



---

## UNDERSTANDING SOLUBILITY

---

When preparing a solution or formulation in the form of a tincture, oil, drink, or lotion, **solubility** is a primary factor. Solubility is the amount of a substance that will dissolve in another substance and is often stated as the maximum quantity that will dissolve or go into solution (i.e. mg/mL).

Solubility is a combination of chemical interactions between molecules. There are many factors that can contribute to and affect solubility. CBD and THC have low water solubility, meaning they do not like to go into solution. The presence of other compounds (i.e. terpenes, other plant compounds, or other cannabinoids) can contribute to CBD and/or THC having improved solubility. The use of a co-solvent (i.e. glycerin, sugars) can aid in more mass (mg) going into solution. Something else to consider is that combinations of solvents/oils/other compounds can also be detrimental to solubility. Not all oils are created equal and combinations of different oils/solvents can lower solubility. As such, formulating is a science, and with very little solubility data to reference on these cannabinoids, it can be frustrating.

Testing your initial solution provides data regarding the volume or mass required to achieve the desired concentration of CBD or THC. However, mixing that tincture with a different oil/solvent, one has to consider an additional interaction that could compromise solubility and cause some of that CBD to fall out of solution. Therefore, if recovery is low, consider the amount of CBD added to that solution, or possibly the amount of oil. A good method to test whether you've reached maximum solubility in that specific combination of oils/solvents if it is testing low is to dilute that solution significantly (i.e. 50/50 with those oil/solvents) and have it tested. If the recovery improves based off of the original formulation calculations, it is possible the amount (mg) of CBD is not fully soluble in that original volume of oil/solvent.

Solubility is temperature dependent. Heating can improve solubility, while cooling can reduce solubility. There are occurrences where substances fall out of solution after cooling to room (or refrigerated) temperature when heat was required to help dissolve the components.

Formulating solutions can be as easy as adding A+B to get C. However, it is not always that simple and the more factors introduced (i.e. production steps, solvents/oils added), the greater opportunity for loss of mass in solution or degradation of compounds.