

# CBD and THC Content of Full Spectrum and THC Free CBD Oils

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## BACKGROUND

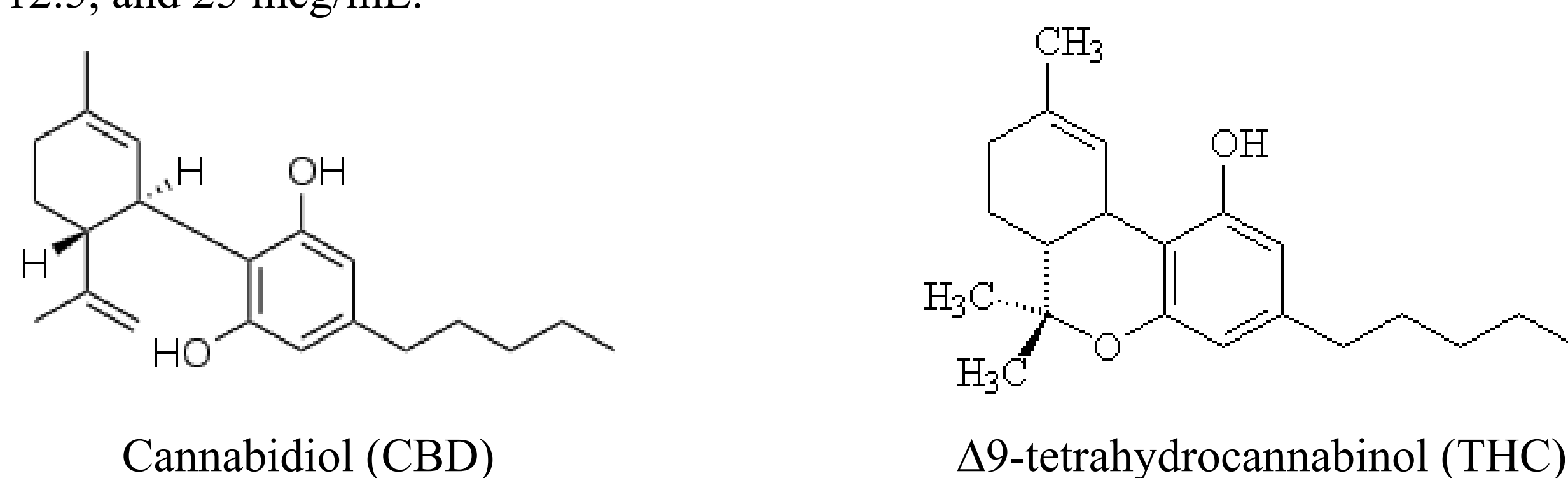
- There are many CBD products available to the public which claim to be either “THC free” or contain < 0.3% THC by volume.
- As a dietary supplement, CBD products are not regulated by the FDA and their contents can vary greatly from what is stated on the label.

## OBJECTIVES

- To quantify CBD and THC content of 12 commercially available CBD oils.

## METHODS

- Twelve 500 mg CBD oils were purchased online for evaluation of CBD and THC content. Six claimed to have 0% THC and six were to have < 0.3% THC.
- A series of dilutions were completed at room temperature using methanol in one series, and acetonitrile in another series. Products were diluted to a 20 times dilution to detect THC, and 667, 1,333, or 6,670 times dilution to detect CBD.
- A CBD calibration curve was prepared with analytical standard diluted to 3.125, 6.25, 12.5, 25, and 50 mcg/mL. The THC calibration curve was prepared with analytical standard diluted to 0.391, 0.781, 1.5625, 3.125, 6.25, 12.5, and 25 mcg/mL.



## RESULTS

- The standard curves for THC and CBD were both linear with  $R^2 > 0.99$ .

