



Ferulic Acid Solubility in Various Solvents at Room Temperature

Solvent	Grams/100 mL	1/8 tsp (0.25 g) FA dissolves in this amount (mL)
Water	0.09	278 (about 56 tsp or 1 1/4 cup)
SKB Solution	0.13	192 (about 38 tsp or 3/4 cup)
95% Ethanol	10.44	2.4 (about 1/2 tsp)
40% Ethanol	2.68	9.3 (about 2 tsp)
Glycerin	1.34	19 (about 4 tsp)
Propylene Glycol	7.90	3.2 (between 1/2 and 1 tsp)

Materials: Ferulic acid (FA) and Sea Kelp Bioferment (SKB) were obtained from SkinCrafters. 95% ethanol was standard, non-denatured, lab grade, compare to Everclear. 40% Ethanol compare to vodka. Glycerin and propylene glycol were USP grade.

Testing method: Briefly, two mixtures were made for each solvent. One contained a carefully measured concentration of FA that was found to be completely soluble in preliminary tests. This first mixture was the "standard." The second mixture contained an excess of FA which did not completely dissolve after mixing continuously for 24 hours at room temperature. The supernatant fluid of this second mixture is "saturated." The standard and saturated solutions were diluted such that the absorption of light at a particular wavelength could be accurately determined in a spectrophotometer. The selected wavelength was a peak at which FA solution strongly absorbs light, but the solvents absorb minimally. Using the principles of Beer's Law, the concentration of the saturated solution was then calculated as compared to the known standard. That concentration is reported here as the solubility in units of grams per 100 mL, also referred to as "percent concentration." For those who don't own a scale, I've also calculated the approximate amount of each solvent necessary to dissolve 1/8 teaspoon FA at room temperature.

Accuracy: These tests were done to provide useful data for preparing do-it-yourself (DIY) skincare products. Careful laboratory practices were followed, but every source of variance was not meticulously controlled (e.g., room temperature varied from 22-28 degrees C. during the course of these experiments). These data are not intended and should not be expected to be absolutely accurate; I estimate these values are within 10% of those that would be derived using the most exhaustive techniques.

SKB Solution: SKB is often used in DIY recipes that also contain FA. It is difficult to test directly because it is a gel and difficult to mix. I chose to make a solution of 5 grams SKB in 25 mL water to approximate the final concentration found in DIY recipes where 1 teaspoon SKB is contained in 30 mL (one fluid ounce) of product.

Other: The presence of other ingredients in a solvent can affect the solubility and the rate of dissolution of FA. As seen here, SKB added to water may slightly increase the rate and/or maximum solubility as compared to pure, distilled water. In other experiments, 10% ascorbic acid appears to decrease the rate and/or maximum solubility of FA.

--For my DIY skincare friends on the forums. Doug Kitt, Salt Lake City, Utah, USA. May, 2011.