



Application Note AN-K-075

卡尔费休滴定法测定莱鲍迪苷 M 的水分含量

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**.

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.

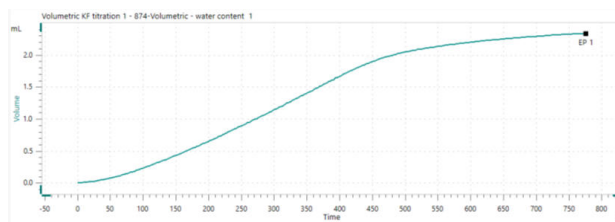


Figure 1. Example volumetric KF titration curve for rebaudioside M.

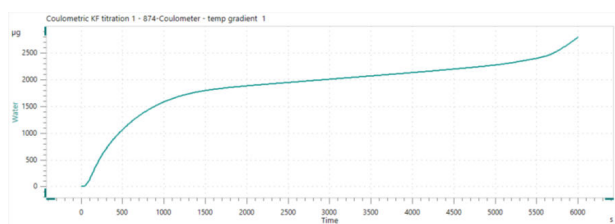


Figure 2. Temperature gradient for rebaudioside M powder demonstrating the optimal operating temperature range.

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.

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CONFIGURATION



874 Oven Sample Processor

874 Oven Sample Processor 用于在卡尔·费休滴定中自动进行热化样品前处理。炉式方法特别适合于那些在较高温度下方可析出水份的样品、以及难溶样品或与 KF 试剂起反应的样品。



852 Titrando Touch Control

库仑法卡氏水分测定仪包括带隔膜的发生电极、Touch Control、801 Stirrer 和整套容量滴定杯。

对于痕量区域(10 μg 至 10 mg 绝对水)的水份测定来说,电量分析法是用于液态、固态和气态中的水份测定理想方法。此外,电量分析法是一种绝对方法,因此无需进行滴定度测定。

建议的电量分析测量范围:10 μg - 200 mg 绝对水量除电量滴定外,852 Titrando 还可以进行卡尔·费休容量滴定。

使用 OMNIS-Software、*tiamo*-软件或 Touch Control。如果需要,满足 GMP/GLP 和 FDA 要求,比如 21 CFR 第 11 部分。



Pt

卡尔·费休滴定法用指示电极,由于具有两个熔融在一起的铂环,比传统铂销电极 (6.0338.100) 更坚固,更易于清洗。