Figure 1. Typical chromatogram showing separation of THC and CBD

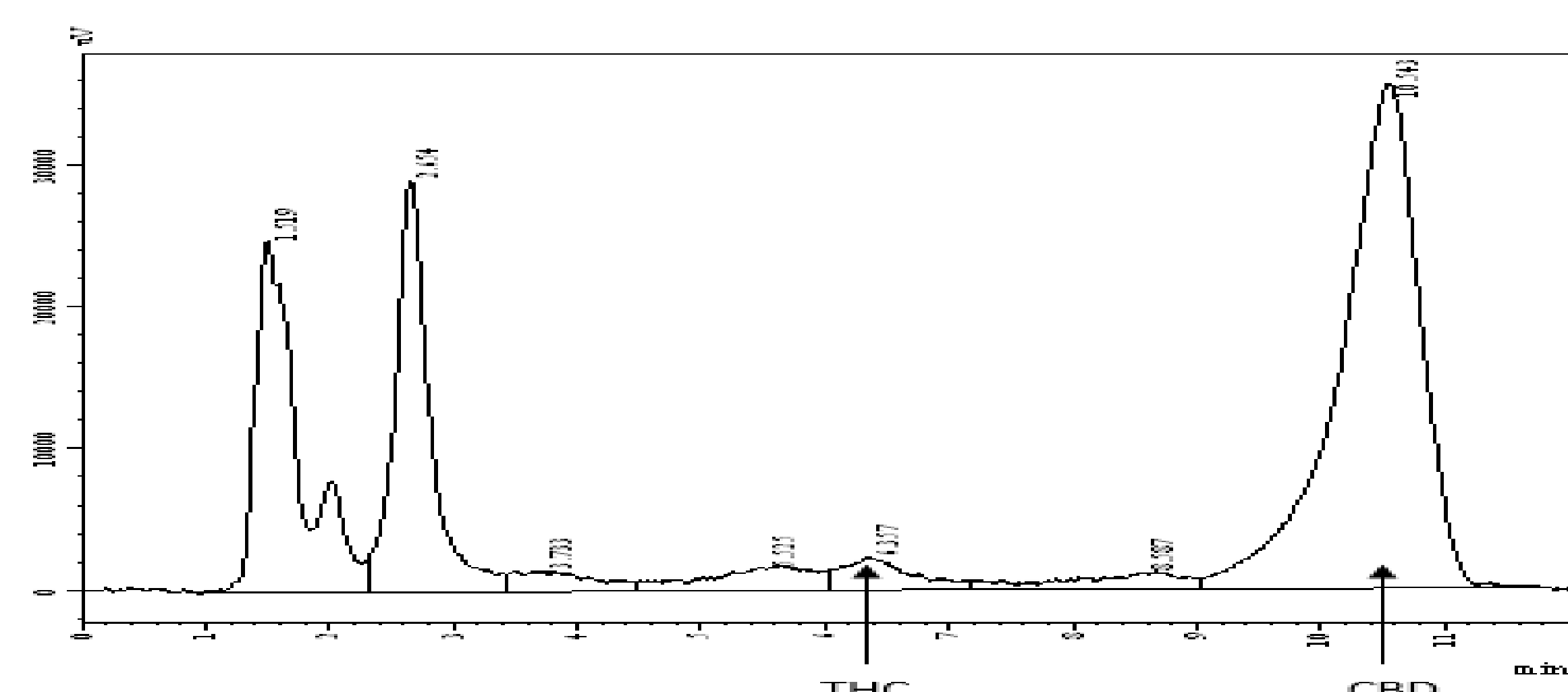
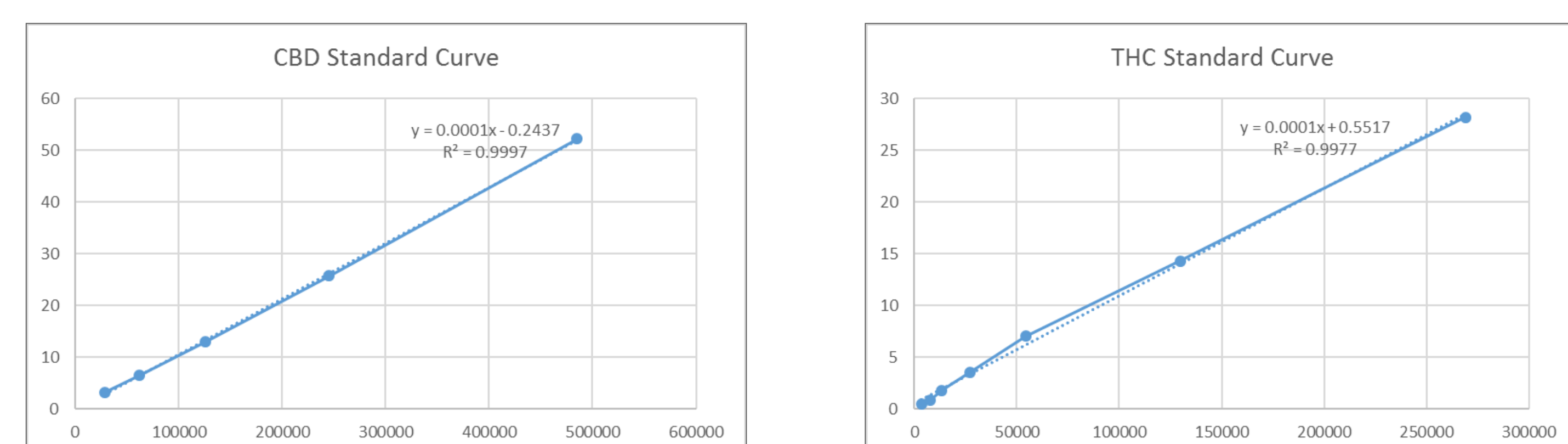


