron, zinc, and copper. Something special about hemp protein in comparison to pea protein is the essential 3:1 balance of Omega-6 to Omega-3 fatty acids. Those help with improving heart joints and brain health.

Meal Replacement | Hemp protein will keep you full for quite a long time since it has higher amounts of fiber and fat and can act as a great meal replacement.

Environmental Benefit | Hemp is basically nature's purifier. The plant binds carbon dioxide from the atmosphere, quickly purifying the air we breathe. In fact, each ton of hemp produced absorbs 1.63 tons of CO_2, making hemp a much more effective carbon dioxide absorber than trees.

Taste | Hemp protein is rather nutty and earthy with a chalkier and grittier texture. Hemp protein, on the other hand, has a faintly nutty flavor that enhances the taste of shakes, oatmeal, and cereal.

Amino-acid Content | Hemp protein may be lacking in high amounts of methionine, but therefore has a higher level of the amino acid arginine, which is important for blood flow regulation, toxin removal, and immune function.

Protein Digestibility | Protein gained from hemp is free of trypsin-inhibiting factors and therefore easily digested by the body. Hemp seeds are composed of two main proteins, albumin and edestin. Albumin is an important transport protein, while edestin is needed for a strong immune system.

Digestive System | Protein derived from hemp is very gentle on the digestive system and does not cause any bloating or cramps. It is free from dairy, lactose, or soya and therefore allergen-free.

Protein Quality | Hemp is not an isolated source of protein but also contains carbohydrates and fat. Hemp is considered a complete protein. This means it has all 9 essential amino acids. Unlike whey protein, hemp does not have as high amounts of all essential amino acids.

Health | Hemp is a source of fiber and heart-healthy fats. It contains omega 3 fats, which promote healthy brain development. Hemp also contains all of the essential amino acids, making it a complete protein. It's also free from allergens.

OILS

In food, oils provide a natural source of fat and therefore carry flavour resulting in an enhanced taste in foods. It also prevents sticking to pans and facilitates the Maillard reaction, which leads to tasty brown colouring and crunchy fried surfaces. Not only in food but also in cosmetics, oils play an important role by providing fat and moisture and long-lasting hydration of the skin. In cannabinoid oils, they are the foundation that enable the solution of cannabinoids and make them easily ingestible and dosable.

Hemp seed oil comes in three different varieties: gold, green, and deep-green. The deep-green oil is produced by pressing the remaining shells of peeled hemp seeds and has an earthy taste. The green oil is the result of pressing whole hemp seeds and its taste is earthy and slightly nutty. The finest oil is the golden hemp seed oil. It is manufactured by pressing only the peeled hemp seeds which yield clean golden oil with a mild and nutty taste.

HEMP SEED OIL

Hemp seed oil is obtained from the seeds of the hemp plant by gentle cold pressing. It has a high content of three polyunsaturated fatty acids: linoleic acid, alpha-linolenic acid, and gamma-linolenic acid. In addition, hemp seed oil has an ideal omega-6 to omega-3 fatty acid ratio of 3:1, which optimises its bioavailability or the body's ability to absorb the nutrients in hemp seed oil. For this reason, regular consumption of hemp seed oil can potentially help achieve the recommended daily intake of healthy fats. In China, the oil has been used as food and medicine for many years and, according to some studies, offers many health benefits.

Hemp seed oil has a nutty, earthy taste reminiscent of walnuts and sunflower seeds and is suitable as an ingredient for salads, smoothies, spreads, dips, or baked goods, for example. It can also be used to fry meat or vegetables. However, it is recommended to use hemp seed oil as a finishing oil and not as a cooking or frying oil because the sensitive omega fatty acids are broken down during the cooking process and the oil is thus deprived of its nutritional benefits. In addition, it has a relatively low flash point and burns quickly during frying. It is therefore recommended to add hemp seed oil fresh to a salad dressing, for example, or to drizzle it directly over pasta, grilled vegetables, or popcorn. Smoothies and soups can also be refined well with a teaspoon of the nutty oil.

Hemp seed oil can also be used in the processing industry as a component of cosmetics or as a carrier oil for CBD oil. It is also used, for example, in the production of detergents and soaps. Meanwhile, the oil has also become a trendy ingredient for skincare products, as it is absorbed relatively quickly into the skin and does not feel greasy. The lipid profile of hemp seed oil is similar to that of human skin, which is why the oil easily penetrates the deeper layers of the dermis. Its nutrients can be quickly absorbed by the skin cells. Hemp seed oil is also considered non-comedogenic, which means that it does not clog the pores. For this reason, it is also included in body oils and lipid-enriched creams designed to penetrate the skin.

Furthermore, thanks to its antioxidant ingredients and gamma-linolenic acid (GLA), hemp seed oil also has moisturising properties and can provide some protection against premature skin ageing. Gamma-linolenic acid (GLA) actually forms specific hormones that are important for metabolism. With ageing, the amount of it in the human body decreases, which can be clearly seen in the skin. This process is accelerated by poor nutrition, alcohol, and stress. Hemp oil applied to the skin can help bind moisture in the cells and smooth out small wrinkles, leaving the skin feeling soft and supple. The oil may also contribute to a significant improvement in hair thickness and nail thickness in some circumstances. In addition, some researchers suggest that certain ingredients in hemp seed oil have

potential antibacterial properties and may also help relieve skin inflammation.

After harvesting, the hemp seeds are cleaned in a food-safe manner and then cold-pressed by a mechanical pressing process without heating so that the oil can be extracted from them. The extraction of the oil produces a by-product known as hemp cake or hemp flour, which is the basic substance for the production of hemp protein powder. Our hemp seed oil is available in glass bottles because in plastic containers it becomes even more susceptible to degradation over time.

MCT OIL

MCT (medium-chain triglycerides) oil is a dietary supplement made from a type of fat called medium-chain triglycerides. It is usually consumed in liquid form and resembles olive oil in appearance. MCT fats are obtained industrially by hydrolysing coconut or palm kernel oil, fractionating the medium-chain fatty acids and then esterifying them with glycerol.

MCT oil contains fatty acids of medium chain length (6-10 carbon atoms) and thus has smaller molecules than those in common dietary fats. The latter consist mostly of long-chain fatty acids (LCT = long chain triglycerides, > 10 carbon atoms). Because the fat molecules of MCT oil are smaller, they are also more easily absorbed by the liver and utilised more quickly for energy production without requiring special enzymes. Because of this, some researchers believe that MCT is burned by the body as "fuel" instead of being stored as body fat. MCT oil can also help increase the feeling of satiety and even increase the metabolic rate, according to some studies.

