

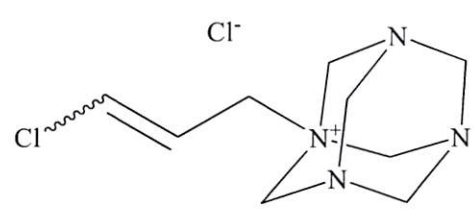
Certificate of Analysis

Certificate No.: **20250417502**



Date: April 17, 2025

Retest date: April 14, 2028

Compound Name: Clethodim Impurity 21 Chloride (Mixture of <i>Z</i> and <i>E</i> Isomers)	
Synonyms:	(3R,5R)-1-(3-chloroallyl)-1,3,5,7-tetraazaadamantan-1-ium, chloride (1:1)
TLC Catalogue Number:	C-9831
CAS Number:	4080-31-3
Alternate CAS Number:	N/A
Molecular Weight:	215.70 35.45
Molecular Formula:	C ₉ H ₁₆ ClN ₄ . Cl
Source:	TLC Pharmaceutical Standards
Source Lot No.:	4411-099A2
Storage Conditions:	Store at 2-8 °C
Solubility:	Methanol, DMSO, Water



Test Description	Specifications	Results
Visual Description	White to off-white solid	Conforms
Identification		
IR	Conforms to structure	Conforms
MS	Conforms to structure	Conforms
¹ H NMR	Conforms to structure	Conforms
Purity (HPLC)	Not less than 95.0%	100.0%
Impurity (HPLC)	N/A	
Residual Solvents (NMR)	No residual solvent	
Assay (qNMR)	Not less than 90.0%	97.1%
Recommendation:	Release. The compound contains 11.0% <i>E</i> -isomer and 86.1% <i>Z</i> -isomer according to its proton qNMR.	

Name	Department	Signature	Date
Reviewed and approved by:	Quality Control		04/17/2025
Approved by:	Quality Assurance		04/17/2025

Attachments: Peak Attribution Table, HPLC, IR, MS and NMR spectra.