

Determination of Water-Soluble Vitamins in “Foods with Nutrient Function Claims”

The Food with Health Claims was started in Japan in April 2002. Of the multitude of various types of health food products on the market, this system grants the nomenclature “Foods with Health Claims” to those products that satisfy certain requirements. These “Foods with Health Claims” are further classified into “Foods for Specified Health Uses” and “Foods with Nutrient Function Claims”. Of these categories, the

Foods with Nutrient Function Claims category has specific standards established, where for twelve vitamins and two mineral substances, they must be within the specified upper and lower daily intake limits.

Here we will show an example of analyzing ten water-soluble vitamins from the list of specific nutritional substances for “Foods with Nutrient Function Claims”.

■ Analytical Conditions of Vitamin B group and Biotin

Fig. 1 shows an example of simultaneously analyzing a standard sample for eight substances – vitamin B₁ (thiamin*), B₂ (riboflavin), B₆ (pyridoxine*), biotin, niacin, nicotinamide, calcium pantothenate and folic acid. The analytical conditions are listed in Table 1. The standard mixture solution was prepared with “mobile phase A” (Table 1) to a concentration of 10mg/L for each substances and 10 μ L was injected. (* Hydrochloride was used for substances indicated with an asterisk.)

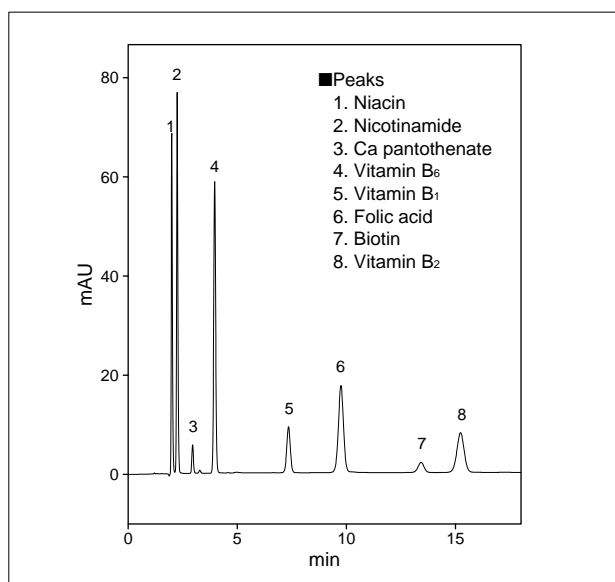


Fig. 1 Chromatogram of A Standard Mixture of 8 Water-soluble Vitamins

Table 1 Analytical Conditions

Column	: Shim-pack VP-ODS (150mmL. \times 4.6mmI.D.)
Mobile Phase	: A : 100mM (Sodium) phosphate buffer (pH = 2.1) containing 0.8mM sodium 1-octanesulfonate B : Acetonitrile A / B = 10 / 1 (v / v)
Flow Rate	: 1.2 mL/min
Column Temp.	: 40°C
Detection	: UV(LC-2010) at 210nm

Fig. 2 shows an example of analyzing a standard sample of vitamin B₁₂ (cyanocobalamin), which was detected at 550 nm (visible range). The analytical conditions are listed in Table 2. The standard solution was prepared with “mobile phase A” (Table 2) to a concentration of 10mg/L and 10 μ L was injected.

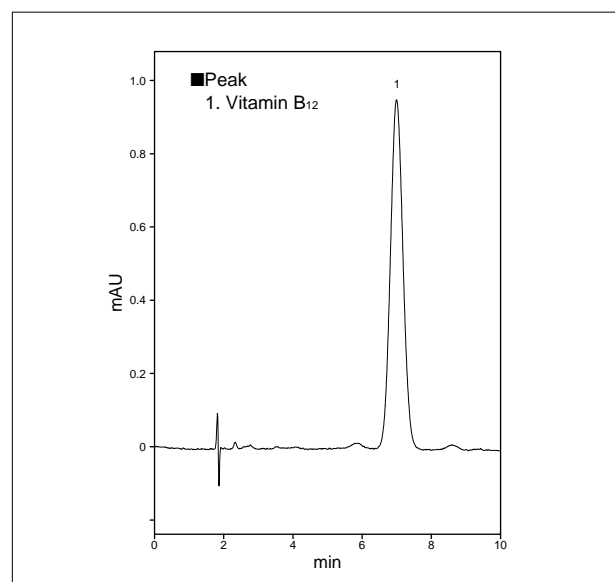


Fig. 2 Chromatogram of Standard Vitamin B₁₂ (Cyanocobalamin)

Table 2 Analytical Conditions

Column	: Shim-pack VP-ODS (150mmL. \times 4.6mmI.D.)
Mobile Phase	: A : 100mM (Sodium) phosphate buffer (pH = 2.1) B : Acetonitrile A / B = 8 / 1 (v / v)
Flow Rate	: 1.2 mL/min
Column Temp.	: 40°C
Detection	: SPD-10AV _{VP} at 550nm

■ Analytical Conditions of Vitamin C

Fig. 3 shows an example of analyzing vitamin C (L-ascorbic acid) with B-complex vitamins and biotin. The standard sample was prepared to a concentration of 10mg/L for each substance and 10 μ L was injected. The analytical conditions are listed in Table 3. Fig. 3 indicates that vitamin C is clearly separated from others.

Table 3 Analytical Conditions for Vitamin C

Column	: Asahipak NH2P-50 4E (250mmL. \times 4.6mmI.D.)
Mobile Phase	: A : 100mM (Triethanolamine) phosphate buffer (pH = 2.2) B : Acetonitrile A / B = 1 / 4 (v / v)
Flow Rate	: 1.0 mL/min
Column Temp.	: 40°C
Detection	: SPD-10AVVP at 240nm

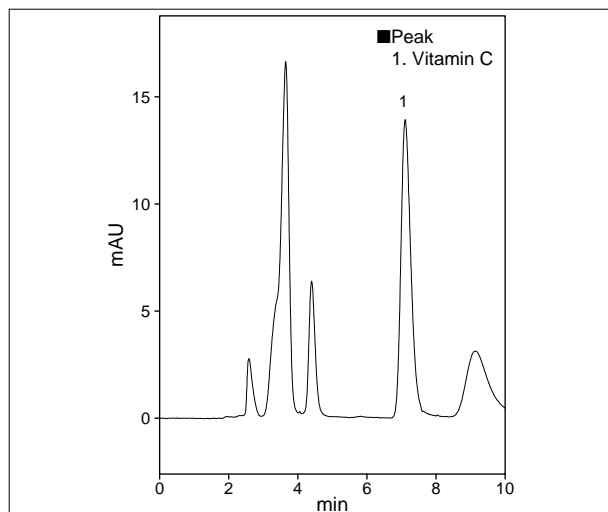


Fig. 3 Analysis of Vitamin C (Ascorbic Acid)

■ Analysis of "Foods with Nutrient Function Claims"

Fig. 5 to 7 show examples of analyzing commercially marketed products that are labeled as a "Foods with Nutrient Function Claims", confection-like tablets (Sample A) and multivitamin tablets (Sample B). Some of the B-complex vitamins dissolve only in a dilute alkaline solution, so the pretreatment procedure shown in Fig. 4 was performed. The analytical conditions for Fig. 5 to 7 are the same as Tables 1 to 3, respectively. 20 μ L of the sample solution was injected for each substance.

Fig.4 Sample Pretreatment Procedure

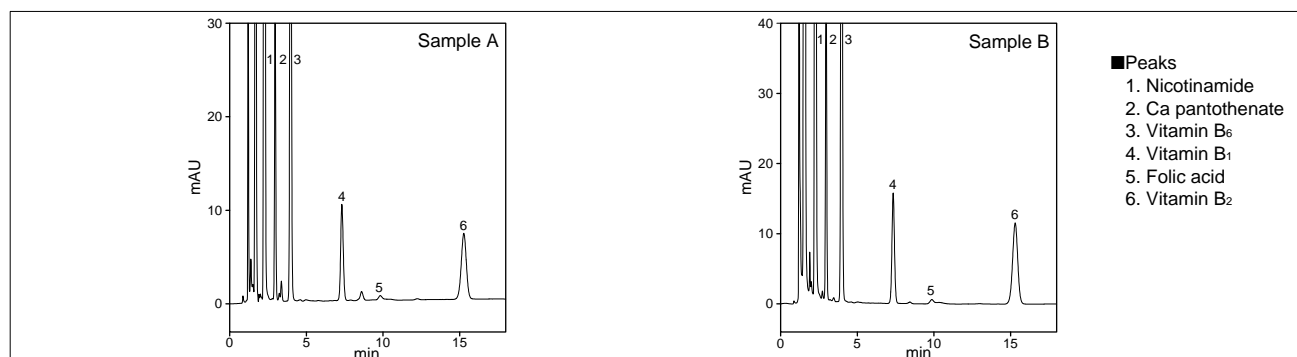
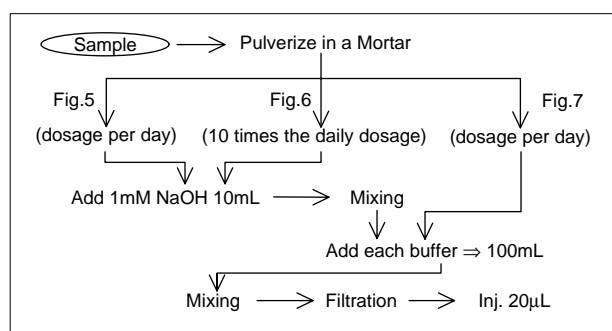


Fig.5 Chromatograms of "Foods with Nutrient Function Claims"

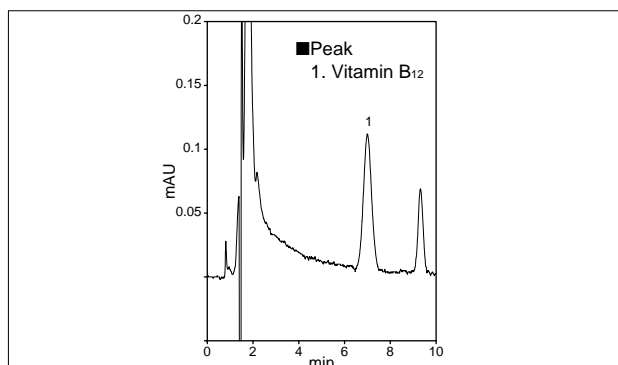


Fig.6 Chromatogram of Sample B

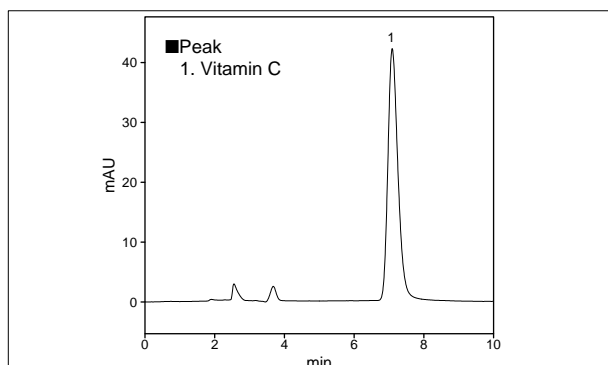


Fig.7 Chromatogram of Sample B



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