There are different types of MCTs, each consisting of a different number of carbon atoms. The four different types of MCTs include capric (acid C6:0), caprylic acid (acid C8:0), caprin (acid C10:0), and lauric (acid C12:0). The number of carbon atoms in a triglyceride determines how the body processes them for energy. MCT oil consists of 100% MCT and is therefore the most concentrated MCT source compared to other oils, such as coconut or palm oil. However, MCT is also found in palm kernel oil, butter, and other dairy products such as cheese and full-fat yoghurt.

MCT oil is often colourless, odourless, and tasteless and liquid at room temperature, which is why it can be an ingredient in a wide variety of products. It is used in the processing industry as an ingredient in cosmetic products and foods such as spreadable fats. It can be added to many foods and drinks, such as smoothies, marinades, baked goods, salad dressings, or teas. One should be careful not to consume it together with sugar so that it does not counteract the benefits of MCTs. It can also be used particularly well for cooking, as it can withstand high heat and does not oxidise easily at high temperatures. Thanks to its pleasant mild coconut flavour, it is also excellent as a carrier oil for CBD oils. MCT oil already evaporates at about 120°C.

In recent years, there has been a significant increase in interest in MCT oil as a dietary supplement, partly due to the growing popularity of the ketogenic diet model and the influx of research into the benefits of coconut oil. Many people following a ketogenic diet use the oil as a source of fatty acids. MCT can help the body produce ketones, which unlike other fatty acids, travel from the blood to the brain where they serve as a source of energy. According to some research reports, MCT can also lower lactate levels and help improve exercise performance during moderate and high-intensity training. However, it is advisable to use MCT oil moderately because it is very high in calories and contains large amounts of saturated fat, which can raise cholesterol levels. Too high a dose of the oil can lead to fat accumulation in the liver. Side effects of MCT oil may also include bloating, abdominal pain, cramps, or diarrhoea.

HEMP TEA

Hemp tea can be made purely from the leaves of the hemp plant or additionally from the flowers and stems of the female hemp plant. The hemp flowers can then be enjoyed pure as a tea but also in combination with various herbal or plant additives. Rose petals, hops, rosehip, or hibiscus are perfect for this and transform the tea into a unique taste and relaxation experience. Signature Products offers many different creations and combinations in this sense. For example, a hemp sleeping tea with chamomile and lavender, “Women Harmony” with anise and blackberry leaves, and a hemp energy tea with mate.

Due to the maximum legal THC content of 0.2% in commercial hemp in Germany, hemp tea does not have a psychoactive effect and does not make you high.

The hemp leaves used are dried in the production process of the tea and possibly mixed with other ingredients. Its taste and smell are very aromatic, reminiscent of herbal teas and similar to the smell of straw. As with other teas, the taste of the tea intensifies with the length of the brewing time.

The hemp tea tastes best when 1-2 teaspoons of the mixture are poured over 150 ml of boiling water. Then let it steep for about 5-8 minutes, and the tea can be enjoyed lukewarm. The length of the infusion time can influence the effect of the tea. For example, the tea has an invigorating effect when steeped for 5 minutes, while it has a more calming and relaxing effect after 15 minutes. This is why a hemp tea that has been steeped for a long time is an excellent preparation for a restful and regenerating night. If you want to spice up the taste of hemp tea a little, you can add some oat drink or another vegan milk alternative.

The leaves contained in hemp tea have a great nutritional profile, with various vitamins, nutrients and antioxidants. For example, they are rich in vitamins B1, B2, and also E. Furthermore, they contain trace elements and minerals such as iron, calcium, potassium, copper, and magnesium. Omega-3 and 6 fatty acids, which are essential for healthy cholesterol levels, bones, skin, and hair, are also present in hemp leaves.

In addition, hemp tea is rich in terpenes and flavonoids. Terpenes are found in all plants and are responsible for their unique and individual smells and tastes. They can stimulate our serotonin production, as well as our dopamine release, both also known as happy hormones. Flavonoids are antioxidants and are considered cell protectors in the fight against free radicals.

The effects can be expected to take effect about 30-90 minutes after drinking the tea. Drinking hemp tea can have the following effects: stimulation of digestion, a reduction of stress symptoms, and a brightening of the mood. In the case of digestive problems, such as irritable bowel syndrome, hemp tea can help with cramps, constipation, and diarrhoea. Hemp tea can also be a great remedy for relieving pain thanks to its antispasmodic effects. Hemp tea, which can dilate the arteries, can also be tried and used as a natural blood pressure reducer. In addition, the tea is often drunk during diets, as it can curb appetite and have a purifying effect.

ADVANTAGES OF HAVING YOUR OWN BRAND

According to the dictionary definition, a brand can be understood “as the sum of all the perceptions that a brand name or trademark evokes or is intended to evoke in customers in order to distinguish the goods or services of one company from those of other companies.”

Successful brands can trigger concrete feelings within their target groups. Here, the first impression is especially important, because if it is not 100% satisfactory, consumers today can easily go elsewhere for their products within seconds. And of course, as the owner of a brand, we want to prevent that.

With the abundance of products now available on the hemp market, it is especially important to stand out and create a recognition value. One's own brand must differentiate itself from others. Otherwise, there is a danger that it and its products will become interchangeable and drown in the masses. By differentiating the brand, a very loyal group of regular customers can be generated who are also prepared to pay a little more for the products. Differentiation can be done in many different ways: branding, packaging, price, additional benefits, etc.

Brand awareness supports customer loyalty to a company in the long term. For this, in addition to the existence of a brand, experiences with it are necessary. If these experiences are positive for consumers, they want to repeat and relive them. As a result, these pleasant experiences are associated with the brand as positive memories. A brand that has a positive presence is likely to be bought again.

Companies with their own brand have the opportunity to benefit from the so-called "halo effect": Consumers like the product of a brand they have never tried before because they have already had a positive experience with another product of this brand. After all, if one brand has released an exceptionally good product, the others are probably pretty good too. The halo effect can be generated when consumers have positive experiences with the brand at every opportunity. They become an extremely loyal group of customers who defend the brand even against negative criticism.

Owning a brand can also represent a significant financial asset, as it is based on trust and respectability. The loyal customer group is, as mentioned, willing to pay a higher price for the products of a particular brand.

Another advantage of a legal nature is a registered trademark that prohibits third parties from using identical labelling for products and services. This provides another opportunity to differentiate one's products.

Signature Products is happy to help you establish your own distinctive brand identity and identify relevant target groups and potential customers. It is essential to know the customer's needs and to fulfil them in a targeted manner. Only then can strong market competition be withstood.

Cannabinoid oils, e-liquids, cosmetics, hemp seed oils, or other liquids can be bottled for private label customers under the name of their own brand. Signature Products customers can benefit from organic certification, which they can also use to advertise their products. The "Made in Germany" seal, which is popular with consumers, can also be used thanks to our production in Germany. Private label customers enjoy the complete service at Signature Products: from the exchange of ideas and product design to the creation of their own brand and packaging with their own label.

