



Application Note AN-K-075

Moisture analysis of rebaudioside M by Karl Fischer titration

Simplified rebaudioside M moisture determination via volumetric Karl Fischer titration paired with an oven system

Natural sweeteners like stevia and its derivatives are an increasingly important part of the global sweetener market as more consumers substitute sugar with healthier alternatives. Stevia's derivatives are significantly sweeter than table sugar. These compounds are estimated to be 50 to 300 times sweeter in comparison. This sweet taste coupled with the fact that the human body cannot metabolize steviol glycosides (i.e., they contribute zero calories to

one's diet), makes them a very attractive sugar replacement.

The moisture content of stevia materials is a crucial factor when discussing their shelf life and stability. Measuring the moisture content of a stevia derivative, rebaudioside M, using an oven system coupled with volumetric Karl Fischer (KF) titration provided a repeatable approach for quantifying the moisture content of this material.

SAMPLE AND SAMPLE PREPARATION

Rebaudioside M powder was used for this study. No

sample preparation is required.

EXPERIMENTAL

The analysis was carried out with a Double Pt ring electrode for volumetry (6.00346.100). Testing was executed on the 874 Oven Sample Processor (2.874.0120) coupled with an 852 Titrando (2.852.0060).

Approximately 0.2 g of sample was weighed into an

874 Oven Sample Processor 6 mL vial and placed onto the rack. The oven was set to a temperature of 100 °C, and the evaporated moisture was carried to the volumetric titration vessel by nitrogen gas flow at 70 mL/min. The moisture from the sample was titrated with Hydranal Comp 5 reagent.

RESULTS

Results are recorded in Figure 1, Figure 2, and Table 1.

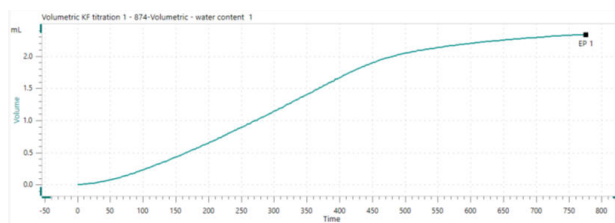


Figure 1. Example volumetric KF titration curve for rebaudioside M.

A temperature gradient was performed and demonstrated that the ideal temperature conditions for the rebaudioside M sample were in a range of ~80–210 °C (Figure 2). A temperature of 100 °C was selected to ensure that moisture was carried from the sample to the titration vessel while minimizing potential sample impact from the temperature. Samples were analyzed in triplicate to exhibit robustness of the method.

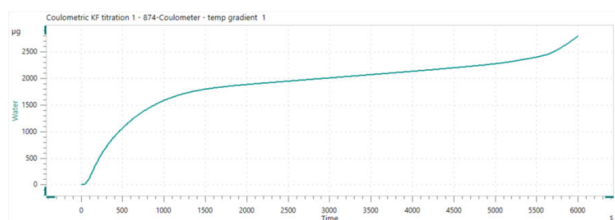


Figure 2. Temperature gradient for rebaudioside M powder demonstrating the optimal operating temperature range.

Table 1. Results for all rebaudioside M samples (n = 3) evaluated for moisture content using the 874 Oven Sample Processor coupled with volumetric KF.

Result 1 (%w/w)	Result 2 (%w/w)	Result 3 (%w/w)	Mean (%w/w)	%RSD
4.42	4.61	4.60	4.54	2.32
4.31	4.44	4.55	4.43	2.66
9.11	9.32	8.96	9.13	1.96

CONCLUSION

Natural low-calorie sweeteners like stevia derivatives are growing in popularity as people choose healthier alternatives to sugar. Working to develop standardized, specific methodology can help support sweetener industry development, effective quality assessment, and the evaluation of rebaudioside M and other steviol glycosides' stability.

This Application Note provides a foundation for the

analysis of stevia powder by Karl Fischer titration. An oven system paired with volumetric Karl Fischer analysis provides an accurate, repeatable method to evaluate stevia powder and its derivatives. This method's compatibility with the 874 Oven Sample Processor allows increased sample throughput through automation, providing operators even more time to complete other important tasks in parallel.

CONTACT

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CONFIGURATION



874 Oven Sample Processor

Le 874 Oven Sample Processor sert pour la préparation thermique automatisée des échantillons pour le titrage Karl Fischer. La méthode d'extraction avec four est surtout adaptée aux échantillons qui libèrent leur eau seulement à des températures très élevées, des échantillons difficilement solubles ou qui réagissent avec le réactif KF.



852 Titrand avec Touch Control et électrode génératrice à diaphragme

Coulomètre avec électrode génératrice avec diaphragme, Touch Control, 801 Stirrer et cellule de titrage volumétrique complète.

La coulométrie est la méthode idéale pour déterminer les traces d'eau (10 µg à 10 mg d'eau absolue) dans les liquides, les matières solides et gazeuses. Comme la coulométrie est une méthode absolue, la détermination du titre n'est pas nécessaire.

Gamme de mesure recommandée en coulométrie : 10 µg à 200 mg d'eau absolue

Le **852 Titrand** maîtrise le titrage volumétrique Karl Fischer en plus du titrage coulométrique.

Utilisation avec le logiciel OMNIS, *tiamo* ou le Touch Control. Satisfait aux exigences des BPF/BPL et de la FDA, telles que celles de la réglementation 21 CFR Part 11, le cas échéant.



Double électrode annulaire Pt pour la volumétrie

Électrode indicatrice utilisée pour le titrage Karl Fischer, laquelle est plus robuste et plus facile à nettoyer que l'électrode à tige classique en platine (6.0338.100) grâce à ses deux anneaux en platine scellés.