



Application Note AN-T-231

Determination of caffeine by direct titration

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.

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.

SAMPLES AND SAMPLE PREPARATION

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

jojoba 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).

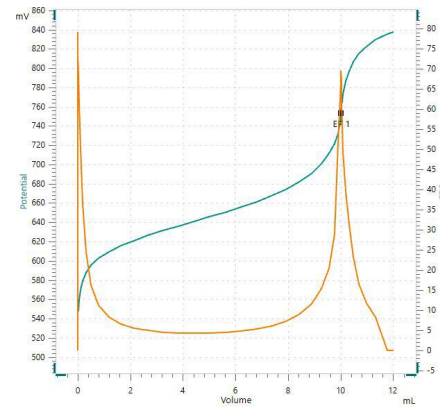


Figure 1.



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
Jajoba 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

新型、模式位分析 OMNIS Titrator 滴定,于独立行或作 OMNIS 滴定系的核心元件行,用于使用 OMNIS Sample Robot 行点和等当点滴定(一/)。由于采用 3S 瓶配器技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台螺旋拌器。包括用于使用其他滴定或加液模平行滴定的“Professional”功能可。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 螺旋拌器的接方式
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的瓶配器:安全理化学品,自生商的原数据

量模式和件:

- 点定滴定:“Basic” 功能可
- 点和等当点滴定(一/):“Advanced” 功能可
- 点和等当点滴定(一/),包括平行滴定:“Professional” 功能可