With the help of white label products, individual ideas can be realised and shared with customers. This skips the steps of designing the packaging and creating the brand. Customers enjoy the advantages of our high-quality products and can combine them with their already existing brand.

Even your own wholesale goods can be filled or packaged together with us. For this purpose, all extracts, cannabinoid oil blends, water-soluble CBD, and flavours are provided in bulk and can be filled by the customer. Included are the corresponding analyses and certificates. ■

THE WHITE-LABEL PROCESS

FROM IDEA TO FINISHED PRODUCT

Our team helps you make your dreams come true. We are always at your disposal and support you in creating your own product. From the initial idea until you hold your own product in your hands. After the initial contact, we guide you through the process of defining your brand and choosing the perfect, high-quality ingredients. By offering a wide range of packaging options and design services, we help your brand stand out from the crowd. During and after the production process, we ensure the right quality and safety through regular inspections and analyses. Even after you receive your products, we'll check in with you to see if we were able to fully satisfy your wishes.

1 **Contact your Signature sales partner.**

5 **The matching attachment is still missing. Would you prefer a spray head, pipette or dropper?**

6 **Do you have special requests? We'd be happy to develop and source the ingredients for the product of your dreams.**

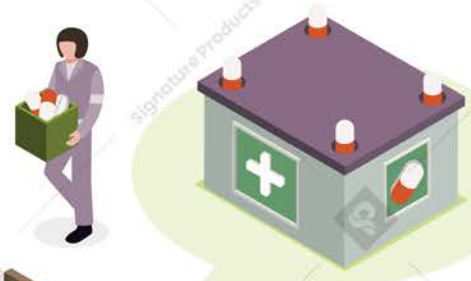
5.1 **In the next step, you should design a label, the packaging, and optionally, an instruction leaflet.**

8 **Once all the designs are in place, it's time to print the label, the packaging and the leaflet.**

7 **Next comes the feasibility analysis and the conformity test.**

3.1 Optionally add various flavours such as lemon, lavender, mint, etc.

3.2 Add optional supplements (vitamins, melatonin, amino acids etc.)

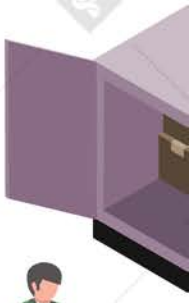


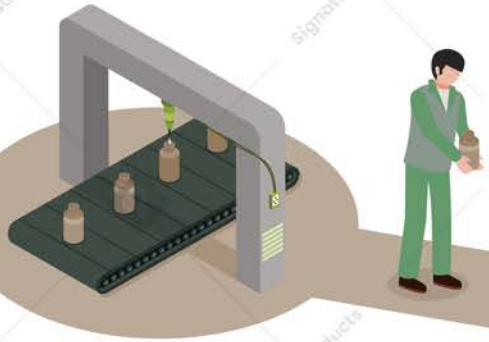
2 Set your product specification, starting with the carrier oil (MCT/hemp seed oil/water).

4 Now it's time for packaging. Decide on a bottle type and size (glass, amber glass, coloured glass, milk glass, PET).

3 3. Set your cannabinoid base and concentration (CBD/CBG/CBN/CBC).

10.1 If you would like further analysis, please do not hesitate to let us know.





11 When everything is ready, your products are prepared for shipment and sent to you.

9 Production comes next. This includes mixing, filling and packaging.

10 Of course, we still subject every product to a quality control.

11 After receiving your goods, we are always available to ensure that you are satisfied with your order and your products.

COLOUR
UP
YOUR
LIFE!
CBD OIL
10%
PREMIUM
CBD OIL
LOGO

VAPE

The word "vaping" comes from the English language and means something like "vapour". It refers to the use of an electric cigarette filled with an e-liquid. Vaping is an alternative to smoking conventional cigarettes. Unlike smoking cigarettes, vaping involves inhaling vapour, not smoke. The ingredients, e.g., aromatic oils or cannabinoids, are not burnt in an e-cigarette but merely vaporised.

People who want to quit smoking cigarettes often switch to e-cigarettes. About 90% of vapers are former smokers. The number one country where people vape the most is Indonesia, with 23% of respondents. In third place is Great Britain with 15%. Germany is sixth with 12%, just two places ahead of Spain with 11%. Since 2010, sales of e-cigarettes in Germany have been steadily increasing, ac-

cording to the E-Cigarette Trade Association. In 2010, for example, sales were still €5 million, and in 2016 they were already €600 million. Worldwide, the global e-cigarette market was estimated at over USD 15 million in 2020, and the trend is growing.

Founded in 2016, CCELL is now one of the largest vaporiser suppliers in the world. Their mission is simple: to take portable vaporisers to perfection. CCELL's ceramic heating elements were developed to replace conventional wick coils. Thanks to them, purer flavours and higher potency of extracts can be released efficiently. The parent company, SMOORE, is the most renowned supplier of vaporisation equipment in the world, with over 15 years of experience. The Chinese company revolutionised the industry with the introduction of the world's first ceramic heating component. In the summer of 2020, SMOORE was listed on the Hong Kong Stock Exchange with a market value of over USD 30 billion. This is a huge achievement for the first electronic atomisation technology company to be listed on the stock exchange. CCELL leads the industry and impresses with advanced resources, strong production capacity (approximately 74 million units per month), and reliable quality control systems.

A PERFECT BRANDING OPPORTUNITY

Special colours, engravings, and other personalisations are also possible for corresponding purchase quantities. We are always happy to help, just contact us. We look forward to your enquiry.

The three CCELL product groups can be grouped into refillable cartridges, batteries, and disposables. Different batteries and cartridges can be linked together to create many different variations and individual products.

TURNKEY MANUFACTURING SOLUTIONS

We at Signature Products were looking for the best hardware vape manufacturer and found it in CCELL. It is very important to us that we only work with the best possible partners to realise joint projects. That is why we are very proud to be a licensed CCELL partner. We look forward to working with our customers to develop advanced and customised products to meet their individual needs.

The manufacturing and regulation of CBD vape products can present many challenges. That's why we offer turnkey CBD vape manufacturing solutions to our customers.

From packaging to lab testing to final registration, we at Signature Products help develop our customers' concepts and ideas. In order to better understand their individual projects, it is very important for us to be in close contact with our customers. This way, nothing stands in the way of successful and successful planning and implementation.

If a finished vape product is already available, we are happy to test whether it meets all regulatory and manufacturing requirements. In order to be able to exclude pesticides, heavy metals, and carbonyls, the product is subjected to strict quality management and laboratory analyses. Laboratory tests are used to analyse and determine the cannabinoid and terpene profiles.

Due to numerous standards and regulations, the process of registering a product according to the requirements of TPD2 (Tobacco Products Regulation) and the Tobacco Products Regulation is often challenging. In the meantime, we are extremely familiar with these specifics and are happy to take over this step as well, so that the product can be brought to market as quickly as possible and 100% legally.