Figure 2. Standard curves for THC and CBD



## RESULTS

### CBD

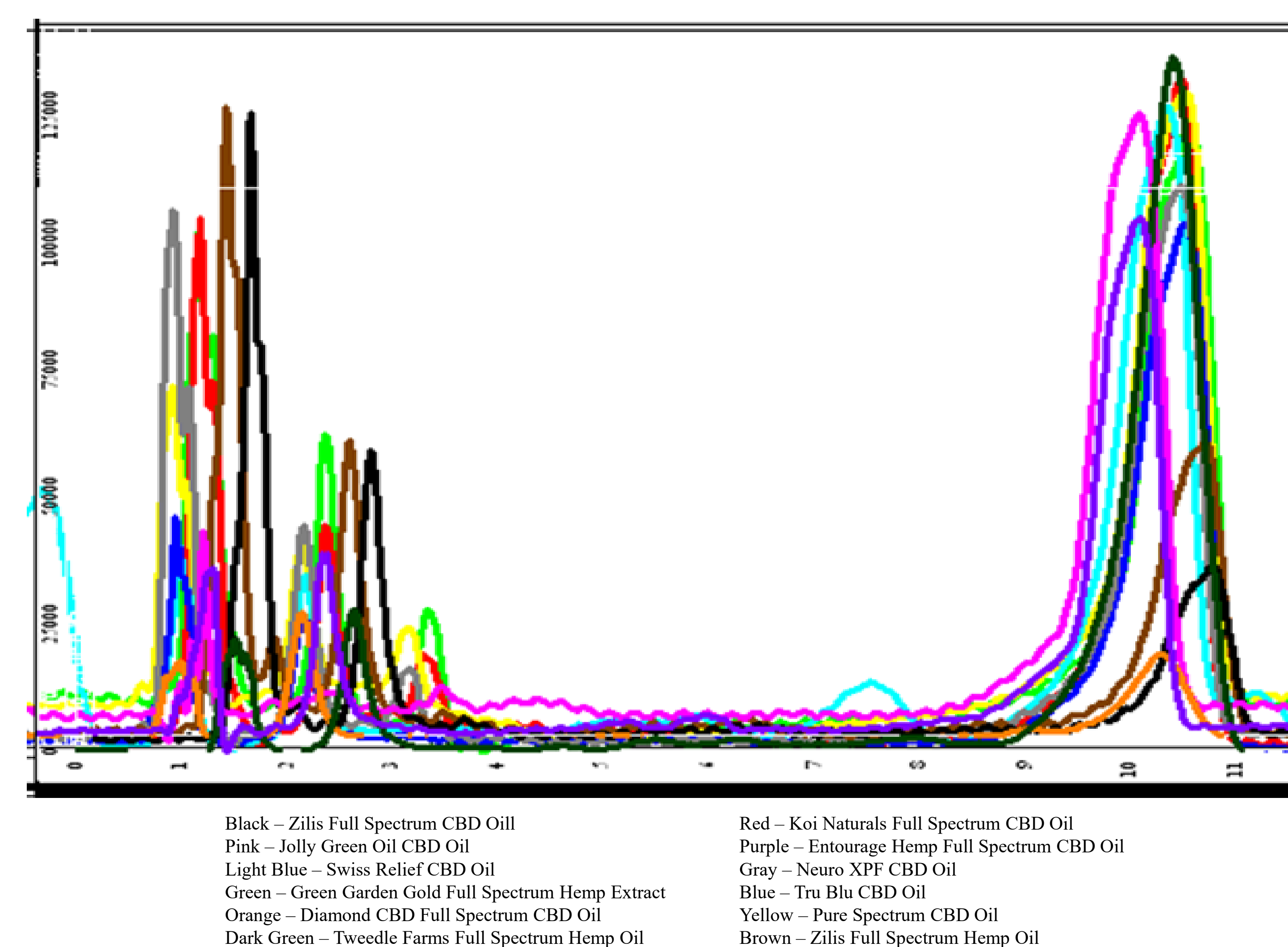
	Pure Spectrum	Entourage Hemp	Green Garden Gold	Koi Naturals	Tru Blu	Neuro XPF	Swiss Relief	Zilis Full Spectrum Hemp Oil	Zilis Full Spectrum CBD Oil	Jolly Green Oil	Tweedle Farms	Diamond CBD
Avg. Conc. With SD (mg/mL)	18.13 ± 1.31	118.09 ± 5.86	9.57 ± 0.93	16.81 ± 2.65	19.42 ± 1.00	13.25 ± 3.17	19.80 ± 2.86	3.27 ± 0.85	3.77 ± 0.76	36.74 ± 1.30	19.77 ± 0.28	5.93 ± 2.89
Expected Conc. (mg/mL)	16.67	125	16.67	16.67	16.67	16.67	16.67	16.67	16.67	33.33	16.66	33.33

