

STUDY OF THE CBD CONTENT IN A VARIETY OF COMMERCIALY AVAILABLE CREAMS

INTRODUCTION

With the approval by the European Union of Cannabidiol (CBD) as an ingredient for cosmetics, various creams claim to contain this cannabinoid, and many consumers are buying these products because of the alleged properties attributed to CBD. However, there is no obligation to inform users of whether the cream actually contains it, or even to guarantee its concentration when it is declared.

In this study, the CBD content of several commercially available creams was tested by mass spectrometry/gas chromatography and the results thus obtained were compared with those declared by the manufacturer.

MATERIALS AND METHODS

During the years 2021, 2022, and 2023 a total of 15 creams were purchased that refer to containing CBD. These are sold in pharmacies or specialist CBD shops.

Chromatographic separation was carried out using an Agilent 5-MS Ultra Inert fused capillary column (30m x 0.25mm I.D., 0.25 µm film thickness) placed in Agilent's 7890B gas chromatography furnace, using 99.9% helium as carrier gas at a flow rate of 1.3 mL/min. Injection was performed with an Agilent 7693 autosampler, working in Split mode, in order to improve the precision of the method. The injector temperature was 250°C and the injected volume was 1 µL. An Agilent 5977B mass spectrometer was used as a detector. The transfer line was maintained at 300°C. The SIM mode was used with the m/z of CBD (231.2) and the internal standard (squalane), thus obtaining a higher quantification sensitivity.

Due to the complexity of the sample, CBD quantification was carried out via GC/MS using the standard addition method. For this purpose, 0.2 g of cream was weighed and diluted by means of the wet method in 4 mL of acetone with the help of a spatula. The sample was then filtered through a nylon filter and fortified using a freshly prepared CBD standard according to the standard addition method. The linear range of each calibration line depended on the approximate CBD content detected in the cream sample. Thus, for samples 11 and 12, CBD concentration was between 0.5 and 15 ppm; for creams 13 and 15 the range was between 0.6 and 20 ppm and, finally, cream 14 had a measurement that ranged between 0.5 and 20 ppm.

In the samples, the total cream content of the container is given in volume units. For this reason, it was necessary to calculate the density of these creams in order to convert these values into weight and to be able to relate them to the values obtained.

RESULTS

The CBD content of each cream, and the CBD content declared by the manufacturer, are shown in table 1.

Table 1. CBD content of the creams studied and their conformity with the claims. * It is not specified whether the CBD % in the sample is expressed as a weight/weight or weight/volume ratio. It is assumed to be weight/weight.

	mg CBD/g cream	mg CBD/container	mg CBD/container specified by the manufacturer	Result
Sample 1	0.01	0.49	500	< than indicated
Sample 2	4.01	192.54	180	> than indicated
Sample 3	0.01	0.45	7767.3*	< than indicated
Sample 4	0.00	0.18	Not specified	
Sample 5	0.17	16.77	Not specified	
Sample 6	0.73	43.37	90*	< than indicated
Sample 7	7.80	437.10	Not specified	
Sample 8	4.79	260.38	Not specified	
Sample 9	0.03	1.76	Not specified	
Sample 10	3.46	348.66	500	< than indicated
Sample 11	0.05	3.59	Not specified	
Sample 12	0.06	3.57	Not specified	
Sample 13	1.66	96.19	Not specified	
Sample 14	11.10	809.60	1225	< than indicated
Sample 15	2.73	158.22	Not specified	

Discrepancy with labelling. Of the 15 creams examined, 6 (40% of the total) specify in their labelling the amount of CBD contained in the formulation. Of these 6, only 1 had a CBD concentration that corresponded to what was declared, and it was actually 6.97% higher. Of the other 5, in 2 creams the negative discrepancy between declared and measured content is very high (99.99% and 99.90% difference from the declared content) and in the other 3, the measured content was 48.19%, 69.732% and 66.09% of what was declared. For samples 3 and 6, the manufacturer did not specify whether the CBD content is declared as weight/volume or weight/weight. As the difference was not sufficiently significant, it was decided to use weight/weight for the calculations.