Packaging represents an essential point in the purchase decision of consumers. They give a product or brand an individual voice. Signature Products is happy to take care of packaging that stands out from the crowd and conveys your desired message. We also conduct compliance testing, as well as consult on labels and packaging, and ultimately source and print them.

Furthermore, we are happy to assist in the development and assembly of a product that fully meets the individual wishes and ideas of our customers. It doesn't matter whether you choose pod-powered or traditional vapes, or even a mixture of both.

Thanks to highly modern facilities, we are able to produce and deliver CBD oils entirely according to our customers' wishes. We fill cartridges or refill containers with CBD liquids and extracts. ■

EXTRACTION

Signature Products only works with the best extractors from Germany. We control the entire extraction process and carry out laboratory analyses before and after extraction. We can extract your hemp extract for you using the ethanol, CO_2, or ultrasonic extraction method. After extraction, we also take care of the leftovers and recycle the raw materials. As a sustainable company, we work with farmers who can use our extraction residues as feed for their animals.

ETHANOL EXTRACTION

Ethanol has been used for botanical extraction for hundreds of years, and today it is still one of the most commonly used solvents for extracting cannabinoids (CBD, CBG, etc.) from hemp. Ethanol (C2H5OH), also called ethyl alcohol, is a colourless and flammable liquid and is used, among other things, to extract oil from plant materials. It is used in all spirits, beers, and wines, as a fuel, and as an ingredient in the production of perfumes, food colours and flavours, essential oils, and medicinal concentrates. It also acts as a solvent in the extraction of cannabinoids and terpenes from the cannabis or hemp plant. The Food and Drug Administration (FDA) has classified ethanol as a class 3 solvent with low toxicity. Ethanol is thus one of the safest solvents for food grade and pharmaceutical extraction processes. It is considered a universal solvent because it has both polar and non-polar properties. For this reason, it can rapidly dissolve most non-polar and polar molecules. These include cannabinoids, terpenes, waxes, as well as water-soluble molecules such as chlorophyll. When handled correctly, ethanol leaves no solvent residue in the final product, which is why it is also considered a "clean" solvent.

In the extraction process, we put the hemp flowers into an ethyl alcohol solution and let it stand for about an hour to separate the trichomes of the plant from the rest of the plant material. Afterwards, the solution is filtered, and the ethanol is evaporated from the extract again, condensed and reused in the closed extraction system. The residual limits of ethanol in the finished extract vary depending on the federal state, but in general, a residual ethanol content of less than 0.5 percent is considered safe. The extracted complex of substances is referred to as crude oil prior to winterisation and distillation. This can then be further distilled and refined to produce a purified CBD, THC, or CBG distillate. Once the ethanol has been removed from the ethanol extract, the oil can undergo a winterisation process to increase its purity. This involves the oil and ethanol solution then being winterised, i.e., cooled in a freezer or cold room, to filter out impurities such as waxes, chlorophyll, plant lipids, and other fats.

Ethanol extraction is ideal for the production of almost all cannabinoid derivatives. This includes isolates but also full-spectrum concentrates enriched with cannabinoids, terpenes, flavonoids, and other compounds. Extraction can be carried out at either warm or cold tem-

peratures. Warm ethanol can be used to produce full-spectrum concentrates, while cold ethanol is used to produce concentrated distillates. The effect of ethanol during the extraction process depends on its polarity. This can be easily modulated or adjusted by changing the temperature, making it a very flexible extraction tool. Cold ethanol extraction is performed to freeze fats, lipids, and other unwanted substances so that they do not dissolve in the ethanol. The colder the ethanol, the higher its affinity for fat-soluble compounds, which facilitates efficient extraction of cannabinoids and terpenes. Warm extraction, on the other hand, is much easier to perform, but unwanted compounds - such as fats and lipids - are much more difficult to remove. This means that they either have to be removed later by another winterisation step or remain in the final product.

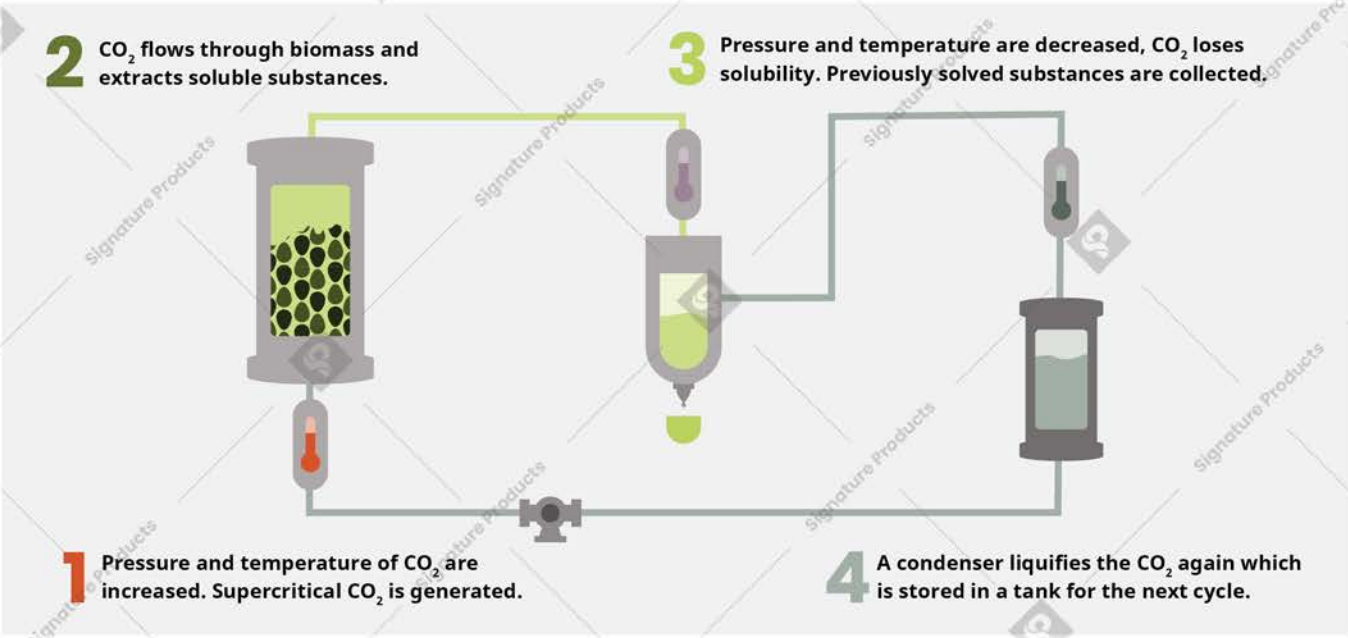
Especially for large-volume extractions, ethanol extraction proves to be one of the safest and most efficient methods to process large quantities of cannabis or hemp. Ethanol is fast, reliable, and efficient in extracting oils from cannabis and hemp. Furthermore, extraction with ethanol is one of the easiest methods to learn. This is mainly due to the fact that, unlike the CO_2 alternative, an ethanol extraction process does not require a complex phase change of the solvent. Phase changes require more in-depth training to ensure a successful outcome. Because the explosion risk of ethanol is much lower due to the lower pressures involved, the building requirements for ethanol extraction are also less stringent than those for CO_2 extraction. Moreover, in an extraction plant, the ethanol may also be stored in larger quantities. After extraction, the ethanol can also be immediately recovered and reused, which reduces the financial outlay for carrying out the extraction process. CO_2 extractors, on the other hand, discharge spent gases into the atmosphere, so a new solvent is needed for each batch. Consequently, with ethanol, continuous cannabis or hemp extraction can be kept running without interruption, allowing for much higher throughput. With the right ethanol extraction system, companies can thus process a large amount of material every hour.

