Product Name: Nitrocefin

Product Number: N005

CAS Number: 41906-86-9

Molecular Formula: C₂₁H₁₆N₄O₈S₂

Molecular Weight: 516.51

Form: Powder

Appearance: Orange or yellow powder

Source: Synthetic

Storage Conditions: Protect from light. Store with inert gas. -20°C
**Description:**

Nitrocefin is a cephalosporin with chromogenic properties and is routinely used to detect beta-lactamase enzymes produced by beta-lactam resistant bacteria. Nitrocefin is soluble in DMSO and is commonly used at a 1.0 mg/mL concentration.

This product is considered a dangerous good. Quantities above 1 g may be subject to additional shipping fees. Please contact us for specific questions.

**Zhangming et al.** used nitrocefin from TOKU-E as a substrate to study TEM-1 beta-lactamase activity from E. coli. "Label-Free Measurements of Reaction Kinetics Using a Droplet-Based Optofluidic Device."

**Liu et al.** used nitrocefin from TOKU-E to study and develop a homogeneous biosensor. "Parts-per-Million of Polyethylene Glycol as a Non-Interfering Blocking Agent for Homogeneous Biosensor Development."


**Ohlhoff et al.** used nitrocefin from TOKU-E as a substrate to study the activity of EstG34 beta-lactamases. "An unusual feruloyl esterase belonging to family VIII esterases and displaying a broad substrate range."

**Huang et al.** used nitrocefin from TOKU-E as a substrate to study the activity of VIM-2 Metallo-beta-lactamases (MBLs). "Inhibiting the VIM-2 Metallo-beta-Lactamase by Graphene Oxide and Carbon Nanotubes."

**Eze E et al.** used nitrocefin from TOKU-E to confirm beta-lactamase production in E. coli and Klebsiella species from Nigeria. Read more here: "Occurrence of Beta-Lactamases and the Antibiogram Pattern of Clinical Isolates of Escherichia coli and Klebsiella Species in Nsukka Metropolis."

**Choi et al.** measured enzymatic activity of engineered protein switches by exploiting nitrocefin hydrolysis. Read more here: "Electrochemical Activation of Engineered Protein Switches."

**Pierre, et al.** used nitrocefin from TOKU-E to measure the enzymatic activity of various beta-lactamases. Read more here: "Molecular Determinants for Protein Stabilization by Insertional Fusion to a Thermophilic Host Protein."

**Tullman and Nicholes, et al.** used nitrocefin from TOKU-E to study and characterize enzymatic protein switches. Read more here: "Enzymatic protein switches built from paralogous input domains."

**Mechanism of Action:**

Essentially all beta-lactamase enzymes hydrolyze the amide bond between the carbonyl carbon and the nitrogen in the beta-lactam ring of nitrocefin. Macroscopic detection of this process is made possible because a ultraviolet absorption shift from intact versus hydrolyzed nitrocefin occurs within the visible light spectrum (~380 nm to ~500 nm, or yellow to red).

**Microbiology Applications**

Nitrocefin is used to detect beta-lactamase activity from suspected beta-lactam resistant bacteria (see protocol below).
Technical Data:

Example of nitrocefin color change before and after exposure to beta-lactamase.

(A) Concentrated nitrocefin (10.0 mg/mL) in DMSO before dilution with PBS buffer. (B) Nitrocefin diluted with PBS buffer to working concentration (1.0 mg/mL). The yellow color is indicative of intact, undegraded nitrocefin. (C) 25 units of beta-lactamase dropped on top of nitrocefin (1.0 mg/mL in PBS). The red color is the result of beta-lactamase mediated cleavage of the nitrocefin. (D) Vortexed mixture of contents shown in picture (C).

References:
