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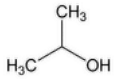
Isopropyl Alcohol



C_3H_8O 60.10
2-Propanol;
Isopropanol CAS RN®: 67-63-0.

DEFINITION
Isopropyl Alcohol contains NLT 99.0% of isopropyl alcohol (C_3H_8O).

IDENTIFICATION
• **A. Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*:** 197F
• **B.** The retention time of the major peak of the *Sample* corresponds to the 2-propanol peak of the *System suitability solution*, as obtained in the *Assay*.
• **C. Limit of Methanol**
[Note—This test must be performed to be in compliance with USP, in addition to *Identification A* and *B* above.]
System suitability solution, Sample, Standard solution A, Chromatographic system, and **System suitability:** Proceed as directed in the *Assay* and *Limit of Volatile Impurities* test.
Analysis: Proceed as directed in the *Limit of Volatile Impurities* test, *Methanol calculation*.
Acceptance criteria: Meets the requirements in *Table 3* for methanol

ASSAY
Change to read:
• **Procedure**
System suitability solution: ▲Transfer 1 µL of methanol and 5 µL of ethyl acetate into a 5-mL volumetric flask, and dilute to volume with USP 2-Propanol System Suitability RS to have▲ (USP 1-Dec-2023) 200 µL/L of methanol and 1000 µL/L of ethyl acetate in USP 2-Propanol System Suitability RS.
Sample: Isopropyl Alcohol (substance under test)
Chromatographic system
(See *Chromatography ⟨621⟩, System Suitability*.)
Mode: GC
Detector: Flame ionization
Column: 0.25-mm × 60-m fused silica column, coated with a 1.4-µm film of phase G43
Temperatures
Detector: 200°
Injection port: 150°
Column: See *Table 1*.

Table 1

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
35	—	35	5
35	1	45	—
45	10	100	5

Carrier gas: Helium

Flow rate: 2.3 mL/min

Injection volume: 1 µL

Injection type: Split, split ratio 50:1. [NOTE—A 4-mm straight liner is suitable.]

Run time: 26 min

System suitability

Sample: *System suitability solution*

[NOTE—See *Table 2*.]

Table 2

Name	Relative Retention Time
Methanol	0.5
Ethyl ether	0.8
Acetone	0.9
Isopropyl alcohol	1.0
Diisopropyl ether	1.3
n-Propyl alcohol (1-propanol)	1.4
Ethyl acetate[a]	1.6
2-Butanol	1.7

[a] Ethyl acetate ▲▲ (USP 1-Dec-2023) is not a known impurity. It is used for calculation of unspecified impurities only.

Suitability requirements

Resolution: NLT 1.5 between acetone and isopropyl alcohol

Tailing factor: NMT 2.0 for the isopropyl alcohol peak

Relative standard deviation: NMT 2.0% for the isopropyl alcohol peak of 6 replicate injections, *System suitability solution*

Signal-to-noise ratio: NLT 10 for any of the following peaks: methanol, ethyl ether, acetone, ▲▲ (USP 1-Dec-2023) diisopropyl ether, 1-propanol, 2-butanol, and ethyl acetate

Analysis

Sample: *Sample*

Calculate the percentage of isopropyl alcohol (C_3H_8O) in the portion of Isopropyl Alcohol taken:

$$\text{Result} = (r_U/r_T) \times 100$$

r_U = peak response of isopropyl alcohol from the *Sample*

r_T = sum of all the peak responses from the *Sample*

Acceptance criteria: NLT 99.0%

IMPURITIES

• **LIMIT OF VOLATILE IMPURITIES**

System suitability solution, Sample, Chromatographic system, and **System suitability:** Proceed as directed in the *Assay*.

Standard solution A: 200 µL/L of methanol in the *Sample*

[NOTE—To be performed as a part of *Identification C*.]

Standard solution B: 1000 µL/L each of acetone, diisopropyl ether, ethyl ether, 1-propanol, 2-butanol, and ethyl acetate in the *Sample*

Analysis

Samples: *Sample*, *Standard solution A*, and *Standard solution B*

Methanol calculation:

[NOTE—To be performed as a part of *Identification C*.]

$$\text{Result (\% v/v)} = \{[M_U/(M_S - M_U)] \times C_M\}/10{,}000$$

M_U = peak area of methanol from the *Sample*

M_S = peak area of methanol from *Standard solution A*

C_M = concentration of spiked methanol from *Standard solution A* (µL/L)

Individual known impurity (ethyl ether, acetone, diisopropyl ether, 1-propanol, 2-butanol) calculation:

$$\text{Result (\% v/v)} = \{[K_U/(K_S - K_U)] \times C_K\}/10{,}000$$

K_U = peak area of individual known impurity from the *Sample*

K_S = peak area of individual known impurity from *Standard solution B*

C_K = concentration of spiked individual known impurity from *Standard solution B* (µL/L)

Individual unspecified impurity calculation:

$$\text{Result (\% v/v)} = [(r_U/r_S) \times C_S]/10{,}000$$

r_U = peak area of each unspecified impurity from the *Sample*

r_S = peak area of ethyl acetate from *Standard solution B*

C_S = concentration of ethyl acetate from *Standard solution B* (µL/L)

Acceptance criteria: See *Table 3*.

Table 3

Impurity	Percentage (% v/v)
Methanol[a]	NMT 0.02[a]
Each other individual known impurity (ethyl ether, acetone, diisopropyl ether, 1-propanol, 2-butanol)	NMT 0.1
Individual unspecified impurity	NMT 0.1
Total impurities	NMT 1.0

[a] To be performed as a part of *Identification C*.

• **Limit of Nonvolatile Residue**

Sample: 50 mL

Analysis: Evaporate the *Sample* in a tared porcelain dish on a steam bath to dryness, and heat at 105° for 1 h.

Acceptance criteria: NMT 2.5 mg (0.005%)

SPECIFIC TESTS

• **Specific Gravity ⟨841⟩:** 0.783–0.787

• **Refractive Index ⟨831⟩:** 1.376–1.378 at 20°

• **Acidity**

Sample solution: To 50 mL of Isopropyl Alcohol add 100 mL of carbon dioxide-free water.

Analysis: To the *Sample solution* add 2 drops of phenolphthalein TS, and titrate with 0.020 N sodium hydroxide to a pink color that persists for 30 s.

Acceptance criteria: NMT 0.70 mL of 0.020 N sodium hydroxide is required for neutralization.

• **Water Determination ⟨921⟩, *Method I***

Sample: 5.0 g

Acceptance criteria: NMT 0.5%

Add the following:

▲• **Ultraviolet Absorption**

Sample: Isopropyl Alcohol

Analytical wavelength: 230–310 nm

Cell: 1 cm

Reference: Water

Acceptance criteria

Absorbance: NMT 0.30 at 230 nm; NMT 0.10 at 250 nm; NMT 0.03 at 270 nm; NMT 0.02 at 290 nm; NMT 0.01 at 310 nm

Curve: The spectrum shows a steadily descending curve with no observable peaks or shoulders.▲ (USP 1-Dec-2023)

Isopropyl Alcohol

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in tight containers, and prevent exposure to excessive heat. Protect from light.
- **USP Reference Standards** ⟨11⟩

  USP 2-Propanol RS

  USP 2-Propanol System Suitability RS

It contains isopropyl alcohol with 0.1% each of ethyl ether, acetone, diisopropyl ether, 1-propanol, and 2-butanol.

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
ISOPROPYL ALCOHOL	Documentary Standards Support	SE2020 Simple Excipients
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SE2020 Simple Excipients

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
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