However, ethanol extraction also has disadvantages. Since ethanol has a high boiling point, many terpenes, which give hemp its special aroma, can be lost during ethanol extraction. Many terpenes also have a similarly high boiling point as ethanol, which further increases the risk of terpene loss. Due to the degradation of the terpene profile, the aroma profile of the dark oil also deteriorates during this process, and its entourage effect is also reduced.

ULTRASONIC EXTRACTION

The functional principle of ultrasonic extraction is based on acoustic ultrasonic waves that are coupled into a liquid medium. In ultrasonic extraction, a probe is inserted into a solvent mixture, which emits various high and low pressure sound waves. The intense ultrasonic waves, which emit at a rate of up to 20,000 per second, accelerate the exchange of substances within the plant materials. The forces that normally act to hold the cell together are no longer effective in the constantly changing pressure atmosphere created by the probe. Consequently, the cell walls are broken down, releasing the intracellular material (e.g., oils, lipids, and proteins) from the plant material and into the surrounding solvent. In this way, the desired compounds can be extracted.

With the help of ultrasonic extraction, high-quality extracts can be produced, as no toxic solvents are needed to release cannabinoids. In addition, the entire extraction process takes only a few minutes, while other methods can take several hours or days. The mechanism is highly adaptable to many different applications, from commercial to industrial and pharmaceutical. Depending on what the end product requires, an ultrasonic extraction process can work with a variety of solvents, such as water, a water-alcohol mixture, ethanol, CO_2, H_2O, olive oil, coconut oil, and many more. Ultrasonic extraction also does not require excessive heat. The cannabinoid content can be significantly reduced with alternative extraction methods that rely on high heat, which destroys much of the medicinal benefit of the whole plant.



Simplified process diagram of a single-stage CO_2 extraction with the help of supercritical CO_2. Supercritical CO_2 is in a hybrid state between liquid and gaseous. To be generated, temperatures must be above 30.98°C, and pressure must be above 73.75 bar. Solubility can be controlled through the density of the supercritical CO_2. The higher the density, the more soluble the CO_2.

CO_2 EXTRACTION

CO_2 extraction is one of the safest and cleanest methods and can be used to produce a variety of end products. CO_2 acts like a solvent at certain temperatures and appropriate pressure. It can be used to extract CBD, THC, and other cannabinoids from hemp or cannabis, while preserving the terpenes contained in the plant material. Although this method is highly expensive and complex, it meets our high quality standards. In the food industry, it is common to find large-scale commercial plants for CO_2 extraction, which are operated, for example, to decaffeinate coffee and to produce essential oils from a variety of plants. CO_2 itself is used as an additive in a variety of popular foods and beverages. Carbonated soft drinks, for example, are produced with the help of CO_2.

In general, a distinction is made between supercritical, subcritical, and medium-critical CO_2 extraction. The supercritical variant proves to be by far the most commonly used CO_2 method for the extraction of cannabinoid derivatives, as it is safe and yields a pure end product. CO_2 extraction involves creating phase or state changes in carbon dioxide using controlled temperatures and pressure. The extraction process begins with the conversion of CO_2 gas into liquid. This is achieved by lowering the temperature and simultaneously increasing the pressure. The next step is to raise the temperature by adding pressure and heat beyond the point where the liquid becomes "supercritical". In its "supercritical" state, the CO_2 now functions as both a gas and a liquid, making it ideal for chemical extraction. Since it does not damage or denature the substance, it can now be introduced into the plant material for extraction purposes. The CO_2 penetrates it, dissolves the membranes of the trichomes, and extracts terpenes and cannabinoids as well as CBD and THC. After extraction, the resulting solution is passed through a separator, and the desired compounds are separated and collected. The extracted oil is pure, as no trace of the solvent remains in it. It is isolated and preserved to ensure its purity.

CO_2 extraction has many advantages for both consumers and extractors and is adaptable to the changing needs of the market. CO_2 is non-flammable, non-toxic, chemically inert, and leaves almost no chemical residue. CO_2 extraction provides oils with the highest degree of purity and without residual solvents. The cannabinoids produced with this method retain their potency without being contaminated by chlorophyll and other toxic substances. The phase changes in CO_2 also make it possible to extract individual parts of the plant material (e.g., cannabinoid derivatives) in different quantities during the extraction process. Another advantage of CO_2 is that its critical temperature is close to room temperature, making it an ideal solvent for temperature-sensitive materials. CO_2 is valued for its ability to retain the terpenes in the extracted substance. It is therefore ideal for the production of full spectrum distillates with the associated terpenes.

CO_2 extraction requires sophisticated equipment and much more practice than ethanol extraction. One needs a lot of specific knowledge and professional training to be able to operate CO_2 equipment correctly and safely. This is mainly due to the complex phase changes that are necessary during the CO_2 extraction of the solvent. These require more in-depth training to ensure a successful outcome. By optimising the ratios of pressure, temperature, and solvent, different cannabinoid derivatives can be extracted by trained extractors. ■

DISTILLATION

Distillation is a method commonly used by the cannabis and hemp industry to further purify extracted crude oil. After all unwanted materials have been removed during the extraction process, the purest form of crude oil remains. Other post-processing steps, such as winterisation, filtration, and decarboxylation are also usually completed before distillation is carried out. Distillation finally converts the crude oil into a pure product (e.g., THC or CBD distillate). In this process, a solution is heated to steam and condensed back to a liquid, where CBD as well as other cannabinoids and terpenes have been separated from less desirable compounds such as fats, waxes, and pigments. This method can be used to separate components with different boiling points from the original substance. There are several variations of this process, all depending on the components and the temperature and pressure of the system.

