

## Standard Method Performance Requirements for Flavanols in Foods and Beverages

### 1 Applicability

Determination of flavan-3-ols as relevant to the matrix in foods, notably in one or more of the following matrixes: tea, wine, fruit and fruit juices, cocoa powder, chocolate, spices, and/or herbs. For the purpose of this SMPR, flavan-3-ols (sometimes referred to as flavanols) are the class of flavonoids based on the 2-phenyl-3,4-dihydro-2H-chromen-3-ol skeleton. Stereoisomers of flavanol compounds may include the catechins (e.g., catechins, gallic catechin, catechins-3-gallate, and gallic catechin-3-gallate) and the epicatechins (e.g., epicatechin, epigallocatechin, epicatechin-3-gallate, and epigallocatechin-3-gallate). See Figure 1. Methods should be able to determine appropriate flavanols in a given matrix. The quantity of procyanidins may also be relevant depending on the matrix being analyzed.

### 2 Analytical Technique

Any analytical technique that meets the following method performance requirements is acceptable.

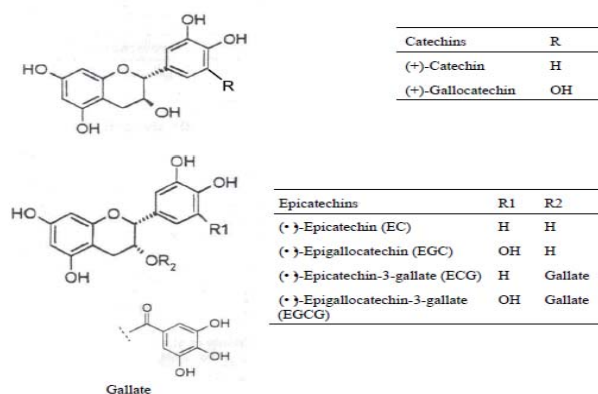
### 3 Definitions

**Limit of quantitation (LOQ).**—The minimum concentration or mass of analyte in a given matrix that can be reported as a quantitative result.

**Recovery.**—The fraction or percentage of spiked analyte that is recovered when the test sample is analyzed using the entire method.

**Repeatability.**—Variation arising when all efforts are made to keep conditions constant by using the same instrument and operator, and repeating during a short time period. Expressed as the repeatability standard deviation ( $SD_r$ ); or % repeatability relative standard deviation (%RSD<sub>r</sub>).

**Reproducibility.**—The standard deviation or relative standard deviation calculated from among-laboratory data. Expressed as



**Figure 1. Structure of flavan-3-ols.** USDA Database for the Flavonoid Content of Selected Foods, Nutrient Data Laboratory, Food Composition Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, U.S. Department of Agriculture, 2003.

Analytical range	$\leq 0.05$ to $\geq 500^a$	
Limit of quantitation (LOQ)	$\leq 0.05^a$	
Repeatability (RSD <sub>r</sub> ) <sup>b</sup>	$< 0.05^a$	$\leq 10\%$
	0.05–500 <sup>a</sup>	$\leq 6\%$
	$> 500^a$	$\leq 5\%$
Recovery factor <sup>b</sup>	Concn	Recovery range, %
	100%	98–101
	10%	95–102
	1%	92–105
	0.1%	90–108
	0.01%	85–110
	10 ppm	80–115
	1 ppm	75–120
Reproducibility (RSD <sub>R</sub> ) <sup>b</sup>	$< 0.05^a$	$\leq 18\%$
	0.05–500 <sup>a</sup>	$\leq 8\%$
	$> 500^a$	$\leq 6\%$

<sup>a</sup> mg/g edible portion.

<sup>b</sup> Modified from the AOAC SLV Guidelines for Dietary Supplements [Official Methods of Analysis (2012) 19th Ed., Appendix K, Part I, AOAC INTERNATIONAL, Gaithersburg, MD].

the reproducibility standard deviation ( $SD_R$ ); or % reproducibility relative standard deviation (%RSD<sub>R</sub>).

### 4 Method Performance Requirements

See Table 1.

### 5 System Suitability Tests and/or Analytical Quality Control

Suitable methods will include blank check samples, and check standards at the lowest point and midrange point of the analytical range. Peak purity will be confirmed by UV or MS data.

### 6 Reference Material(s)

Certified reference materials if available and should be used as appropriate.

### 7 Validation Guidance

Recommended level of validation: *Official Methods of Analysis*<sup>SM</sup>.

### 8 Maximum Time-to-Result

No maximum time.

Approved by the AOAC Stakeholder Panel on Strategic Food Analytical Methods (SPSFAM) on September 29, 2012. Final Version Date: September 28, 2012.