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Application News

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High Performance Liquid Chromatography

Analysis of Montelukast Sodium Using Prominence-i and Nexera-i MT

Montelukast sodium is used as a therapeutic drug for treating bronchial asthma and allergic rhinitis, and is listed in the 17th edition of the Japanese Pharmacopoeia (JP). The JP is aiming for international harmonization with the US Pharmacopoeia (USP) and European Pharmacopoeia (EP), and descriptions for this drug have already been harmonized between the USP and EP. Therefore, the testing methods described in the JP are based on this harmonized content. Structural formulae of impurities and flow rates used for analysis are clearly indicated, showing how the tests should be from now on.

This article introduces system suitability tests of montelukast sodium using Prominence-i and Nexera-i MT in compliance with the 17th edition of the JP.

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Analysis of Montelukast Sodium Using Prominence-i

A system suitability test was conducted according to the quantitative method for montelukast sodium (Fig. 1) described in the JP.

Solution A (1 mg/mL) for peak identification was prepared using the montelukast standard for system suitability tests. Solution B for peak identification was then prepared by taking 1 mL of solution A into a clear vial and allowing to stand it for 20 minutes. Table 1 lists the analytical conditions of solution B. The obtained chromatogram using Prominence-i is shown in Fig. 2 and indicates that the related substances listed in the JP are also identified. Table 2 shows results of the system suitability test.

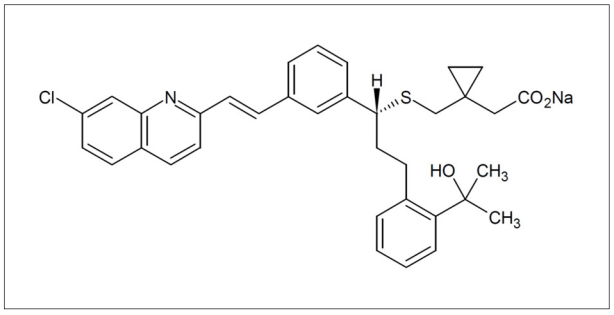

Fig. 1 Structural Formula of Montelukast Sodium

Table 1 Analytical Conditions

Column	: Phenyl silyl silica gel column (50 mm L. × 4.6 mm I.D., 1.8 µm)
Flow rate	: 1.2 mL/min
Mobile phase	: A) Water/Trifluoroacetic acid = 2000/3 (v/v) B) Acetonitrile/Trifluoroacetic acid = 2000/3 (v/v)
Time program	: B Conc. 40 % (0 min) → 40 % (3 min) → 51 % (16 min)
Column temp.	: 30 °C
Detection	: UV 238 nm (Cell temp. 40 °C)
Injection vol.	: 10 µL

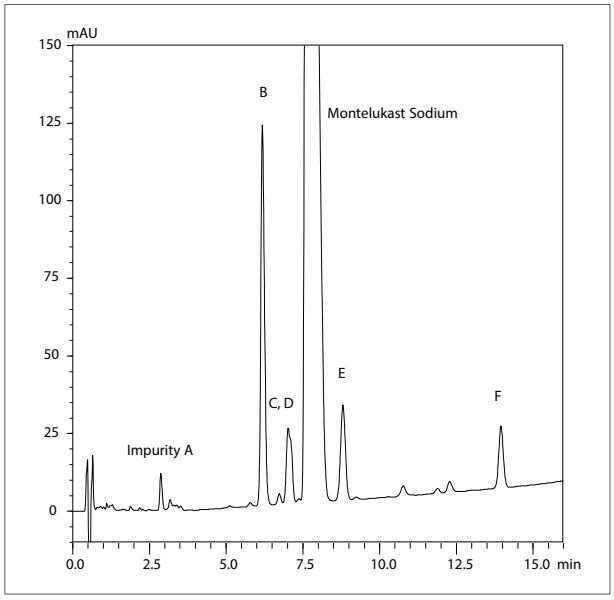

Fig. 2 Chromatogram of Montelukast Sodium Standard for System Suitability Test Using Prominence-i

Table 2 Results of System Suitability Test (Prominence-i)

System Suitability Requirements		Results	Judgements
Resolution (Montelukast Sodium and Impurity B)	≥ 2.5	3.8	PASSED
Resolution (Montelukast Sodium and Impurity E)	≥ 1.5	2.8	PASSED
System Repeatability (% RSD Area)	≤ 0.73 %	0.27	PASSED

Analysis of Montelukast Sodium Using Nexera-i MT

Nexera-i MT has two flow channels of HPLC and UHPLC and enables method switching from HPLC to UHPLC within a single instrument. In this analysis, montelukast sodium was analyzed using the HPLC channel of Nexera-i MT. The obtained chromatogram is shown in Fig. 3 and indicates that the related substances listed in the JP are also identified. Table 3 shows results of the system suitability test.