Distillation may require several passes to remove all unwanted compounds before producing the intended final product. The first pass usually removes low boiling point volatiles. A second pass focuses on distilling the desired cannabinoids and removes other impurities such as waxes, sugars, and leftover plant material. This produces distillates with a concentration of 88-99% CBD or CBG. Optionally, they are completely THC-free or have a minimal THC residue of less than 0.2%. This can then be infused into a variety of topical products and foods. Multiple passes may be required, especially if a company does not use a winterisation process for their products. Winterisation removes all impurities such as fats and waxes from the initial oil extraction. Without this process, these impurities remain in the solution and must be removed during distillation to produce a pure end product.

Consequently, the different boiling or evaporation temperatures play an essential role in the distillation process of the respective components of cannabis and hemp extracts. For example, THC boils at 155°C and thus evaporates earlier than CBD, which boils at 165°C. Most terpenes evaporate at lower temperatures, while most minor cannabinoids boil at higher temperatures. Fats, waxes, and other unwanted compounds always boil at higher temperatures but these can also produce unwanted compounds like benzene. To prevent this, we distil CBD in a high vacuum, where we use much lower temperatures between 0°C to -100°C. This prevents burns and prevents the production of toxic chemicals.

The distillation process removes all unwanted ingredients and leaves the product with what the producer needs for their final product. The cannabis plant has inherently inconsistent and unpredictable properties. Depending on the strains and the development within the strains, the taste, smell, and THC/CBD potency of the plant can vary greatly. These inconsistencies inevitably feed into any final product, causing undesirable variations. To produce a consistent product, the THC and CBD cannabinoids can be isolated by distillation, separated from the other cannabis components and then infused into the product. Flavours and other active ingredients can be added back into the distillate in a controlled manner. Manufacturers thus have the ability to modify the taste, smell, and potency of the distillate as desired, ensuring product consistency for the end-user.

BOTTLING

At Signature Products, we offer our customers full-service bottling for all types of liquids and for all sizes of companies. It doesn't matter whether the substances are cannabinoid oils, hemp seed oil, MCT oil, or vape liquids. We fill according to GMP standards and also according to the EU guidelines for certified organic goods.

The GMP standards (Good Manufacturing Practice) define the minimum manufacturing standards, which should ensure a safe, pure, and effective product of the highest quality. Since 1975, the GMP guidelines have been monitored by the WHO. The quality seal was developed to protect the health and safety of consumers. Our bottling services are GMP certified.

We are one of the few organic certified hemp companies in Europe. As we comply with the EU guidelines for certified organic products, we can guarantee our customers that the bottled products are also certified organic.

Here at Signature Products, we can fill a wide variety of combinations of bottles and bottle tops. We can fill in PET, glass, or larger bulk containers, optionally equiped with dropper, pipette, or spray head. There are various possibilities to create and fill an individual product. Signature Products has a large portfolio of different containers in stock.

For white-label and private-label customers, the cannabinoid profile can be individually customisable. We offer crude oil, a variety of high quality full- and broad-spectrum distillates and cannabinoid isolates. The amount of CBD as well as the THC content can be determined by you. Also, concentrations of the less famous cannabinoids like CBG (cannabigerol), CBN (cannabinol), and CBC (cannabichromene) can be individualised and adjusted. From a list of over 90 natural flavours, the taste of cannabinoid oils can be upgraded. We can also add vitamins and minerals thanks to close collaborations with vitamin and mineral suppliers. You can find more information under “White-/Private-Label”.

WE HAVE EXPANDED OUR FILLING FACILITIES TO INCREASE THE MAXIMUM HOURLY THROUGHPUT OF OUR BOTTLING MACHINES AND ALSO OFFER THE FILLING OF SOLIDS AND POWDERS.

LABORATORY ANALYSES

Transparency is immensely important for us and our customers. Therefore, we attach great importance to regular laboratory analyses of our products and also recommend this to our customers. Hemp is a natural product, and therefore, every batch should be analysed anew. We offer analyses of raw hemp, flowers, crude oils, distillates, and finished CBD products. These are conducted under the highest standards in Germany, and the products are ultimately certified. Our service is available in various languages. Together with our customers, we can determine the exact content of all cannabinoids as well as the water and fat content of EU crops.

CANNABINOID ANALYSES

A cannabinoid analysis is used to determine the individual contents of cannabinoids (including CBD, CBG, CBN, and THC) in the product to be tested. Especially the testing of the content of tetrahydrocannabinol (THC) is of utmost importance, as it is legally limited to a maximum of 0.2% in many European countries. Accordingly, it is of utmost importance that the cannabinoids of the hemp products, especially THC, are conscientiously analysed and remain within the legal limits. The analysis of cannabidiol (CBD) is also particularly important for many customers. Especially in the case of CBD oils, the exact content plays an important role because, in the end, this is what the product is advertised with, and consumers naturally expect that advertising and product match.

In the meantime, there are various methods to determine the quantity and quality of cannabinoids in the hemp plant. For the analysis of quantity, gas chromatography (GC) is very often used. The term chromatography describes the process of separating a mixture of substances by different distribution of its individual components between a stationary and a mobile phase. This type of analysis is usually completed in less than 20 minutes and at up to 300°C. Experience has shown that one-dimensional gas chromatography (GC) does not provide sufficient resolution for the analysis of complex cannabinoid mixtures. Two-dimensional gas chromatography (GC x GC) has proven to be more advantageous in comparison, as it reveals more sample constituents. In addition, GC x GC provides a preference that greatly facilitates the identification of analyses.

TERPENE PROFILE ANALYSIS

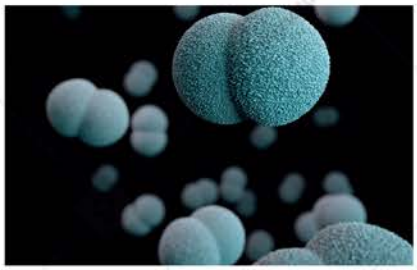
Terpenes significantly determine the flavour of plant products, which also includes the hemp plant. Terpene profile analysis can be used to analyse the exact composition of terpenes in a particular product. Since the human senses are not sufficient to analyse exactly which terpenes are present, analyses are very helpful here and offer a great opportunity to break down products very precisely. Natural smells can be imitated or even created with the help of aromatic molecules. Many cannabis strains, such as Blueberry and Jack Herer, are so popular because of their unique smell and taste. Unique combinations of the different terpenes make them so special. Using terpene profile analyses, the mixture can now be determined in detail and imitated accordingly.

PESTICIDE ANALYSES

Pesticides are various synthetic chemical substances that have a toxic effect on certain organisms, e.g., plants, and serve to protect crops. Pesticide analysis is used to ensure that no harmful pesticide residues are present in the product to be determined. Since the hemp plant is a natural product, pesticides, i.e., plant protection and pest control agents, may be used during cultivation. The pesticides are intended to protect against weeds and fungal infestations. The analysis of pesticides is an essential component of quality assurance because they should not enter the food chain or the water cycle.

