Ethyl Alcohol

Type of Posting	Immediate Standard
Posting Date	12-Oct-2020
Effective Date	1-Nov-2020
Expert Committee	Food Ingredients
Reason for Revision	Safety, urgent

In accordance with the Rules and Procedures of the Council of Experts, the Food Ingredients Expert Committee (FIEC) has revised the *FCC* Ethyl Alcohol monograph.

The purpose of the revisions is to address the concerns expressed by the U.S. Food and Drug Administration (FDA) that a sharp increase has been observed in hand sanitizer products that are labeled to contain ethanol and that have tested positive for methanol. Since recent Guidance from the FDA allows the use of *FCC* Ethyl Alcohol in these products in response to the COVID pandemic, the *FCC* Ethyl Alcohol monograph is implicated in this public health issue. Consistent with the goal above and based on a request from FDA, the FIEC is revising the *FCC* Ethyl Alcohol monograph to include a required, quantitative test for methanol and a limit of NMT 200 ppm. An *Identification* section will also be added to the monograph to add specificity. The revisions will have an effective date of November 1, 2020 to allow stakeholders an opportunity to notify USP of any concerns and to prepare to implement the revisions.

The Ethyl Alcohol Immediate Standard supersedes the currently effective monograph.

Should you have any questions, please contact fcc@usp.org.

Immediate Standard
Effective: November 1, 2020

Ethyl Alcohol

Alcohol

Ethanol

C_2H_6O
Formula wt: 46.07
CAS: [64-17-5]

DESCRIPTION

Ethyl Alcohol occurs as a clear, colorless, mobile liquid. It is miscible with water, with ether, and with chloroform. It boils at about 78° and is flammable. Its refractive index at 20° is about 1.364.

[Note—This monograph applies only to undenatured ethyl alcohol.]

Function: Extraction solvent; carrier solvent

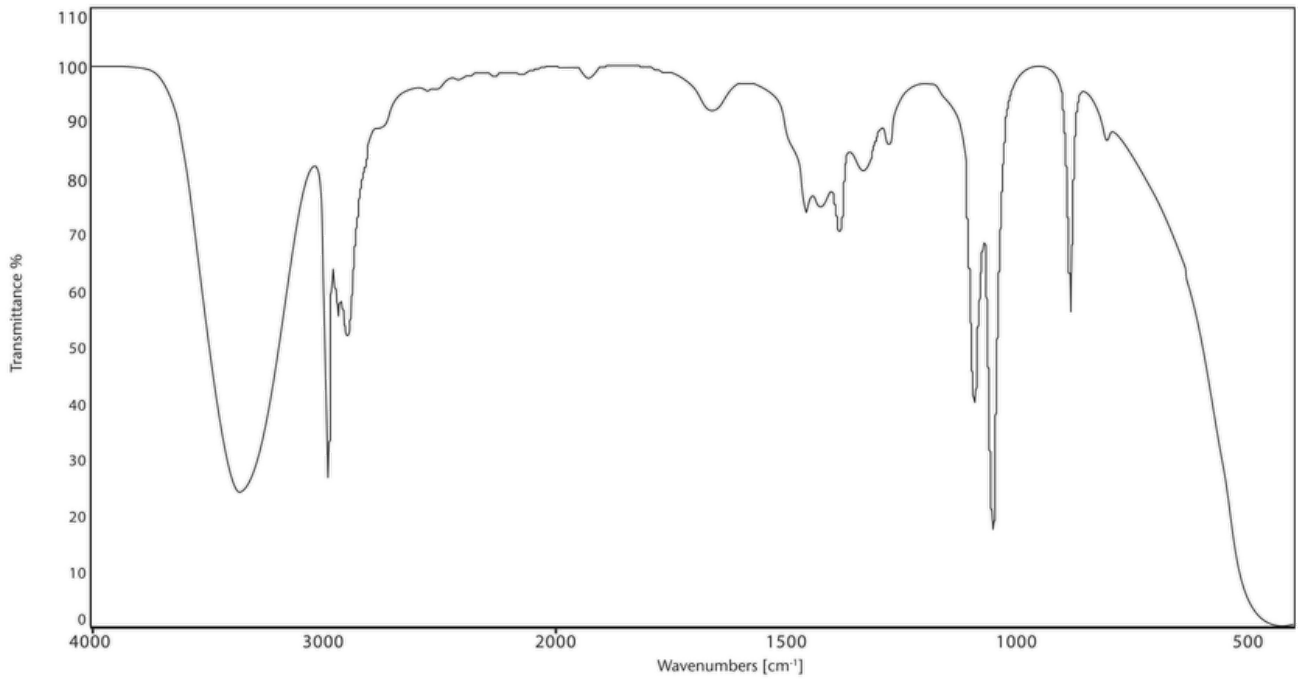
Packaging and Storage: Store in tight containers, remote from fire.

Add the following:

▲IDENTIFICATION

- **Infrared Spectra, *Spectrophotometric Identification Tests, Appendix IIIC***

  Acceptance criteria: The spectrum of the sample exhibits relative maxima at the same wavelengths as those of the spectrum below.



Ethyl Alcohol

▲ (IS 1-Nov-2020)

ASSAY

- **Specific Gravity:** Determine by any reliable method (see *General Provisions*).

