Product Name: Cefpirome sulfate

Product Number: C014

CAS Number: 98753-19-6

Molecular Formula: $C_{22}H_{22}N_{6}O_{5}S_{2}H_{2}SO_{4}$

Molecular Weight: 612.66

Form: Powder

Appearance: White or almost white crystalline powder

Solubility: DMSO (1 mg/ml)

Source: Synthetic

Water Content (Karl Fischer): $\leq 4.0\%$

pH: (2% in H$_2$O): 1.3-2.5

Storage Conditions: $-20^\circ$C

Description: Cefpirome sulfate is a semisynthetic, broad-spectrum, fourth generation cephalosporin antibiotic that inhibits bacterial cell wall synthesis. Cefpirome is a $\beta$-lactam antibiotic consisting of a $\beta$-lactam ring bound to a dihydrothiazine ring. This two-ring system distorts the $\beta$-lactam amide bond, resulting in increased reactivity. Cefpirome sulfate is soluble in DMSO (1 mg/ml).

TOKU-E offers two forms of Cefpirome:

- Cefpirome sulfate (C014)
- Cefpirome sulfate solubilized (C055)

Mechanism of Action: Like $\beta$-lactams, cephalosporins interfere with PBP (penicillin binding protein) activity involved in the final phase of peptidoglycan synthesis. PBP’s are enzymes which catalyze a pentaglycine crosslink between alanine and lysine residues providing additional strength to the cell wall. Without a pentaglycine crosslink, the integrity of the cell wall is severely compromised and ultimately leads to cell lysis and death. Resistance to cephalosporins is commonly due to cells containing plasmid encoded $\beta$-lactamases.

The relative lack of cross-resistance between Cefpirome and the third generation cephalosporins suggests a slightly different mechanism of action of Cefpirome in comparison to the other cephalosporins. Due to its compact dipolar structure, Cefpirome can penetrate Gram-negative bacteria more quickly than the other agents (Nikaido et al, 1990)
Cefpirome is a broad spectrum antibiotic targeting a wide variety of Gram-positive and Gram-negative bacteria. A relatively low affinity of Cefpirome for lactamasess is considered to be one of the reasons for its high antimicrobial activity against such enzyme-producing strains (Nikaido et al, 1990). Many Bacteroides, Enterococci, and Haemophilus species have developed resistance to Cefpirome.

Microbiology Applications: Cefpirome sulfate is commonly used in clinical in vitro microbiological antimicrobial susceptibility tests (panels, discs, and MIC strips) against gram positive and gram negative microbial isolates. Medical microbiologists use AST results to recommend antibiotic treatment options for infected patients. Representative MIC values include:

- *Campylobacter jejuni*: 0.5µg/mL – 8 µg/mL
- *Klebsiella pneumoniae*: 0.032 µg/mL – 0.125 µg/mL
- For a complete list of cefpirome MIC values, click here.

TOKU-E cefpirome sulfate was used in a study by Spinler J.K. et al.: Discriminating strain-specific β-lactam drug resistance by clonal isolates of multidrug-resistant Pseudomonas aeruginosa using selected reaction monitoring.

Cancer Applications: Cefpirome was found to be more effective than ceftazidime, aztreonam, timentin, and piperacillin against nosocomially important isolates from cancer patients during *in vitro* examination of 253 bacterial isolates (Rolston et al, 1986).

References:


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