MICROBIOLOGICAL ANALYSES

Microbiological analyses can be used to determine whether a product is free from pests and microbial contamination and can therefore be marketed without hesitation. Microorganisms, for example bacteria, viruses, and moulds, are omnipresent in our environment and can also be caused by improper handling during production.



Sometimes they are even desired, e.g., during the fermentation and ripening of various foods. Microorganisms can lead to food spoilage and pose a risk to consumers. Microbiological analyses are used to identify pathogens and spoilage germs so that they can be eliminated and quality and product safety can be guaranteed. The total plate count in particular is an important indicator in this process, because it indicates how many microorganisms are present in a sample. In this respect, there are certain guideline values that must not be exceeded. The specialist group for food microbiology and hygiene of the German Society for Hygiene and Microbiology (DGHM) has compiled an overview of these guide values.

HEAVY-METAL ANALYSES

Heavy metals, according to the common definition metals with a density greater than 5g/cm³ , can be absorbed by the hemp plant from nature because some are natural components of our earth's crust. The amount absorbed by the hemp plant depends on the soil conditions and the cultivation method. Some of these heavy metals are indispensable for the human body: trace elements such as iron and zinc. They are important for metab-

olism, for example. If too high amounts of these trace elements are ingested, this can be dangerous and toxic for humans.

The heavy-metal analysis can be used to determine whether these are only contained in the product in harmless quantities. The sample to be analysed is usually destroyed to such an extent that the heavy metals are free in solution. The elements are then measured. EC Regulation 1881/2006 is responsible for setting the maximum level of contaminants in the EU.

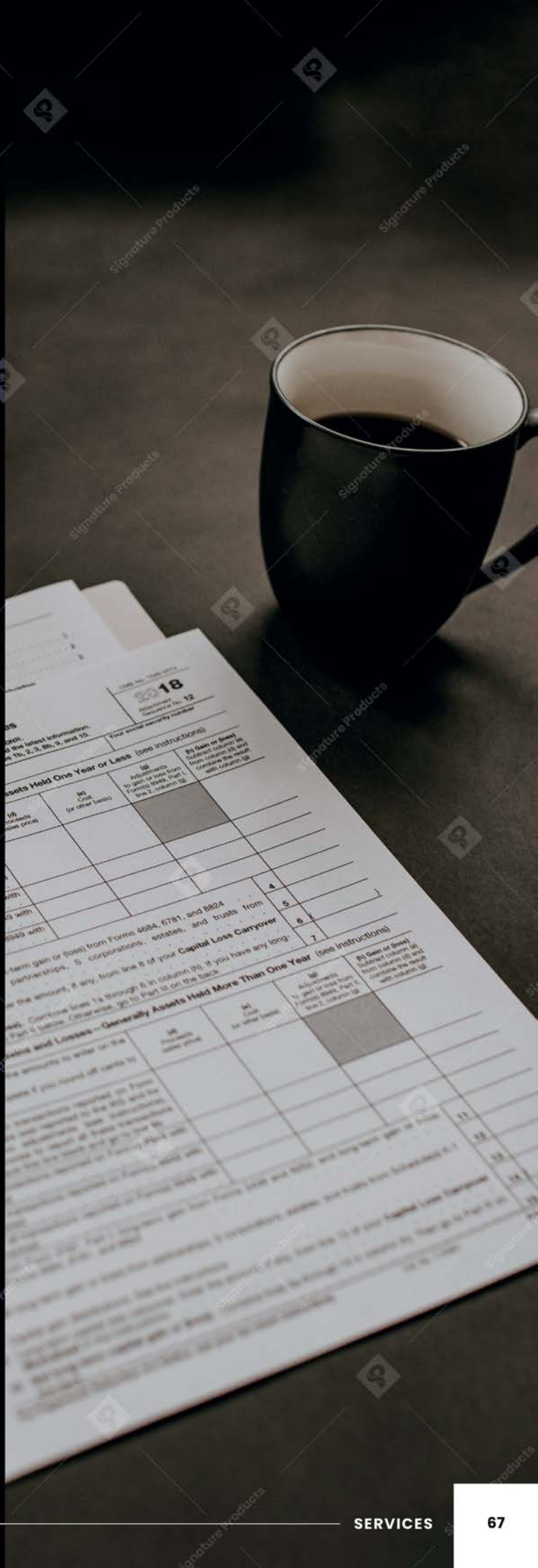
STABILITY TESTS

A stability test, or shelf-life test, is used to check whether a mixture will last in the long term. This is because not every cannabinoid oil can be mixed with random ingredients. A stability test can be used to make sure that the product does not dehomogenise after being put on the market, i.e., that the consistently uniform liquid does not split unevenly. The aim of the whole process is to ensure that the physical-chemical structure of the product is not affected, that a lasting effectiveness is achieved, and that harmful influences are prevented during use. For the manufacturer, it is essential to know when and under which conditions the effects of his product will cease. In this way, important information regarding storage and shelf life can also be noted on the packaging.

Such tests usually include the following steps: storing the products at different temperatures, for different lengths of time, with different humidity levels and light sources. In addition, suitable test parameters are selected, e.g., the pH value, appearance, odour, consistency, and taste. Furthermore, use by a user is simulated. In addition, the shelf life is evaluated and assessed. The packaging is also tested and checked for tears and cracks.

REGISTRATIONS

Thanks to our daily business ventures, we are experts when it comes to the registration and correct declaration of products. Whether you want to certify your product as organic, register it for cosmetic use, or as a tobacco replacement, we are at your disposal. With our help, you can save a lot of time and paperwork and focus on what really matters to sell your products efficently.



PZN REGISTRATION

The PZN (Pharma Central Number) is used to identify medical and health products in the German health system. The number consists of eight numbers from zero to nine, with the last number being a check digit. It not only supports the identification of health products but also the billing of pharmacies with health insurance companies. The PZN identifies products by manufacturer, name, dosage form, active-ingredient strength, and package size. If necessary for clear differentiation from other products, other criteria such as colour, shape, and size are included, for which a separate PZN is created.

IFA GmbH in Frankfurt is responsible for registering the PZN. First, an IFA provider contract must be concluded for this and the article data must be entered into the IFA database. The prerequisites for inclusion in the IFA database are, among others, that the article is customary in pharmacies according to the Pharmacy Operations Ordinance (Apothekenbetriebsordnung). Furthermore, it must be marketable in Germany without restrictions. The supplier must fulfil the legal and factual requirements for placing the products on the market. These include, for example, distribution law, patent law, and that the articles are basically available on the market and can be obtained from pharmacies.

We are happy to help you with the time-consuming process of PZN registration for your products. We have already carried this out many times and will gladly take over this work for you or advise you on this process from start to finish.

Frankfurt, hometown of IFA GmbH, the company that maintains a database of all products suited for pharmacies and assigns PZN numbers to newly registered products.

