

**For discussion on
7 June 2022**

Legislative Council Panel on Security

Proposed Control of Cannabidiol through Legislation

Purpose

This paper introduces the Government's proposal to further control cannabidiol (CBD) in Hong Kong under the Dangerous Drugs Ordinance (DDO) (Cap. 134). The proposal will not affect the current mechanism to allow research related to cannabis compounds as well as the registration and use of CBD pharmaceutical products.

The Proposal

2. It is proposed that CBD be brought under control as a dangerous drug through inclusion of the substance in the First Schedule to DDO. Upon the commencement of the relevant piece of legislation, CBD will become a dangerous drug in Hong Kong. The manufacture, import, export, supply, sale, possession, transshipment, etc. of CBD, including any products containing CBD, will be prohibited unless in accordance with DDO (e.g. use of medicine according to prescription) or a licence issued by the Department of Health (DH) where appropriate.

Justifications

Need to combat cannabis abuse

3. Cannabis is a drug strictly controlled by the United Nations. Tetrahydrocannabinol (THC) is the major psychoactive substance found in cannabis, and its consumption by human would lead to physical dependence and a range of health hazards (e.g. addiction, hallucination, heightened risks of cancer and respiratory diseases if used with tobacco, heart attacks and stroke in young cannabis users, etc). The health hazards posed by THC and cannabis are set out in greater detail at **Annex A**. Currently, in Hong Kong, cannabis, cannabis resin, THC and certain other cannabinoids are already controlled under DDO. The illegal

trafficking, manufacture, import, export, cultivation, possession and consumption of the cannabis and controlled cannabis substances are serious criminal offences¹.

4. Broadly following the world trend, the Central Registry of Drug Abuse (CRDA)² has recorded higher number of cannabis abusers in Hong Kong in recent years than before. In 2021, the total number of reported cannabis abusers increased by 33% (from 749 to 994) as compared to 2020, while the number of young cannabis abusers aged under 21 increased by 48% (from 326 to 483). Cannabis has also become the most popular drug abused among young people since 2019, with more than 56% of reported young abusers taking that drug in 2021.

5. The Government has taken a firm stance against cannabis and repeatedly stated that the use, cultivation, manufacturing, trafficking, etc. of cannabis and controlled cannabis products are illegal and will remain so. However, there has been a growing availability of different types of CBD products, including food, health supplements, skin care and beauty products, etc. around the world and in Hong Kong for both human and pet consumption. Many of them claim to provide health benefits. So far, there is no authoritative conclusion on those claims, and replacements could be found. There is also no international standard on the safety level of human consumption of CBD and guidelines on its usage.

6. Meanwhile, frontline social workers have reflected to us that many members of the public are confused about cannabis and CBD, and some youngsters are particularly eager to try out CBD products which may lead to cannabis abuse. There is a need to reinforce our control of cannabis and its related products so as to combat this emerging phenomenon. Indeed, there are calls that the Government should outlaw CBD products or regulate them, and the public has expressed worries about the popularity of cannabis among young drug abusers, and the potential

¹ Under DDO, trafficking (including importing and exporting) and manufacturing of substances in contravention of the law will be subject to a maximum penalty of life imprisonment and a fine of \$5 million. Cultivation of cannabis plants will be subject to a maximum penalty of 15 years' imprisonment and a fine of HK\$100,000. Possession and consumption of the substances in contravention of DDO will be subject to a maximum penalty of seven years' imprisonment and a fine of \$1 million.

² CRDA is set up to provide relevant drug abuse statistics for monitoring changes in drug abuse trends and characteristics of drug abusers to facilitate the planning of anti-drug strategies and programmes in Hong Kong. It is a voluntary reporting system recording the details of drug abusers who have come into contact with and have been reported by the reporting agencies, including law enforcement agencies, treatment and welfare agencies, tertiary institutions, hospitals and clinics.

health impact of CBD products.