  Acceptance criteria: NMT 0.8096 at 25°/25° (equivalent to 0.8161 at 15.56°/15.56°), and equivalent to NLT 94.9% by volume (92.3% by weight) of C_2H_6O

IMPURITIES

Inorganic Impurities

- **Lead, *Lead Limit Test, Atomic Absorption Spectrophotometric Graphite Furnace Method, Method I, Appendix IIIB***

  Sample: 10 g

  Acceptance criteria: NMT 0.5 mg/kg

Change to read:

Organic Impurities

- **Fusel Oil**

  Sample: 10 mL

  Analysis: Mix the *Sample* with 1 mL of glycerin and 1 mL of water, and allow to evaporate from a piece of clean, odorless, absorbent paper.

  Acceptance criteria: No foreign odor is perceptible when the last traces of alcohol leave the paper.

- **Ketones, Isopropyl Alcohol**

  Sample: 1 mL

  Analysis: Transfer the *Sample*, 3 mL of water, and 10 mL of *mercuric sulfate TS* to a test tube; mix; and heat in a boiling water bath.

  Acceptance criteria: No precipitate forms within 3 min.

- ▲**Methanol and Other Volatile Impurities**

  Sample solution A: Ethyl Alcohol (substance under test)

  Sample solution B: 300 µL/L of 4-methylpentan-2-ol in *Sample solution A*

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

  System suitability solution: 10 µL/L of methanol and 10 µL/L of acetaldehyde in *Sample solution A*

  Chromatographic system, *Appendix IIA*

  Mode: GC

  Detector: Flame ionization

  Column: 0.32-mm × 30-m fused-silica capillary; bonded with a 1.8-µm layer of a 6% cyanopropylphenyl–94% dimethylpolysiloxane stationary phase

  Temperatures

  Injection port: 200°

  Detector: 280°

  Column: See *Table 1*.

Table 1

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
40	0	40	12

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
40	10	240	10

Linear velocity: 35 cm/s

Carrier gas: Helium

Injection volume: 1.0 µL

Injection type: Split, split ratio (20:1)

System suitability

Sample: *System suitability solution*

Suitability requirements

Resolution: NLT 1.5 between the first major peak (acetaldehyde) and the second major peak (methanol)

Analysis: Separately inject *Sample solution A, Sample solution B,* and the *Standard solution* into the chromatograph, record the chromatograms, and measure the peak responses.

Determine the content, in µL/L, of methanol in the portion of the sample taken:

$$\text{Result} = (r_U/r_S)$$

r_U = peak area of methanol from *Sample solution A*

r_S = peak area of methanol from *Standard solution*

Determine the content, in µL/L, of each other impurity in the portion of the sample taken:

$$\text{Result} = (r_U/r_M) \times C_M$$

r_U = peak area of the individual impurity in *Sample solution B*

r_M = peak area of 4-methylpentan-2-ol in *Sample solution B*

C_M = concentration of 4-methylpentan-2-ol in *Sample solution B* (µL/L)

Acceptance criteria: See *Table 2*.

Table 2

Name	Acceptance Criteria
Methanol	NMT 0.5, corresponding to NMT 200 µL/L
Any other single impurity	NMT 1000 µL/L (calculated as 4-methylpentan-2-ol)
Sum of all impurities[a]	NMT 5000 µL/L

[a] Disregard any peaks of less than 9 µL/L (0.03 times the area of the peak corresponding to 4-methylpentan-2-ol in the chromatogram obtained with *Sample solution B*).

▲ (IS 1-Nov-2020)

- **Substances Darkened by Sulfuric Acid**

  Sample: 10 mL

  Analysis: Transfer 10 mL of sulfuric acid into a small Erlenmeyer flask, cool to 10° and, with constant agitation, add the *Sample*, dropwise.

  Acceptance criteria: The mixture is colorless or has no more color than either the acid or the sample before mixing.

- **Substances Reducing Permanganate**

  Sample: 20 mL

  Analysis: Transfer the *Sample*, previously cooled to 15°, to a glass-stoppered cylinder, add 0.1 mL of 0.1 N potassium permanganate, mix, and allow to stand for 5 min.

  Acceptance criteria: The pink color does not entirely disappear.

SPECIFIC TESTS

- **Acidity (as acetic acid)**

  Analysis: Transfer 10 mL of sample to a glass-stoppered flask containing 25 mL of water, add 0.5 mL of phenolphthalein TS, and then add 0.02 N sodium hydroxide to the first appearance of a pink color that persists after shaking for 30 s. Add an additional 25 mL of sample, mix, and titrate with 0.02 N sodium hydroxide until the pink color is restored.

  Acceptance criteria: NMT 0.5 mL of 0.02 N sodium hydroxide is required to restore the pink color. (NMT 0.003%)

- **Alkalinity (as NH_3)**

  Sample: 25 mL

  Analysis: Add 2 drops of *methyl red TS* to 25 mL of water, add 0.02 N sulfuric acid until a red color just appears, then add the *Sample*, and mix.

  Acceptance criteria: NMT 0.2 mL of 0.02 N sulfuric acid is required to restore the red color. (NMT 3 mg/kg)

- **Nonvolatile Residue**

  Sample: 125 mL (about 100 g)

  Analysis: Evaporate the *Sample* to dryness in a tared dish on a steam bath, dry the residue at 105° for 30 min, cool, and weigh.

  Acceptance criteria: NMT 0.003%

- **Solubility in Water**

  Analysis: Transfer 50 mL of sample to a 100-mL glass-stoppered graduated cylinder, dilute with water to 100 mL, and mix. Place the graduated cylinder in a water bath maintained at 10°, and allow it to stand for 30 min.

  Acceptance criteria: No haze or turbidity develops.