COSMETICS REGISTRATION

Cosmetics are substances that only come into contact with the human body externally. This includes, for example, skin, hair, nails, teeth, and the mucous membranes of the mouth. Cannabidiol (CBD) was included in the CosIng guidelines as a legal cosmetic ingredient in 2021. Therefore, products containing CBD can be registered as cosmetics not only for external use but also for use in the mouth and throat. Cosmetic products must be safe for normal use. Furthermore, they must not mislead consumers. It does not matter whether the product is imported into the EU from a third country or presented on the market for the first time. It is important that the responsible person, or even the responsible company, is visibly identifiable with name and address on the product. The responsible person or company must ensure that the product complies with Regulation (EC) No 12/23/2009 on cosmetic products and the German Cosmetics Regulations.

At the time of placing on the market, the compositional, notification, and good-manufacturing practice requirements must be fulfilled. This requires the so-called Product Information File (PID), a comprehensive documentation on each product. Therefore, knowledge of the full composition of the product is essential. The responsible person must also inform the competent supervisory authority about the placing of cosmetic products on the market.

The following requirements are imposed on the registration of cosmetics: A safety assessment is required, which assesses whether the product is safe for the intended use but also for the foreseeable use.

Furthermore, a CPNP registration. CPNP stands for Cosmetic Product Notification Portal, where all cosmetic products marketed in the European market must be registered. We at Signature Products are happy to take on this registration, but the responsibility remains with our

customers. For this purpose, the customer must register in the ECAS (European Commission Authentication Service) database.

In addition, the product must comply with the INCI list. The International Nomenclature for Cosmetic Ingredients is an international guideline for the error-free raw material designation of ingredients. As already mentioned, a product information file (PID) is also required. However, our safety assessment already contains all the required documents for the PID. The company selling the product is obliged to document all complaints regarding the cosmetic product.

We have already carried out various cosmetic certifications and are happy to accompany and advise our customers during this process. For this purpose, we carry out various tests to ensure maximum stability and to prevent possible impurities. The ingredients are also tested, and an independent expert issues an opinion on their marketability. After passing the safety assessment, the product is registered as a cosmetic product.

TOBACCO SUBSTITUTE REGISTRATION

For all smokable products, such as vape pens, a tobacco substitute registration is required. This registration is essential so that the products can be legally sold on the German and European markets. In this process, each individual product undergoes registration and testing. Relevant in this process are safety data sheets, analyses of, for example, heavy metals and allergens, as well as optional nicotine analyses.

The competent authority has a veto period of six months, within which it can stop the product from being placed on the market. Once the holding period has expired without a veto, the product is officially registered as a tobacco substitute.

At Signature Products, we are also happy to take care of this registration for you. We have often accompanied the process of tobacco substitute registration and are happy to advise you from start to finish. ■

EPILOGUE

In 2021, around 6,444 hectares of cultivated commercial hemp covered part of Germany. Over the last nine years, this number has steadily increased, with an initial value of 424 hectares. This means that the number of hectares of cultivated commercial hemp in Germany has increased more than fifteenfold. These promising developments allow us to predict how the cultivation of commercial hemp in Germany will behave and expand in the coming years. Through the development of new product innovations, the research conducted on the hemp plant, which contributes to an improved understanding of the plant, market experts assume further growth at the European level.

Products containing hemp have long since become commonplace in supermarkets, drugstores, and online shops. Whether it's cooking oils, hummus, crisps or bars, body lotions, hand creams, or shower gels, trade has long since moved with the hemp hype. More and more companies are adding hemp seeds, hemp seed oil made from them, or CBD to their products. The market for CBD oils has also exploded in recent years: In Germany, there are said to already be around 500 CBD producers*, and in 2019, sales of more than 100 million are expected to have been made with CBD throughout Germany. By 2025, the analysis company Brightfield, which focuses on the hemp market, expects 1.4 billion euros across Europe.

Compared to Switzerland, Italy, Austria, the Czech Republic, and Luxembourg, Germany is currently at the bottom of the league with a maximum legal THC value of 0.2%. A ray of hope for the hemp industry, however, is the 0.3% THC permitted in commercial hemp from 01.01.2023 in Europe. This increase, which may seem minimal, can have many encouraging effects for the hemp market: In addition to the expansion of approved varieties, there is the option of receiving subsidies for new hemp varieties. While a THC level of one percent is already permitted in Switzerland, the same will be true in the Czech Republic from 01.01.2022.

This will benefit the planned cannabis legalisation of the traffic light parties in Germany, a "controlled distribution for consumption purposes in licensed shops", which could possibly catapult the hemp market into new spheres. It is still unclear when legalisation will come into force, but many farmers are already ready to start. According to studies, cannabis legalisation could create 27,000 new jobs, e.g., in production and sales. Economist Prof. Justus Haucap calculated revenues of about 2.7 billion euros per year for Germany after cannabis legalisation.

Hemp is sustainable in cultivation and can be completely recycled. Hemp not only serves the food, pet food, cosmetics, pharmaceutical, tobacco, construction, and textile industries. Hemp can not only replace meat or meat alternatives like soy and peas. Hemp can do much more.

If we grew more hemp in Europe and put even more money into research into its possible applications, we could solve many of the problems of the future. We could actively contribute even more to combating climate change, reducing mass animal slaughter, and feeding humanity more sustainably. And that is just the beginning.

But one plant alone cannot make the world a better place. It needs many alternatives, but also, above all, it needs to educate people. If people are not aware of how sustainable living is important for the future of the planet and do not know how to feed the world and themselves sustainably, then we will not get the big problems of humanity solved.

This is why we have brought this magazine into the world. We want people to be educated about hemp and its sustainable uses.

We, the whole team at Signature Products, are always ready to answer questions about hemp and are happy to clarify the current state of knowledge. We are actively committed to a sustainable lifestyle. Contact us at any time. ■

WANT TO GET TO KNOW US BETTER? PLEASE FEEL FREE TO CONTACT US.

Your contact person supports and gladly advises you in your project.

FLORIAN PICHLMAIER | CEO

+49 7231 133 264 2

florian@signature-products.com

PAUL MYSKA | HEAD OF SALES

+49 7231 133 264 6

paul@signature-products.com

DAVID KLEIN | HEAD OF PRIVATE LABEL

+49 7231 133 264 5

david@signature-products.com

MATTHEW HIMPSON | HEAD OF INTL. MARKETS

+49 7231 133 264 8

matthew@signature-products.com

MAX WÖLK | CTO & HEAD OF MARKETING

+49 7231 133 264 4

max@signature-products.com

KATHRIN RANEGGER | HEAD OF PURCHASE

+49 7231 608 941 5

kathrin@signature-products.com

SIGNATURE PRODUCTS MAGAZINE **SIGMA** ISSUE *2022*

SIGNATURE PRODUCTS GMBH | KLUMPENSEE 2 | 75177 PFORZHEIM | GERMANY

WWW.SIGNATURE-PRODUCTS.COM