### THC

	Pure Spectrum	Entourage Hemp	Green Garden Gold	Koi Naturals	Tru Blu	Neuro XPF	Swiss Relief	Zilis Full Spectrum Hemp Oil	Zilis Full Spectrum CBD Oil	Jolly Green Oil	Tweedle Farms	Diamond CBD
Avg. Conc. With SD (%)	0.007 ± 0.003	0.005 ± 0.00	0.010 ± 0.002	0.007 ± 0.008	0.024 ± 0.019	0.004 ± 0.004	0.020 ± 0.023	0.018 ± 0.018	0.026 ± 0.020	0.013 ± 0.004	0.058 ± 0.00	0.005 ± 0.00
Expected Conc. (%)	< 0.3%	< 0.3%	< 0.3%	0	0	0	0	0	< 0.3%	0	< 0.3%	< 0.3%
Avg. THC/serv. (mg/serv.)	0.0400	0.0018	0.0828	0.0268	0.1863	0.0368	0.2409	0.1398	0.2028	0.1010	0.1934	0.0134

## RESULTS

Figure 3. Chromatogram overlay of all products



## DISCUSSION

- Majority of the CBD oils were close to what the label stated, however several products had significantly lower levels of CBD than claimed on the label.
- All of the “THC free” CBD oils had some trace amounts of THC.
- The potential for failed drug screenings due to CBD has been discussed in the literature. Using pharmacokinetic properties of Dronabinol, a synthetic THC, we can extrapolate this information to our products to predict the likelihood of a failed drug screening after consumption of any of these products.

## CONCLUSION

- 92% of the CBD oils were mislabeled.
- Urine drug screens can detect THC metabolite levels as low as 5 ng/mL, therefore, it is possible that any one of these CBD oils could result in a failed drug screen if taken within 72 hours after consumption.

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