Presence of THC in CBD products

7. The chemistry of cannabinoid is complex and the related scientific findings are evolving. CBD is a cannabinoid found naturally in the cannabis plant. Pure CBD is not psychoactive and is not associated with abuse potential³. It does not give a euphoria (or “high”) feeling. At present, CBD that is added to various CBD products is mainly extracted from cannabis plants (known as “CBD isolates”), albeit it is also possible to derive CBD through a chemical process from other starting materials, such as terpenes from non-cannabis botanicals (hereinafter as “synthetic CBD”).

8. According to the scientific advice of the Government Laboratory (GL), where CBD is extracted from cannabis, it is very difficult to isolate pure CBD from cannabis, and it would not be practical to completely remove THC impurities from CBD isolates. There is also a risk of contamination by THC during the production process. It is nearly inevitable that CBD products manufactured from CBD isolates contain certain levels of THC, even though at trace levels or levels below the detection limits of various analytical methods.

9. Having regard to the likelihood that CBD products may contain THC, the Hong Kong Police Force and the Customs and Excise Department proactively launched operations at various locations in Hong Kong (including chain stores) to seize and test products claiming to contain CBD in view of the different types of CBD products imported and sold locally in recent years. Since 2019, more than 120 such operations have been conducted. Of the samples sent to GL for testing and for which testing had been completed, around one-third of them were found to contain THC, involving more than 4 100 items seized. The positive results of THC found in CBD products reflect the scientific finding that THC is likely present in CBD products which are prepared from CBD isolates.

Decomposition and conversion of CBD to THC

10. Moreover, since the chemical structures of CBD (whether as CBD

³ CBD has thus far not been listed as a substance controlled by the three major international drug conventions. CBD is also currently not controlled under DDO and the Control of Chemicals Ordinance (Cap. 145), the two principal ordinances governing the control of dangerous drugs and their precursors in Hong Kong respectively.

isolates or as synthetic CBD) and THC are similar, CBD may naturally decompose into THC. According to GL, water and carbon dioxide in air may act as a catalyst for the decomposition. Therefore, where CBD products are not protected against air and moisture (e.g. by opening of lid), decomposition of CBD to THC may take place even under normal storage conditions.

11. CBD can also be purposely converted into THC. Scientific literature has reported that CBD may be converted to THC with a very high yield⁴ (up to 82%) through chemical processes. Some researchers have even reported that the conversion is possible in the household kitchen environment under simple process and harnessing commonly available acidic materials. GL's in-house experiment on the same has produced similar results, with the yield of conversion of CBD to THC up to 60%. In addition, it was reported in scientific literature that CBD that is added to e-cigarettes may be converted to THC, among other cannabinoids, during smoking.

12. GL's key advice on the presence of THC in CBD products and the possible decomposition and conversion of CBD to THC is set out in greater detail at **Annex B**.

Need for clear and effective control of CBD in Hong Kong

13. The Government all along maintains a firm stance against drugs and does not tolerate any level of THC in non-pharmaceutical products, as part of our long-standing anti-drug policy. This is to protect public health, particularly amid the lack of any well recognised safety threshold of prolonged exposure to trace-level THC internationally. Under DDO, any quantity of a dangerous drug is regarded as dangerous drug notwithstanding that the quantity is insufficient to be measured or used. Whether the THC level is high enough to deliver psychoactive effect is irrelevant. The fact that CBD products may likely contain THC, as remnants of extraction from cannabis or through natural decomposition under normal storage conditions, is clearly at odds with the law and our policy. The situation is unacceptable as consumers may buy products that contain the dangerous drug THC even when they are labelled as "THC-free".

⁴ In chemistry, "yield" herein refers to the quantity of THC molecules formed in relation to the quantity of CBD molecules consumed. Since THC and CBD coincidentally have the same composition of elements in THC and CBD molecules (i.e. their masses are identical), a yield of 60%, for instance, also means that 60 grammes of THC can be made from 100 grammes of CBD in a particular chemical reaction.