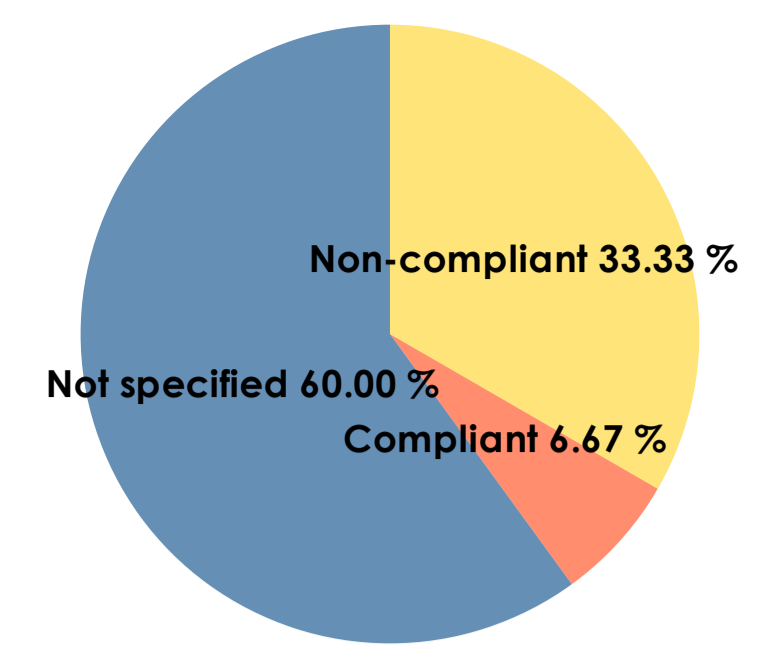


Figure 1. Proportion of creams reporting CBD content, and proportion in which the declared CBD content corresponds or not to the findings

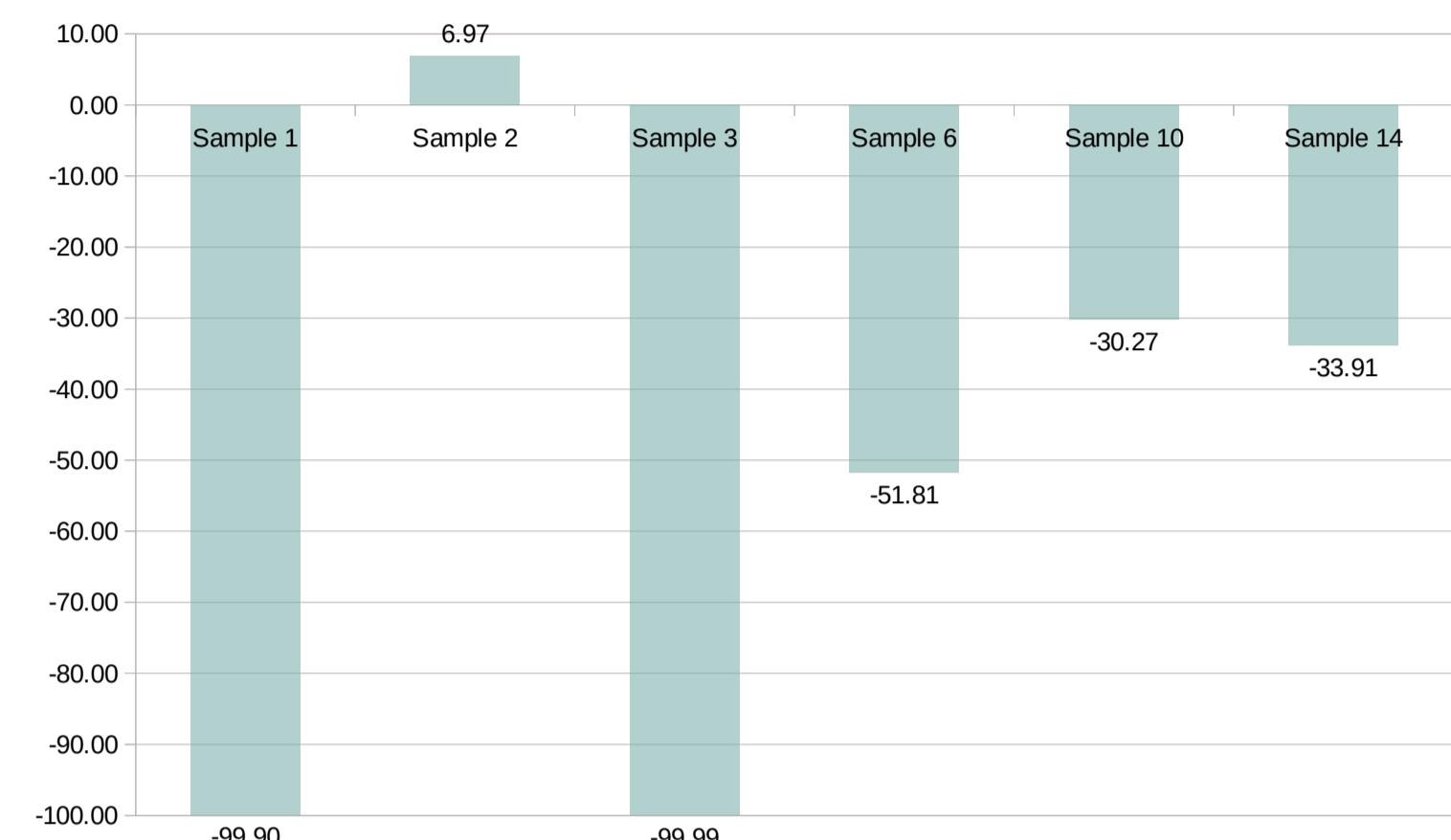


Figure 2. Deviation in % between the content as declared by the manufacturer and as measured

Concentration of CBD in creams. In 8 of the 15 creams, CBD concentration (mg CBD/mg cream) was extremely low, with concentrations between 0.00 and 0.73 mg of CBD per mg of cream (i.e. less than 0.073% CBD content by weight in all 8 creams).

The CBD concentration of the others (7 creams out of 15) was between 0.17% and 1.11% measured by weight.

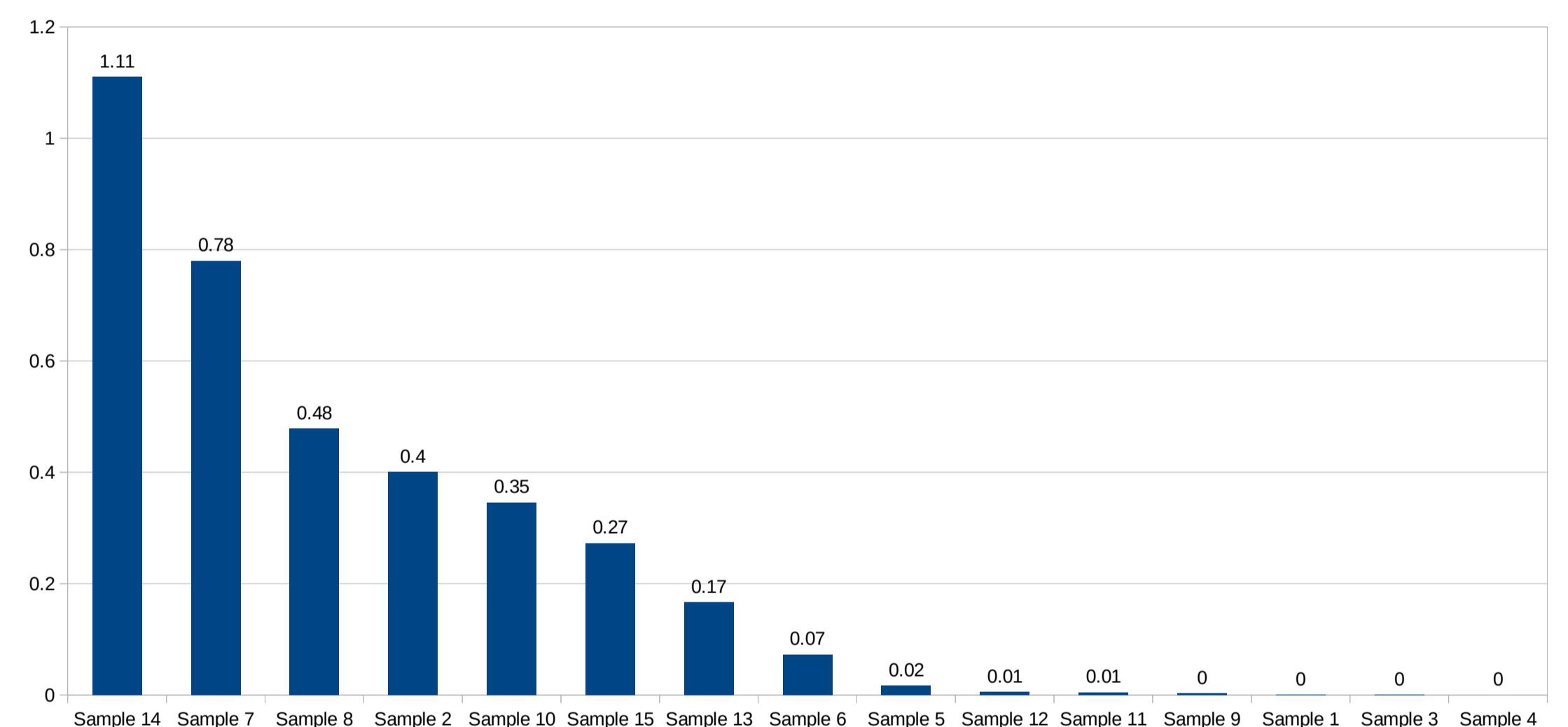


Figure 3. CBD concentration of the creams studied in % w/w

CONCLUSIONS

In general terms, consumer information on the CBD content of the cream is deficient, as only 40% of the creams examined specify it on their packaging. The reliability of this information is also very low, as only 1 of the 6 creams providing this information contained the amount declared. There is also a lack of precision in the information on CBD concentration in creams 3 and 6 as it is not specified whether the % indicated is expressed in weight/weight or weight/volume. Most notably, however, CBD is virtually absent in a large number of samples while, in others, the concentration is so low that it would be very difficult for the CBD to provide any kind of effect.

Consumers who buy these creams tend to do so for the added value and potential effects that derive from CBD. Manufacturers should therefore specify the amount of CBD contained in the cream, as this is information that the buyer should be aware of.

It is also important to check the CBD content of the formulation and all its batches, as they must comply with certain minimums with respect to what is declared, so that the consumer or professional can be sure that the product contains the amount of CBD they are looking for and/or acquiring.