Caffeine Extraction

Measuring caffeine would not be easy. The existing methods to measure tea range from requiring laboratory equipment to a DIY approach. In reviewing their approaches, the way they extract caffeine differs from how one normally brews tea such as the amount of grams used and steeping time. While these studies are not perfect, the amount of caffeine typically extracted from tea is low.

Below I summarize three different approaches to measuring caffeine:

Precise measurement of caffeine requires laboratory grade equipment such as a UV spectroscopy or a High Performance Liquid Chromatography (HPLC). An example of UV spectroscopy can be found here (Spectrophotometric Analysis of Caffeine) stating that this type of procedure is often used in universities and research institutes. An example of a HPLC can be found here regarding the type of equipment needed.

An alternative would be to measure coffee with more of a DIY approach, but it is less precise and requires careful attention to detail. The most popular method would be to use Dichloromethane to extract caffeine. Several sources exist that provide a breakdown of the equipment needed and procedures to follow such as this article and this video. The goal is to extract caffeine in its pure form which would appear as needle-like crystals. The amount of setup; however, is costly compared the end result of extracting a low yield amount of caffeine. This article provides a frame of reference where they used Dichloromethane and extracted .089g caffeine from black tea and .08g from green tea — less than .1 grams.

From a commercial standpoint, measuring caffeine with the Lighttells CA-700 coffee caffeine analyzer would be straightforward. The cost is steep (more than $2500), but requires less setup or access to a laboratory space. The product was intended to measure caffeine from coffee, but contacting them would suffice to double check whether it can measure caffeine from tea.

An observation I noticed is that each process differs in the amount of grams used when measuring tea or coffee. Precise measurement methods seem to use less than 1 gram, whereas less precise measurements require using more grams. In this context, the amount of grams used when measuring caffeine content from tea differs from the amount of grams one might use when casually brewing tea (e.g., gōngfū chá).

Revision #1
Created 2025-09-02 01:25:40 UTC by jesse.bozo
Updated 2025-09-02 01:25:56 UTC by jesse.bozo