14. In addition, since CBD may be converted to THC with a high yield through chemical processes, there is a risk that some people may attempt to obtain THC from CBD products. For traders, the likely presence of THC in CBD products may put them at risk of violating DDO. The wide availability of CBD products may also misguide members of the public into believing that cannabis or even THC is not a drug or expecting the relaxation of local control, which is not true.

15. While any CBD product containing THC is against DDO, reliance on detecting THC or other dangerous drugs in CBD products is neither desirable nor effective for stemming illicit supplies of THC and protecting the health of our residents. For non-pharmaceutical CBD products, various other laws are also applicable in the respective areas of ensuring food safety and goods safety, and prohibiting the application of false trade descriptions, etc. For instance –

- (a) the Public Health and Municipal Services Ordinance (Cap. 132) tackles food unfit for human consumption;
- (b) under the Trade Descriptions Ordinance (Cap. 362), a trader making a false or misleading statement of any goods to a material degree commits the offence of false trade descriptions;
- (c) the Consumer Goods Safety Ordinance (Cap. 456) imposes a duty on manufacturers, importers and suppliers of certain consumer goods to ensure that the consumer goods they supply are safe; and
- (d) the Undesirable Medical Advertisements Ordinance (Cap. 231) prohibits or restricts the advertising of any medicine, surgical appliance or treatment for the prevention or treatment of diseases or conditions prescribed in its Schedules.

These laws apply to regulating different types and/or aspects of CBD products, and would not be enough for addressing the presence of THC across different types of CBD products and strengthening relevant control.

16. For the above considerations, there is a need for stepping up the current control of CBD by bringing it under the control of a clear legislation, and DDO is the most suitable ordinance for this purpose. The control would cover both CBD extracted from cannabis and synthetic CBD as they are of identical chemical structure and both are capable of decomposing or being converted to THC through the process described in paragraphs 10 to

11 above. This approach is most suitable for the current local situation and in meeting public expectation.

Other Control Options Considered

17. Internationally, there has been no standard practice on whether and how the use of CBD in different non-pharmaceutical products such as food, supplements, cosmetics and skin care products should be regulated. We consider that the legislation as mentioned in paragraph 15 above would not be enough to directly address the likely presence of THC in CBD products. On balance, given the latest scientific advice on the presence of THC in CBD products through decomposition or conversion, and the need to stem the supply of the substance as such, controlling CBD under DDO is the most appropriate and clear-cut option. This will bring the control of CBD in line with cannabis and THC under one ordinance.

Next Steps

18. Pursuant to section 50(1) of DDO, the Chief Executive may by order published in the Gazette amend the First Schedule to DDO. As in past updates to the First Schedule to DDO, we will consult relevant stakeholders, including the Action Committee Against Narcotics, holders of licences under DDO, the Control of Chemicals Ordinance (Cap. 145) and the Pharmacy and Poisons Ordinance (Cap. 138), the logistics trade and relevant industry and trade groups before taking forward the legislative amendments.

19. Given that CBD products are now widely available in the market in Hong Kong, we plan to table the relevant legislation within 2022 and allow reasonable time (e.g. three months) thereafter for the trade to dispose of the products before the amendment comes into operation.

20. Meanwhile, law enforcement agencies will continue to take actions against CBD products in the market. Products suspected to contain THC will be taken for testing, and if THC is found, law enforcement will follow. The Government will also continue its publicity and public education on the harms of cannabis. In particular, we expect local residents will come across more CBD and other cannabis-derived products when they travel in future. Publicity will be launched to educate the public in this regard.

Advice Sought

21. Members are invited to comment on the Government's proposal in paragraph 2 above.

**Narcotics Division
Security Bureau
May 2022**

Harms of Tetrahydrocannabinol (THC) and Cannabis

THC is the major cannabinoid in cannabis plants causing psychoactive effects (“high”), harmful effects and addiction.

