in the portion of constituted solution or suspension taken by the formula:

$$(L / D)(C)(R_U / R_S)$$

in which L is the labeled quantity, in mg of cefuroxime ($C_{16}H_{16}N_4O_8S$), in the container, or in the volume of constituted solution or suspension taken; D is the concentration, in mg of cefuroxime ($C_{16}H_{16}N_4O_8S$) per mL, of *Assay preparation 1* or *Assay preparation 2*, based on the labeled quantity in the container or in the portion of constituted solution or suspension taken, respectively, and the extent of dilution; C is the concentration, in mg of cefuroxime ($C_{16}H_{16}N_4O_8S$) per mL, of the *Standard preparation;* and R_U and R_S are the peak response ratios of cefuroxime to the internal standard obtained from the *Assay preparation* and the *Standard preparation,* respectively. Where the test for *Uniformity of dosage units* has been performed using the *Procedure for content uniformity*, use the average of these determinations as the *Assay* value.

Celecoxib

$C_{17}H_{14}F_3N_3O_2S$ 381.4

4-[5-(4-Methylphenyl)-3-(trifluoromethyl)-1*H*-pyrazol-1-yl]benzenesulfonamide;

p-[5-*p*-Tolyl-3-(trifluoromethyl)pyrazol-1-yl]benzenesulfonamide [169590-42-5].

DEFINITION

Celecoxib contains NLT 98.0% and NMT 102.0% of $C_{17}H_{14}F_3N_3O_2S$, calculated on the anhydrous basis.

IDENTIFICATION

- **A. Infrared Absorption ⟨197⟩:** [NOTE—Methods ⟨197A⟩, ⟨197K⟩, or ⟨197M⟩ under *Infrared Absorption* may be used.]
  [NOTE—If the spectra obtained show differences, dissolve the substance to be examined and the Reference Standard separately in isopropyl alcohol, evaporate to dryness, and record the new spectra.]
- **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY

- **Procedure**

Buffer: 2.7 g/L of monobasic potassium phosphate adjusted with phosphoric acid to a pH of 3.0 ± 0.2
Mobile phase: Methanol, acetonitrile, and *Buffer* (3:1:6)
Diluent: Methanol and water (3:1)
System suitability solution: 0.5 mg/mL of USP Celecoxib RS and 2.4 µg/mL each of USP Celecoxib Related Compound A RS and USP Celecoxib Related Compound B RS in *Diluent*
Standard solution: 0.5 mg/mL of USP Celecoxib RS in *Diluent*
Sample solution: 0.5 mg/mL of Celecoxib in *Diluent*
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 215 nm
Column: 4.6-mm × 25-cm; 5-µm packing L11
Column temperature: 60°
Flow rate: 1.5 mL/min
Injection size: 25 µL
Run time: About 1.5 times the celecoxib peak elution
System suitability
Samples: *System suitability solution* and *Standard solution*
Suitability requirements
Resolution: NLT 1.8 between celecoxib related compound A and celecoxib and NLT 1.8 between celecoxib and celecoxib related compound B, *System suitability solution*
Relative standard deviation: NMT 0.73%, *Standard solution*
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of $C_{17}H_{14}F_3N_3O_2S$ in the portion of Celecoxib 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 the *Standard solution* (mg/mL)
C_U = concentration of the *Sample solution* (mg/mL)
Acceptance criteria: 98.0%–102.0% on the anhydrous basis

IMPURITIES

Inorganic Impurities

- **Heavy Metals:** NMT 20 ppm

Diluent: Acetone and water (17:3)
Standard solution: Dilute 1.0 mL of *Standard Lead Solution*, prepared as directed under *Heavy Metals* ⟨231⟩, *Special Reagents*, with *Diluent* to 20 mL.
Sample solution: Dissolve 0.50 g of Celecoxib in 20 mL of *Diluent*.
Blank solution: 20 mL of *Diluent*
Analysis
Samples: *Standard solution*, *Blank solution*, and *Sample solution*
To each solution, add 2 mL of *pH 3.5 Acetate Buffer*, prepared as directed under *Heavy Metals* ⟨231⟩, *Method I*. Mix, and add to each solution 1.2 mL of thioacetamide–glycerin base TS. Mix immediately, and allow to stand for 2 min. Pass the solutions through a filter of 0.45-µm pore size. Compare the spots on the filters obtained from each of the solutions.
Acceptance criteria: The brownish-black color of the spot resulting from the *Sample solution* is not more intense than that of the spot resulting from the *Standard solution*. The test is invalid if the *Standard solution* does not show a brownish-black color compared to the *Blank solution*.

- **Residue on Ignition ⟨281⟩:** NMT 0.2%, using a platinum crucible

Organic Impurities

- **Procedure**

Buffer, Mobile phase, Diluent, System suitability solution, Sample solution, and **Chromatographic system:** Proceed as directed in the *Assay*.
Standard solution: 0.5 µg/mL of USP Celecoxib RS in *Diluent*
System suitability
Samples: *System suitability solution* and *Standard solution*
Suitability requirements
Resolution: NLT 1.8 between celecoxib related compound A and celecoxib and NLT 1.8 between celecoxib and celecoxib related compound B, *System suitability solution*
Signal-to-noise ratio: NLT 20, *Standard solution*
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the percentage of each impurity in the portion of Celecoxib taken:

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

r_U = peak response for each impurity in the *Sample solution*

r_S = peak response of celecoxib in the *Standard solution*
C_S = concentration of celecoxib in the *Standard solution* (mg/mL)
C_U = concentration of Celecoxib in the *Sample solution* (mg/mL)

Acceptance criteria

Individual impurities: See *Table 1*.

