

# Matching: Product Label & Certificate of Analysis

Product labeling is the primary way a processor or product formulator communicates with a consumer. In the hemp industry the most visible item on a label is the amount of CBD in that product. A Certificate of Analysis (COA) obtained by a third-party independent lab, such as ECC Test Lab, provides the processor and, in turn, the consumer with assurance that what is written on a product label accurately represents the concentration of the CBD in that product.

**A challenge arises for the consumer when comparing the CBD concentration on a product label to what is written on a COA. Why is this so confusing?**

- Different units of measurement are used on the product versus on the COA (mg, g, mL, fl. oz, etc)
- The amount of CBD is sometimes referring to the TOTAL amount in a bottle or package. And sometimes it's referring to how much CBD is in ONE dose.
- Dosing sizes can vary – 1 dropper full of a tincture, 2 gummies, 3 capsules before bed. Each of these can be a recommended dose, depending on the strength of the product.
- Lotions, salves and topicals usually don't have a recommended dose, and sometime they don't have a CBD concentration at all. (If there is not CBD concentration written on the label, check to make sure it's not a **hemp seed oil** product, rather than a CBD-infused product).

**Examples below show a LABELED PRODUCT and a CANNBINOID POTENCY TABLE from a matching COA:**

CANNABINOID POTENCY				
ANALYTE	LOD (mg/g)	LOQ (mg/g)	Concentration (mg/g)	Concentration (%)
CBD	0.07	0.25	18.51	1.85
CBDA	0.07	0.25	0.03	0.00
delta9-THC	0.07	0.25	0.51	0.05
delta9-THCA	0.07	0.25	ND	ND
CBG	0.07	0.25	0.35	0.04
CBGA	0.07	0.25	ND	ND
CBN	0.07	0.25	ND	ND
CBC	0.07	0.25	0.94	0.09
delta8-THC	0.07	0.25	ND	ND
THCV	0.07	0.25	ND	ND
<b>TOTAL CBD</b>			<b>18.54</b>	<b>1.85</b>
<b>TOTAL THC</b>			<b>0.51</b>	<b>0.05</b>

Total CBD = CBD + 0.877\*CBDA and Total THC = THC + 0.877\*THCA

The Measurement Uncertainty for Total THC at 0.3% is +/-0.05% or in the range of 0.25% - 0.35%.

**Two Concentrations on the COA:**

**Concentration (mg/g)** is the number of milligrams (mg) of that cannabinoid are in one gram (g) of product.

**Concentration (%)** is the percent of that cannabinoid in the product. THC should be below 0.3% in any hemp product. This product is in compliance because it contains **0.05% Total THC**.

**Two Concentrations on the Label:**

**500mg CBD** is the TOTAL amount of CBD in that bottle.

**16.6 mg/mL** is the amount of CBD in 1 milliliter (mL).



The bottle holds 30mL.  
 That volume of OIL has an approximate mass of **27g**.<sup>Note1</sup>  
 Using the TOTAL CBD on the COA,  
 multiply the **mass of the product** by the **concentration in mg/g**:  
**27g (product) x 18.54mg/g = 500mg CBD**

Assuming a single dose is 1 mL (1 dropper full), the concentration per dose is determined by dividing the TOTAL amount of CBD in the bottle by the number of doses in the bottle (30).  
**500mg CBD / 30mL = 16.6mg/mL**





CANNABINOID POTENCY				
ANALYTE	LOD (mg/g)	LOQ (mg/g)	Concentration (mg/g)	Concentration (%)
CBD	0.07	0.25	37.54	3.75
CBDA	0.07	0.25	ND	ND
delta9-THC	0.07	0.25	1.10	0.11
delta9-THCA	0.07	0.25	ND	ND
CBG	0.07	0.25	1.85	0.19
CBGA	0.07	0.25	ND	ND
CBN	0.07	0.25	ND	ND
CBC	0.07	0.25	2.07	0.21
delta8-THC	0.07	0.25	ND	ND
THCV	0.07	0.25	ND	ND
<b>TOTAL CBD</b>			<b>37.54</b>	<b>3.75</b>
<b>TOTAL THC</b>			<b>1.10</b>	<b>0.11</b>

Total CBD = CBD + 0.877\*CBDA and Total THC = THC + 0.877\*THCA

The Measurement Uncertainty for Total THC at 0.3% is +/-0.05% or in the range of 0.25% - 0.35%.