Short-term serious harms to health

- Intoxication, with disturbed consciousness, cognition, perception, affect of behaviour, and psychophysiological functions
- Panic attacks, hallucinations and vomiting (in a minority of first-time users)
- Impairment of driving and an increased risk of road traffic injuries
- Possible triggering of coronary events in younger cannabis smokers
- Adverse effects on the fetus if a mother smokes cannabis during pregnancy

Long-term psychosocial effects of regular cannabis use

- Dependence
- More severe and persistent negative outcomes among adolescents than among adults
- A dose-response relationship between cannabis use in adolescence and the risk of developing psychotic symptoms or schizophrenia in young adulthood
- Increased risk of cognitive impairment, illicit use of other drugs, depressive symptoms and suicidal ideation and behavior (when cannabis is used daily in adolescence and young adulthood)

Other possible longer-term physiological risks of regular cannabis use

- Chronic and acute bronchitis and injury to bronchial lining cells
- Myocardial infarctions and strokes in young cannabis users
- An increased risk of cancer and other respiratory diseases if used with tobacco
- Testicular cancer (the link requires further investigation)

**Government Laboratory’s Key Scientific Advice and Findings
on Cannabidiol (CBD) and Tetrahydrocannabinol (THC)**

CBD Extracted from Cannabis and Synthetic CBD

1. CBD that is added to various CBD products is **mainly extracted from cannabis plants**.
2. CBD that is extracted from cannabis would normally undergo a process which attempts to remove all other unwanted cannabinoids and impurities. The product after purification is known as “**CBD isolate**”.
3. It is possible to derive CBD through a chemical process (“synthetic CBD”). **Synthetic CBD may be chemically synthesised in laboratory from non-cannabinoid starting materials**, such as terpenes from non-cannabis botanicals like citrus fruits.
4. CBD extracted from cannabis plants and synthetic CBD are **chemically identical**.

Presence of THC in CBD Products

5. According to a study in December 2021, depending on the levels of purifications performed, typical CBD isolates used in the production of CBD products contains 0.02-0.03% of THC, while high-end commercially available CBD isolate contains lower amounts of THC, at 0.005-0.007%¹. Other different recent studies have reported that

¹ Report from the United Kingdom’s Advisory Council on the Misuse of Drugs (ACMD) on: “Consumer cannabidiol (CBD) products”, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1041851/For_publication_-_CBD_products_report_17_December.pdf.

THC can be found in a significant proportion of products sampled^{2,3,4}.

6. **It is nearly inevitable that CBD products manufactured from CBD isolates would contain certain levels of THC** as it is difficult for any purification process under present technologies to totally remove THC. While in some CBD products, no THC may be found above or at the relevant detection limits of analytical methods⁵, THC below the detection limits would likely exist.
7. In the first four months of 2022, among the samples of CBD products submitted by the Hong Kong Police Force and the Customs and Excise Department to the Government Laboratory (GL) for testing, **42.5% were found to contain THC**.

Decomposition and Conversion of CBD into THC

Decomposition of CBD into THC

8. The chemical structures of CBD and THC are very similar, and **CBD may interact with moisture and air, and decompose into THC even under normal storage conditions**.
9. Since the chemical structures of CBD extracted from cannabis and synthetic CBD are identical, both are at the risk of the natural decomposition process.

² Report by the United States Food and Drug Administration: “Sampling Study of the Current Cannabidiol Marketplace to Determine the Extent That Products are Mislabeled or Adulterated”.

³ Lachenmeier DW, Habel S, Fischer B, Herbi F, Zerbe Y, Bock V, Rajcic de Rezende T, Walch SG, Sproll C. Are adverse effects of cannabidiol (CBD) products caused by tetrahydrocannabinol (THC) contamination? F1000Res. 2021 Jul 30;8:1394.

