Nitrocefin
PRODUCT DATA SHEET

issue date 12/12/2018

Product Name:	Nitrocefin
Product Number:	N005
CAS Number:	41906-86-9
Molecular Formula:	$C_{21}H_{16}N_4O_8S_2$
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 ß-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."

Dahlin et al. used nitrocefin from TOKU-E in a surrogate ß-lactamase-nitrocefin assay. "A Cell-Free Fluorometric High-Throughput Screen for Inhibitors of Rtt109-Catalyzed Histone Acetylation."

Ohlhoff et al. used nitrocefin from TOKU-E as a substrate to study the activity of EstG34 ß-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-ß-lactamases (MBLs). "Inhibiting the VIM-2 Metallo-ß-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 nitrocefinhydrolysis. Read more here: "Electrochemical Activation of Engineered Protein Switches."

Pierre, et al. used nitrocefin from TOKU-E to measure the enzymatic acivity 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."

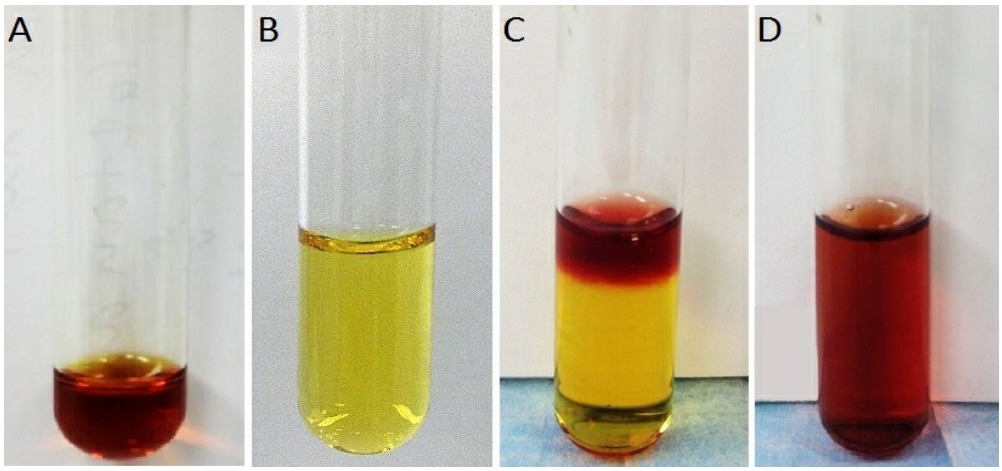
Mechanism of Action:

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 mixutre of contents shown in picture (C).

References:

O'Callaghan, Cynthia H. et. al. "Novel Method for Detection of B-Lactamases by Using a Chromogenic Cephalosporin Substrate." *Antimicrobial Agents and Chemotherapy* 1.4 (1972): 283-88. *Ncbi.gov* Web. 10 Oct. 2012.

Parr, T. R., Jr. "Simple Screening Method for Beta-lactamase-positive and -negative Ampicillin-resistant Haemophilus Influenzae Isolates." *Journal of Clinical Microbiology* 20.1 (1984): 131-32. *Ncbi.gov.* Web. 10 Oct. 2012.