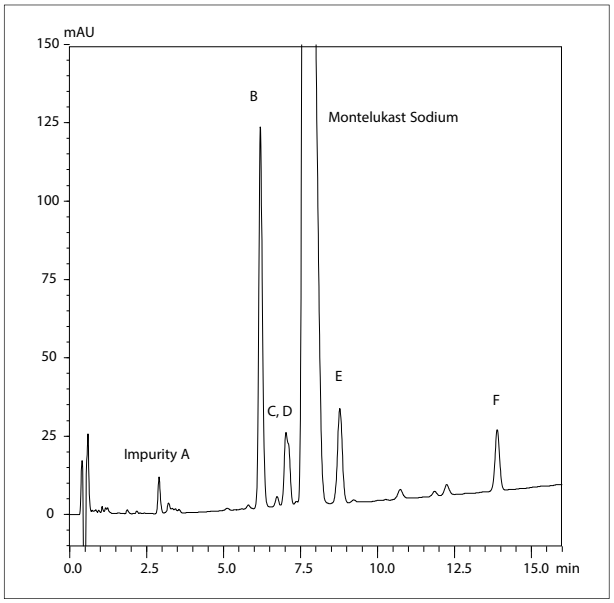

Fig. 3 Chromatogram of Montelukast Sodium Standard for System Suitability Test Using Nexera-i MT

Table 3 Results of System Suitability Test (Nexera-i MT)

System Suitability Requirements		Results	Judgements
Resolution (Montelukast Sodium and Impurity B)	≥ 2.5	3.8	PASSED
Resolution (Montelukast Sodium and Impurity E)	≥ 1.5	2.8	PASSED
System Repeatability (% RSD Area)	≤ 0.73 %	0.21	PASSED

Correction of System Volume Utilizing the ACTO Function

Here we introduce an example of method transfer from another LC system using the ACTO (Analytical Condition Transfer and Optimization) function, which is a standard feature of the Shimadzu integrated liquid chromatograph "i-Series" and work station "LabSolutions".

If an analytical method on an existing LC system is transferred to another LC system, the retention time may not be identical due to the difference in dwell volume, pump specifications, etc. In such a case, the gradient start time adjustment function, which is a feature in the ACTO function, can be executed to adjust the gradient start time for the specified volume.

Fig. 4 (a) shows the chromatogram obtained using Prominence-i and Fig. 4 (b) shows the one obtained using Nexera-i MT's HPLC channel. In the analysis using Nexera-i MT, the gradient start time adjustment function was enabled to correct the difference in volume between the systems, thereby obtaining a chromatogram congruent with that from Prominence-i. (Table 4)

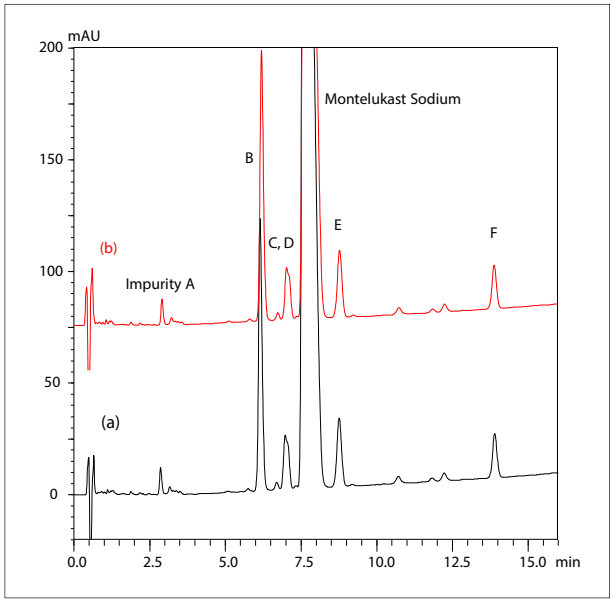

Fig. 4 Method Transfer Example Using Gradient Start Time Adjustment Function (a) Prominence-i (b) Nexera-i MT

Table 4 Difference in Retention Time (%) between Prominence-i and Nexera-i MT

Component	Before Gradient Adjustment	After Gradient Adjustment
Impurity A	1.3	1.1
Impurity B	2.7	0.3
Impurity C, D	3.1	0.2
Montelukast Sodium	2.7	–0.1
Impurity E	2.8	–0.1
Impurity F	2.5	–0.3

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