⁴ Liebling JP, Clarkson NJ, Gibbs BW, Yates AS, O'Sullivan SE. An Analysis of Over-the-Counter Cannabidiol Products in the United Kingdom. Cannabis Cannabinoid Res. 2022 Apr;7(2):207-213.

⁵ A detection limit is the lowest concentration of an analyte in a sample that can be consistently detected with a stated probability. Technologies used to detect THC may include chromatography, mass spectrometry, Fourier infrared spectroscopy, Raman spectroscopy, etc. There is no single testing methodology applicable to all products.

10. A recent study⁶ has reported that a freshly opened synthetic CBD solution was found not to contain THC at a level above the detection limit of the analytical method at the start of the experiment. After a three-month normal usage and storage period on a bench-top as suggested on the product label, traces of THC were subsequently detected in the bottle of synthetic CBD solution. **The researchers opined that water and carbon dioxide in air together formed carbonic acid which acted as a catalyst for the decomposition of CBD to THC.**

Purposely Converting CBD to THC

11. CBD can be purposely converted to THC. A piece of literature published in 2020 reported that the yield⁷ of conversion of CBD to THC under specific conditions could be as high as 82%⁸. The procedure is by adding laboratory grade strong acid (p-toluenesulfonic acid) to CBD in an organic solvent (e.g. toluene) and keeping the reaction mixture at room temperature for 48 hours.
12. Another recent piece of literature reported **the use of commonly available acidic materials, such as vinegar or battery acid which can be bought from convenience stores or local shops, to convert CBD to THC.** The procedure could proceed in a household kitchen by adding the acid to a solution of CBD kept at about 70°C⁹. The researchers believe that **illicit drug dealers can start producing their own THC from CBD** with yields from different routes ranging from 40% to 80%.

⁶ Citti C, Russo F, Linciano P, Strallhofer SS, Tolomeo F, Forni F, Vandelli MA, Gigli G, Cannazza G. Origin of Δ^9 -Tetrahydrocannabinol Impurity in Synthetic Cannabidiol. *Cannabis Cannabinoid Res.* 2021 Feb 12;6(1):28-39.

⁷ In chemistry, “yield” herein refers to the quantity of THC molecules formed in relation to the quantity of CBD molecules consumed. Since THC and CBD coincidentally have the same composition of elements in THC and CBD molecules (i.e. their masses are identical), a yield of 60%, for instance, also means that 60 grammes of THC can be made from 100 grammes of CBD in a particular chemical reaction.

⁸ Marzullo P, Foschi F, Coppini DA, Fanchini F, Magnani L, Rusconi S, Luzzani M, Passarella D. Cannabidiol as the Substrate in Acid-Catalyzed Intramolecular Cyclization. *J Nat Prod.* 2020 Oct 23;83(10):2894-2901.

⁹ Kiselak TD, Koerber R, Verbeck GF. Synthetic route sourcing of illicit at home cannabidiol (CBD) isomerization to psychoactive cannabinoids using ion mobility-coupled-LC-MS/MS. *Forensic Sci Int.* 2020 Mar;308:110173.

13. A study in 2021 reported that 25-50% of **CBD could be converted into other cannabinoids (mainly THC) during the smoking of e-cigarettes**¹⁰.
14. GL has conducted an in-house experiment to convert CBD to THC by adding hydrochloric acid to a solution of CBD. When the reaction mixtures were kept at about 40-50°C for about 4 and 24 hours, **the yields of conversion of CBD to THC were about 20% and 60% respectively.**

**Government Laboratory
May 2022**

¹⁰ Czégény Z, Nagy G, Babinszki B, Bajtel Á, Sebestyén Z, Kiss T, Csupor-Löffler B, Tóth B, Csupor D. CBD, a precursor of THC in e-cigarettes. Sci Rep. 2021 Apr 26;11(1):8951.