Application Note POLYMER017

View on rigaku.com

POLYMER017: TG-DTA Analysis of Fiber Moisture Absorption under Water Vapor Atmosphere

Introduction

Moisture absorption of textile materials is an important characteristic that directly affects the comfort of clothing and the expression of functions in medical and industrial applications. However, simple measurement of moisture absorption under dry conditions makes it difficult to evaluate differences in moisture absorption behavior and moisture retention in actual use environments, leaving uncertainty in material selection and design decisions according to application. By using TG-DTA measurement under water vapor atmosphere, moisture absorption behavior can be quantitatively evaluated under conditions close to the use environment, thus enhancing reliability in the development of functional fibers and optimal design for each application.

Thermal analysis

Analysis:	Parts and end products
Use:	Process control, failure analysis, quality assurance
Analyzed materials:	Silk, cotton, nylon

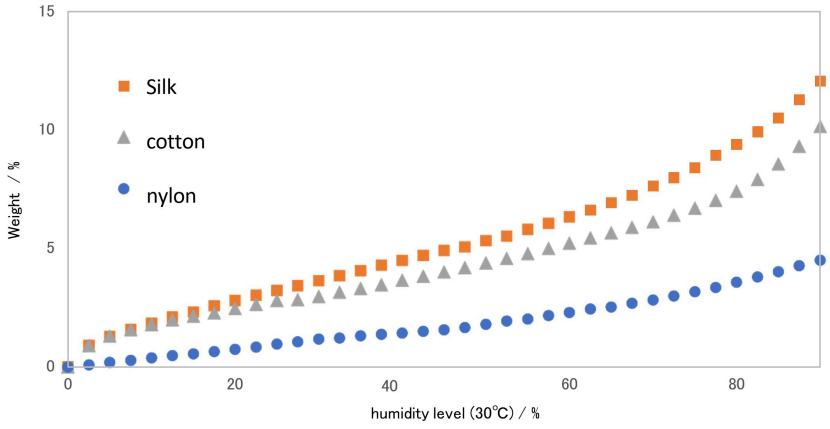

Figure 1: Weight change of each fiber versus relative humidity

Conclusion

Comparison of the moisture absorption of silk, cotton, and nylon at 30°C and varying humidity from dry to 90%RH showed that the order of hygroscopicity was silk > cotton > nylon. Using TG-DTA, which can control the water vapor atmosphere, it is possible to determine hygroscopicity under quasi-practical conditions quantitatively, providing practical information for determining suitability for applications and improving the accuracy of material selection.

Related products

STAvesta/HUM

Humidity-controlled STA
The compact humidity generator is connected to the STA (TG-DSC) for measurements under constant relative humidity water vapor atmosphere