

Intellectual Property Executive Summary

Prepared by Jacob Black, PhD – CSO, Treehouse Biosciences & Next Frontier Brands
4/20/2021

Introduction

Industrial Hemp & THC

Congress has defined industrial hemp as the plant *Cannabis sativa* containing no more than 0.3% Δ9-tetrahydrocannabinol (THC) by dry weight. Interpretations of the 2014 and 2018 Farm Bills, which allow for the lawful cultivation of industrial hemp, state that any product containing >0.3% THC by weight is a marijuana product, therefore federally illegal and subject to DEA oversight.

In this light, Treehouse developed two key patents (one granted, one pending) each providing a different method for removing or remediating THC from industrial hemp-derived oils. Additionally, a method for producing USDA Organic Certified CBD isolate (>99% CBD, with 0% THC) is disclosed in a recent provisional application.

Accessing Rare Cannabinoids

While THC and cannabidiol (CBD) have recently garnered much attention, there are over 100 different biologically active molecules (cannabinoids) produced by *Cannabis sativa*. These cannabinoids are responsible for the medicinal efficacy of the plant, though the exact mechanism of action and therapeutic potential remain unknown. Of the over 100 rare cannabinoids most are completely unstudied, and thus present an untapped field of medicinal potential for wellness and pharmaceutical product development. Additionally, current US regulations do not prohibit the study or manufacturing of non-THC based cannabinoids.

Consequently, Treehouse has developed an extensive patent portfolio focused on accessing all cannabinoids. This includes 13 patent applications surrounding specific formulations and their methods of production from hemp; and 6 applications covering methods to synthesize a variety of rare, minor, and novel cannabinoids. Notice of allowance has been issued by the United States Patent & Trademark Office (USPTO) for a method to access cannabigerol (CBG). Much of the “allowed” material forms the foundation for the synthetic methodology to access the aforementioned 100+ rare cannabinoids.

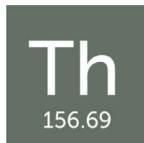
Summary

The combined portfolio described above was strategically developed to provide access to hemp derived products regardless of regulatory conditions, both internationally and domestically. Additionally, we placed special focus on securing key portions of the cannabinoid supply chain with methodology, formulation, and composition of matter claims. This ensures any cannabinoid or cannabinoid containing product can be produced either naturally or synthetically.

Estimated values and a brief description of each category in the Treehouse patent portfolio are described below. A list of the individual patents (granted and pending) is attached on the last page for reference.

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Patent Descriptions and Valuation

Industrial Methods

Our portfolio consists of three major methods we have developed to address the needs of the industry, specifically 1) removing THC from hemp oil, 2) selectively converting THC to the federally legal CBN in hemp oils, and 3) solventless production of pure cannabinoids.

1) These inventions relate to removing THC from hemp oil to produce THC-free products. Hemp Benchmarks has reported that 100+ hemp processors in the United States use this technology to produce THC-free oils, likely violating protected claims in our granted patent. Roughly half of those processors produce over 100 kg of THC-free oil each month, with 15% of them producing over 1,000 kg per month. At the time of this writing, THC-free distillates are sold at or above \$1,000/kg. This presents an incredible licensing opportunity. 50 processors manufacturing 100 kg/month of oil, selling at \$1,000/kg, with a 5% license fee, affords the company \$3,000,000 annually in revenue.

Valuation: \$3M per year * 18 years = \$54M

2) This technology selectively converts the THC found in hemp oils into the federally legal cannabinoid, cannabiol (CBN). The method is incredibly mild and is USDA Organic Certified. Producing THC-free products utilizing this method provides the following advantages: high throughput, low CAPEX, minimal operating costs, USDA Organic Certification, and high yields. This technology is particularly useful for large-scale operations. Licensing this technology to 10 processors who each produce 1,000 kg of THC-free oil each month, with a 5% licensing fee, the company stands to generate \$6,000,000/year in revenue.

Valuation: \$6M per year * 20 years = \$120M

3) Current technology necessarily requires the use of hazardous solvents, such as pentane or heptane, in the production of cannabinoid isolates. With a large and rapidly growing segment of wellness consumers demanding USDA Certified Organic products a solventless isolate production methodology is highly desirable. To date no companies have been able to manufacture cannabinoid isolates in such a manner. This technology enables the production of pure CBD, CBG or CBN without the use of solvents allowing, for the first time, USDA Organic Certified cannabinoid isolates. The growing demand for organic products, particularly within the wellness focused hemp industry, allows these cannabinoid isolates to demand a premium price point.

Valuation: 3,000 kg per year * \$1,000 per kg * 20 years = \$60M

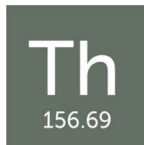
Unique Ingredients and Formulations

By patenting unique, valuable, and specific cannabinoid formulations, Treehouse can command exclusivity on the sale of these formulations in the US, Canadian and European markets. This portfolio includes THC-free formulations as well as oils rich in cannabigerol (CBG), cannabichromene (CBC), and CBN. With exclusive sales of THC-free products alone, prices can be normalized to afford healthy and protected margins.

Valuation: 6,000 kg per year * \$1,000 per kg * 20 years = \$120M

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Synthetic Chemistry

While *Cannabis sativa* is known to produce over 100 unique cannabinoids, only 5 of these cannabinoids are produced naturally by the plant in any appreciable amounts. This renders isolation of > 95% of all known cannabinoids from the plant unfeasible on an industrial scale. Each of these 100+ cannabinoids possess unique biological activity and thus unique therapeutic potential. Market demand for these cannabinoids is rapidly and consistently growing. The most efficient way to access these compounds to meet consumer demand is through synthetic chemistry, which is specifically tailored to manufacturing at an industrial scale. Treehouse has developed a patent portfolio that allows access to all 100+ cannabinoids in a cost-effective manner, enabling bulk ingredient sales of rare cannabinoids and custom cannabinoid blends to meet specific consumer demands. Historically, rare cannabinoid isolates have sold between \$60,000-\$250,000/kg. Further, this patent portfolio encompasses the preferred methods that pharmaceutical companies utilize, offering valuable licensing potential. In particular, our patent for the pharmaceutically relevant synthesis of cannabigerol (CBG) has been allowed by the USPTO, with several additional filings behind it. Much of the “allowed” material forms the foundation for the synthetic methodology to access the aforementioned 100+ rare cannabinoids.

Valuation: 100 kg * \$60,000 per kg * 20 years = \$120M

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