[NOTE— Disregard any impurity peak less than 0.05%.]

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Celecoxib related compound A[a]	0.9	0.4
Celecoxib	1.0	—
Celecoxib related compound B[b]	1.1	0.10
Individual unspecified impurity	—	0.10
Total impurities	—	0.5

[a] 4-[5-(3-Methylphenyl)-3-(trifluoromethyl)-1*H*-pyrazol-1-yl]benzenesulfonamide.

[b] 4-[3-(4-Methylphenyl)-5-(trifluoromethyl)-1*H*-pyrazol-1-yl]benzenesulfonamide.

SPECIFIC TESTS

- **WATER DETERMINATION,** *Method I* ⟨**921**⟩**:** NMT 0.5%, using a 400-mg sample

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight containers, protected from light and moisture. Store at room temperature.
- **USP REFERENCE STANDARDS** ⟨**11**⟩

USP Celecoxib RS
p-[5-*p*-Tolyl-3-(trifluoromethyl)pyrazol-1-yl]benzenesulfonamide.
$C_{17}H_{14}F_3N_3O_2S$ 381.4

USP Celecoxib Related Compound A RS
4-[5-(3-Methylphenyl)-3-(trifluoromethyl)-1*H*-pyrazol-1-yl]benzenesulfonamide.
$C_{17}H_{14}F_3N_3O_2S$ 381.4

USP Celecoxib Related Compound B RS
4-[3-(4-Methylphenyl)-5-(trifluoromethyl)-1*H*-pyrazol-1-yl]benzenesulfonamide.
$C_{17}H_{14}F_3N_3O_2S$ 381.4

Oxidized Cellulose

DEFINITION

Oxidized Cellulose contains NLT 16.0% and NMT 24.0% of carboxyl groups (COOH), calculated on the dried basis. It is sterile.

IDENTIFICATION

- **A.**

Sample solution: 200 mg in 10 mL of 0.25 N sodium hydroxide

Analysis 1: Shake the *Sample solution* for 1 min. Add 10 mL of water, and shake.

Acceptance criteria 1: The *Sample solution* shows no more than a slight haze and is substantially free from fibers and foreign particles.

Analysis 2: Allow the resulting solution to stand for 10 min.

Acceptance criteria 2: Any swollen fibers initially present are no longer visible.

Analysis 3: Acidify the resulting solution with 3 N hydrochloric acid.

Acceptance criteria 3: A flocculent white precipitate is formed.

ASSAY

- **PROCEDURE**

Solution A: 20 mg/mL of calcium acetate

Sample: 500 mg, previously dried under vacuum over phosphorus pentoxide for 18 h

Blank: 50.0 mL of *Solution A*

Titrimetric system

(See *Titrimetry* ⟨541⟩.)

Mode: Direct titration

Titrant: 0.1 N sodium hydroxide VS

Endpoint detection: Visual

Analysis: Place the *Sample* in a 125-mL conical flask. Add 50.0 mL of *Solution A*, swirl until the sample is completely covered, allow the mixture to stand for 30 min, then add phenolphthalein TS. Titrate the solution with *Titrant*. Perform a blank determination, and make any necessary correction. Each mL of *Titrant* is equivalent to 4.502 mg of carboxyl groups (COOH).

Acceptance criteria: 16.0%–24.0% on the dried basis

IMPURITIES

- **RESIDUE ON IGNITION** ⟨**281**⟩**:** NMT 0.15%
- **LIMIT OF NITROGEN**

Solution A: 40 mg/mL of boric acid

Solution B: Methyl red TS and bromocresol green TS (1:4)

Sample: 1 g, previously dried under vacuum over phosphorus pentoxide for 18 h

Titrimetric system

(See *Titrimetry* ⟨541⟩.)

Mode: Direct titration

Titrant: 0.02 N sulfuric acid VS

Endpoint detection: Visual

Analysis: Place a 125-mL conical flask, containing 30 mL of *Solution A* and 6 drops of *Solution B*, beneath the condenser of the distillation apparatus so that the tip of the condenser is well below the surface of the resulting solution. To a 500-mL Kjeldahl flask, add the *Sample*, and add 1 g of Devarda's alloy, 100 mL of recently boiled water, a small lump of paraffin, and 100 mL of 1 N sodium hydroxide. Connect the Kjeldahl flask to the condenser by a suitable trap bulb. Heat the mixture in the flask until 45–50 mL of distillate has collected in the receiver. Rinse the condenser, and titrate the resulting solution with *Titrant* to a pale pink endpoint. Perform a blank determination, and make any necessary correction. Each mL of *Titrant* is equivalent to 0.2801 mg of nitrogen.

Acceptance criteria: NMT 0.5%

- **LIMIT OF FORMALDEHYDE**

Solution A: Formaldehyde in water (1 in 40,000)

Standard: 0.50 mL of *Solution A*

Sample: 500 mg

Instrumental conditions

(See *Spectrophotometry and Light-Scattering* ⟨851⟩.)

Mode: Vis

Analytical wavelength: 570 nm

Blank: Mixture of 0.5 mL of water and 10 mL of chromotropic acid TS

Analysis: Transfer the *Sample* to a 500-mL iodine flask. Add 250 mL of water, and allow to stand for NLT 2 h with intermittent shaking. Pipet 0.50 mL each of the supernatant from the resulting solution and the *Standard* into two separate glass-stoppered test tubes. To each test tube add 10 mL of chromotropic acid TS. Stopper the tubes loosely, and heat in a boiling water bath for 30 min. Cool, and determine the absorbance of each solution against the *Blank*.

Acceptance criteria: 0.5%; the absorbance of the *Sample* is NMT the *Standard*.