r_S = peak response from the *Standard solution*
C_S = concentration of USP Acetaminophen RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of acetaminophen in the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0%

IMPURITIES

• **4-Aminophenol in Acetaminophen-Containing Drug Products ⟨227⟩**

Buffer: 4.0 g/L of sodium citrate dihydrate and 1.5 g/L of anhydrous citric acid, in water

Diluent: *Buffer* and acetonitrile (9:1)

Sample stock solution: Approximately 12–13 mg/mL of acetaminophen prepared as follows. Transfer an appropriate number of whole Suppositories to a suitable volumetric flask. Add *Diluent* until the flask is about half filled and sonicate for 1 h with frequent swirling. Allow to cool and then dilute with *Diluent* to volume.

Sample solution: Approximately 4.8–5.2 mg/mL of acetaminophen in *Diluent* from the *Sample stock solution* prepared as follows. Pipet 20.0 mL of the *Sample stock solution* into a 50-mL volumetric flask and dilute with *Diluent* to volume.

Standard stock solution: Prepare as indicated in the chapter.

Standard solution: Add 20.0 mL of the *Sample stock solution* and 15.0 mL of the *Standard stock solution* to a 50-mL volumetric flask, and dilute with *Diluent* to volume.

Acceptance criteria: Meet the requirements

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight containers, and store at controlled room temperature or in a cool place.

• **USP Reference Standards ⟨11⟩**
USP Acetaminophen RS

Acetaminophen Oral Suspension

DEFINITION

Acetaminophen Oral Suspension is a suspension of Acetaminophen in a suitable aqueous vehicle. It contains NLT 90.0% and NMT 110.0% of the labeled amount of acetaminophen ($C_8H_9NO_2$).

IDENTIFICATION

• **A. Infrared Absorption ⟨197K⟩**

Sample: Transfer a volume of Oral Suspension, equivalent to 240 mg of acetaminophen, to a separator. Add 50 mL of ethyl acetate, and shake. Filter the ethyl acetate extract through a funnel containing glass wool and 10 g of anhydrous sodium sulfate. Collect the filtrate in a beaker, and evaporate on a steam bath to dryness. Dry the residue under vacuum over silica gel.

Acceptance criteria: The crystals so obtained meet the requirements.

ASSAY

• **Procedure**

Mobile phase: Methanol and water (1:3)

Standard solution: 0.01 mg/mL of USP Acetaminophen RS in *Mobile phase*

Sample stock solution: Nominally 0.5 mg/mL of acetaminophen prepared as follows. Transfer 100 mg of acetaminophen from a volume of Oral Suspension, previously well shaken, to a 200-mL volumetric flask. Add 100 mL of *Mobile phase*, and shake by mechanical means for 10 min. Dilute with *Mobile phase* to volume.

Sample solution: Nominally 0.01 mg/mL of acetaminophen from the *Sample stock solution* in *Mobile phase*. Pass a portion of this solution through a filter of 0.5-µm pore size or finer, discarding the first 10 mL of the filtrate. Use the clear filtrate.

Chromatographic system
(See *Chromatography ⟨621⟩, System Suitability.*)
Mode: LC
Detector: UV 243 nm
Column: 3.9-mm × 30-cm; packing L1
Flow rate: 1.5 mL/min
Injection volume: 10 µL

System suitability
Sample: *Standard solution*
Suitability requirements
Column efficiency: NLT 1000 theoretical plates
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%

Analysis
Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of acetaminophen ($C_8H_9NO_2$) in the portion of Oral Suspension taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Acetaminophen RS in the *Standard solution* (mg/mL)
C_U = nominal concentration of acetaminophen in the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

• **Uniformity of Dosage Units ⟨905⟩:** Meets the requirements for oral suspensions packaged in single-unit containers

• **Deliverable Volume ⟨698⟩:** Meets the requirements for oral suspensions packaged in multiple-unit containers

IMPURITIES

• **4-Aminophenol in Acetaminophen-Containing Drug Products ⟨227⟩:** Meets the requirements

SPECIFIC TESTS

• **pH ⟨791⟩:** 4.0–6.9

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in tight containers, and store at controlled room temperature.

• **USP Reference Standards ⟨11⟩**
USP Acetaminophen RS
USP 4-Aminophenol RS

Acetaminophen Tablets

DEFINITION

Acetaminophen Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of acetaminophen ($C_8H_9NO_2$).

IDENTIFICATION

• **A.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

• **B. Thin-Layer Chromatographic Identification Test ⟨201⟩**

Sample solution: Nominally 1 mg/mL of acetaminophen prepared as follows. Triturate 50 mg of acetaminophen from powdered Tablets in 50 mL of methanol, and filter. Use the clear filtrate.

Chromatographic system
Developing solvent system: Methylene chloride and methanol (4:1)