

Ginkgo biloba Dietary Supplement Standard Reference Materials

NIST is working in collaboration with the National Institutes of Health Office of Dietary Supplements (NIH-ODS), and Food and Drug Administration (FDA), Center for Drug Evaluation and Research (CDER) and Center for Food Safety and Applied Nutrition (CFSAN) to develop Standard Reference Materials (SRMs) to support the development of analytical methods and to provide quality assurance for constituents in dietary supplements. A suite of three ginkgo-containing reference materials will be the next SRMs to be issued as part of this program.

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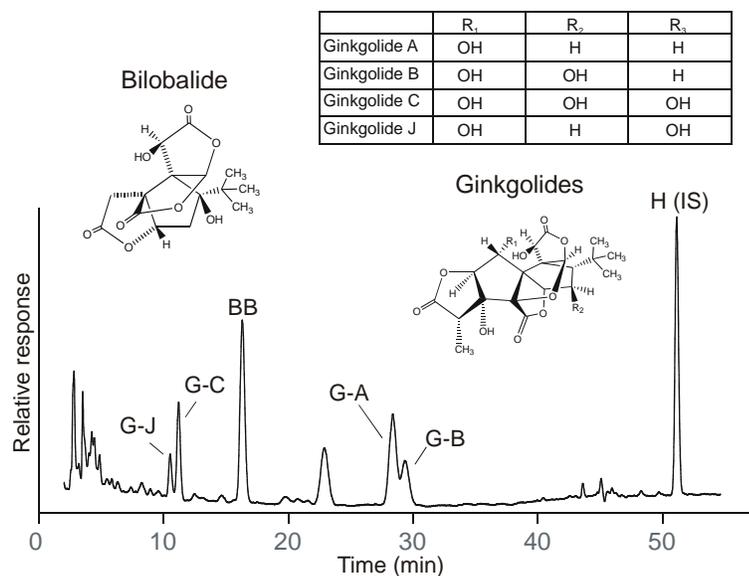
The enactment of the Dietary Supplement Health and Education Act (DSHEA) in 1994 by the U. S. Congress has promoted growth in the nutritional supplement industry, due in part to the way in which dietary supplements are regulated. DSHEA provides a legal definition of dietary supplements that classifies these materials separately from food additives and pharmaceutical drugs. Requirements for product labeling are less stringent than for drug substances, and the burden of proof for the safety of dietary supplements is placed on the FDA. Reference materials are needed for use in method validation and as controls to support the analysis of dietary supplements and related botanical materials. Potential applications include: 1) verification of product label claims; 2) quality assurance in product manufacturing; and 3) support of measurements associated with clinical trials.



A suite of three ginkgo-containing SRMs has been developed: SRM 3246 *Ginkgo biloba* (Leaves), SRM 3247 *Ginkgo biloba* Extract, and SRM 3248 Ginkgo-Containing Tablets,

representing a variety of natural, extracted, and processed sample matrices that provide different analytical challenges. In addition to the three individual SRMs, all three ginkgo-containing SRMs will be available packaged together, two bottles of each, as SRM 3249. The Certificates of Analysis for these materials will provide certified values for five terpene lactones, three flavonoid aglycones, and four potentially toxic trace elements (arsenic, cadmium, lead, and mercury). The concentrations of these constituents have been determined by multiple independent methods with measurements performed by NIST and collabor-

ating laboratories. The methods utilized different sample extraction and cleanup steps in addition to different instrumental analytical techniques and approaches to quantification. Flavonoid aglycones were determined at NIST by liquid chromatography (LC) with absorbance and mass spectrometric (MS) detection. Terpene lactones (ginkgolides) were determined by two different LC/MS methods. The total ion chromatogram for one of these methods is shown below. Toxic elements were determined at NIST by isotope dilution – inductively coupled plasma mass spectrometry (Cd, Pb, and Hg) and instrumental neutron activation analysis (As).



Ginkgo-containing products represent a large share of the dietary supplement market and are widely used to improve cognitive function.

These materials are provided primarily for use in method development and as control materials to support analytical methods for the determination of these constituents. The SRM suites will assist manufacturers of dietary supplements to characterize raw materials, to prevent the use of materials that are contaminated or adulterated. In addition, the SRMs will assist self-assessment of consistency and quality in finished products, and to provide a foundation to which accuracy of label information can be linked. The goal of this ongoing effort is to provide tools to the dietary supplement industry and measurement communities that will lead to improved quality of dietary supplements, and ultimately reduce public health risks that could potentially be associated with these products.