The bottle holds 15mL.  
That volume of OIL has an approximate mass of **13.5g**.<sup>Note2</sup>

Using the TOTAL CBD on the COA, multiply the **mass of the product** by the **concentration in mg/g**:

$$13.5g \times 37.54mg/g = 507mg \text{ CBD}$$

Assuming a single dose is 1 mL (1 dropper full), the concentration per dose is determined by dividing the TOTAL amount of CBD in the bottle by the number of doses in the bottle (15).

$$500mg \text{ CBD} / 15mL = 33.3mg/mL$$

There are **8 fluid ounces (fl oz)** or **237mL** of LOTION in this bottle. The **density** of this LOTION is **0.99g/mL**.<sup>Note3</sup>

Multiply the **density** by the **volume** of LOTION in the bottle: **237mL (lotion) x 0.99g/mL = 234g (lotion)**

Using the TOTAL CBD on the COA, multiply the **mass of the lotion** by the **concentration in mg/g**:

$$234g \times 1.28mg/g = 300mg \text{ CBD}$$



CANNABINOID POTENCY				
ANALYTE	LOD (mg/g)	LOQ (mg/g)	Concentration (mg/g)	Concentration (%)
CBD	0.07	0.25	1.28	0.13
CBDA	0.07	0.25	ND	ND
delta9-THC	0.07	0.25	ND	ND
delta9-THCA	0.07	0.25	ND	ND
CBG	0.07	0.25	ND	ND
CBGA	0.07	0.25	ND	ND
CBN	0.07	0.25	ND	ND
CBC	0.07	0.25	ND	ND
delta8-THC	0.07	0.25	ND	ND
THCV	0.07	0.25	ND	ND
<b>TOTAL CBD</b>			<b>1.28</b>	<b>0.13</b>
<b>TOTAL THC</b>			<b>ND</b>	<b>ND</b>

Total CBD = CBD + 0.877\*CBDA and Total THC = THC + 0.877\*THCA

The Measurement Uncertainty for Total THC at 0.3% is +/-0.05% or in the range of 0.25% - 0.35%.



There are 30 gummy bears in the package, each with 30mg CBD. The approximate mass of ONE gummy bear is **4.25g**.<sup>Note4</sup> Multiply the number of gummies by the mass of each gummy:

$$30 \text{ gummies} \times 4.25g \text{ per gummy} = 127.5g$$

Using the TOTAL CBD on the COA, multiply the total mass of the gummies by the **concentration in mg/g**:

$$127.5g \times 7.06mg/g = 900mg$$

CANNABINOID POTENCY				
ANALYTE	LOD (mg/g)	LOQ (mg/g)	Concentration (mg/g)	Concentration (%)
CBD	0.07	0.25	7.06	0.71
CBDA	0.07	0.25	ND	ND
delta9-THC	0.07	0.25	ND	ND
delta9-THCA	0.07	0.25	ND	ND
CBG	0.07	0.25	ND	ND
CBGA	0.07	0.25	ND	ND
CBN	0.07	0.25	ND	ND
CBC	0.07	0.25	ND	ND
delta8-THC	0.07	0.25	ND	ND
THCV	0.07	0.25	ND	ND
<b>TOTAL CBD</b>			<b>7.06</b>	<b>0.71</b>
<b>TOTAL THC</b>			<b>ND</b>	<b>ND</b>

Total CBD = CBD + 0.877\*CBDA and Total THC = THC + 0.877\*THCA

The Measurement Uncertainty for Total THC at 0.3% is +/-0.05% or in the range of 0.25% - 0.35%.

Note1,2: Because the DENSITY of OIL is approximately 0.9mg/mL, the mass of 30mL of OIL is 27g and the of mass of 15mL of OIL is 13.5g.

Note3: This is an approximate density for lotion. The densities of the various lotions and other topicals available may be different.

Note4: The mass of one gummy is widely variable across different gummy products available.

