



Application Note AN-T-231

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Fast and accurate potentiometric determination of caffeine in nonaqueous samples

Caffeine is a natural substance found in many foods including coffee, black and green tea, cola, mate, guarana, energy drinks and, to a lesser extent, cocoa and chocolate.

Chemically speaking, caffeine is considered a weak base. It can be titrated accurately in nonaqueous media if a very strong acid is used as the titrant. The strongest acid in nonaqueous media is perchloric acid (HClO_4) in glacial acetic acid.

This application is demonstrated on caffeine standard, guarana extract concentrate, and jojoba

Direct titration is particularly suitable for determining the purity of caffeine. Even highly concentrated caffeine samples (e.g., pharmaceuticals) or water-insoluble samples (e.g., cosmetics and oils) can be titrated well in this way.

In this Application Note, caffeine content in nonaqueous samples is accurately and reliably determined by direct titration using the OMNIS Titrator equipped with a dSolvotrode.

cosmetic oil. Sample preparation is not required.

EXPERIMENTAL

An appropriate amount of sample is weighed into the titration beaker. Glacial acetic acid, acetic anhydride, and toluene are then added. While stirring, the solution is titrated until after the first equivalence point with standardized perchloric acid in acetic acid (**Figure 1**). The determination is carried out with an OMNIS Titrator equipped with a dSolvotrode (**Figure 2**).

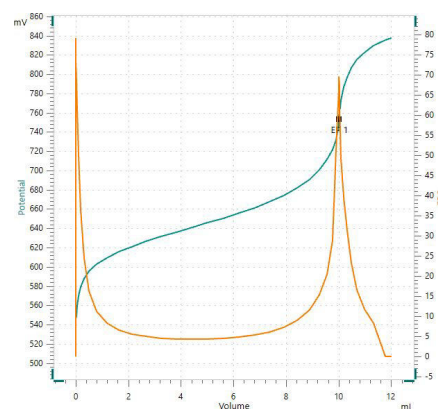


Figure 1.



Figure 2. OMNIS Titrator equipped with a dSolvotrode electrode for the determination of caffeine content in nonaqueous samples.

RESULTS

This method offers very accurate results, as displayed in **Table 1**.

Table 1. Results of caffeine determination in different nonaqueous samples.

Sample (n = 6)	Caffeine in %	SD(rel) in %
Caffeine standard	100.5	0.7
Guarana extract concentrate	54.1	2.9
Jojoba cosmetic oil	0.4	4.7

CONCLUSION

Direct titration is a simple and precise way to accurately measure the caffeine content in different nonaqueous products. The OMNIS Titrator equipped with a dSolvotrode reliably determines caffeine through flexible analyses combined with high-end

software. The dSolvotrode is optimized for nonaqueous titrations and due to its flexible ground-joint diaphragm, it is especially suitable for contaminated samples.

Internal reference: AW TI CH-1330-112022

CONTACT

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CONFIGURATION



OMNIS Professional Titrator

OMNIS Titrator, OMNIS ,(/) 3S OMNIS Liquid Adapter „Professional”

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-
- :51020 50 mL
- 3S OMNIS Liquid Adapter:,
- :
- :“Basic”
- (/):“Advanced”
- (/), 5 :“Professional”