Full wwPDB X-ray Structure Validation Report ⓘ

Mar 30, 2026 – 01:22 pm BST

PDB ID	:	9QTE / pdb_00009qte
Title	:	Simkania negevensis CE-clan virulence factor SnCE1 wildtype
Authors	:	Schmoeker, O.; Girbardt, B.; Palm, G.J.; Hoppen, J.; Schulze, S.; Lammers, M.
Deposited on	:	2025-04-08
Resolution	:	2.82 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

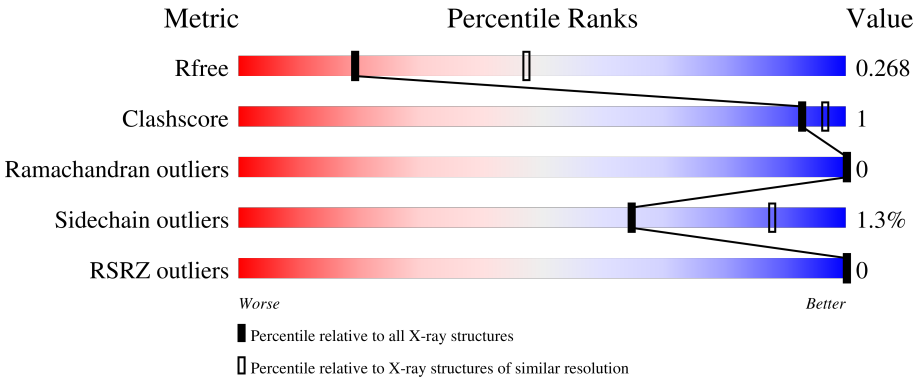
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.82 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	4293 (2.84-2.80)
Clashscore	180529	4801 (2.84-2.80)
Ramachandran outliers	177936	4739 (2.84-2.80)
Sidechain outliers	177891	4741 (2.84-2.80)
RSRZ outliers	164620	4295 (2.84-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	212	90% 5% 6%
1	B	212	87% 6% 7%
1	C	212	88% 6% 7%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 10009 atoms, of which 4928 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

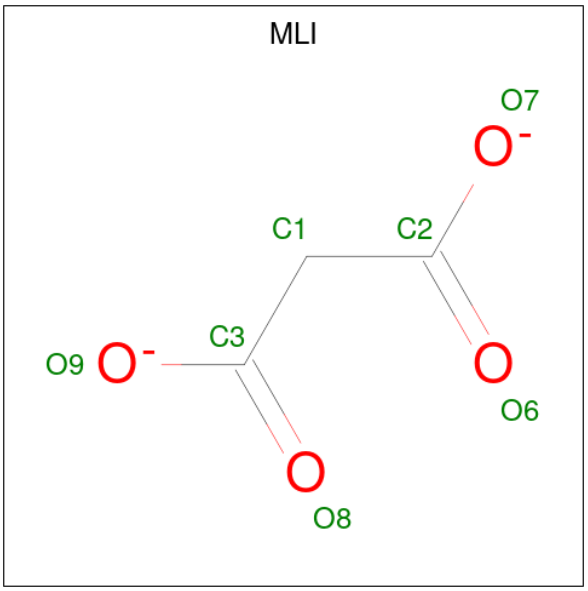
- Molecule 1 is a protein called Deubiquitinase and deneddylase ChlaDub2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	200	Total	C	H	N	O	S	36	0	0
			3344	1110	1647	280	305	2			
1	B	197	Total	C	H	N	O	S	37	0	0
			3306	1099	1632	275	298	2			
1	C	198	Total	C	H	N	O	S	36	0	0
			3331	1106	1645	277	301	2			

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	26	GLY	-	expression tag	UNP F8L4W9
A	27	PRO	-	expression tag	UNP F8L4W9
A	28	GLY	-	expression tag	UNP F8L4W9
A	29	LEU	-	expression tag	UNP F8L4W9
A	30	SER	-	expression tag	UNP F8L4W9
B	26	GLY	-	expression tag	UNP F8L4W9
B	27	PRO	-	expression tag	UNP F8L4W9
B	28	GLY	-	expression tag	UNP F8L4W9
B	29	LEU	-	expression tag	UNP F8L4W9
B	30	SER	-	expression tag	UNP F8L4W9
C	26	GLY	-	expression tag	UNP F8L4W9
C	27	PRO	-	expression tag	UNP F8L4W9
C	28	GLY	-	expression tag	UNP F8L4W9
C	29	LEU	-	expression tag	UNP F8L4W9
C	30	SER	-	expression tag	UNP F8L4W9

- Molecule 2 is MALONATE ION (CCD ID: MLI) (formula: $C_3H_2O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C H O 9 3 2 4	0	0
2	C	1	Total C H O 9 3 2 4	0	0

- Molecule 3 is water.

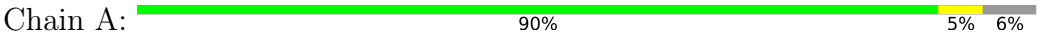
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total O 2 2	0	0
3	B	5	Total O 5 5	0	0
3	C	3	Total O 3 3	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

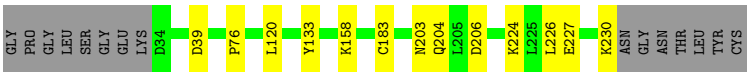
• Molecule 1: Deubiquitinase and deneddylase ChlaDub2

Chain A:



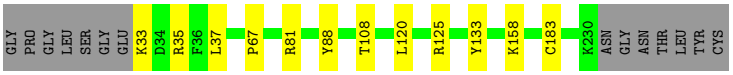
• Molecule 1: Deubiquitinase and deneddylase ChlaDub2

Chain B:



• Molecule 1: Deubiquitinase and deneddylase ChlaDub2

Chain C:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α, β, γ	105.64Å 105.64Å 122.09Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.10 – 2.82 44.10 – 2.82	Depositor EDS
% Data completeness (in resolution range)	98.3 (44.10-2.82) 98.0 (44.10-2.82)	Depositor EDS
R_{merge}	0.23	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.29 (at 2.81Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.247 , 0.269 0.246 , 0.268	Depositor DCC
R_{free} test set	751 reflections (4.64%)	wwPDB-VP
Wilson B-factor (Å^2)	54.2	Xtriage
Anisotropy	0.265	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 30.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.46$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	0.419 for -h,k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	10009	wwPDB-VP
Average B, all atoms (Å^2)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.76% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MLI

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.99	0/1748	1.32	3/2360 (0.1%)
1	B	0.99	0/1725	1.33	3/2329 (0.1%)
1	C	1.00	0/1737	1.32	1/2344 (0.0%)
All	All	0.99	0/5210	1.32	7/7033 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	39	ASP	CA-C-O	-7.22	113.11	120.77
1	A	222	ARG	NE-CZ-NH1	-5.61	115.89	121.50
1	A	76	PRO	CA-C-N	5.46	126.15	120.03
1	A	76	PRO	C-N-CA	5.46	126.15	120.03
1	C	125	ARG	CD-NE-CZ	5.27	131.78	124.40
1	B	76	PRO	CA-C-N	5.22	125.88	120.03
1	B	76	PRO	C-N-CA	5.22	125.88	120.03

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1697	1647	1642	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1674	1632	1625	7	0
1	C	1686	1645	1640	4	0
2	A	7	2	2	0	0
2	C	7	2	2	0	0
3	A	2	0	0	1	0
3	B	5	0	0	0	0
3	C	3	0	0	0	0
All	All	5081	4928	4911	14	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (14) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:35:ARG:NH2	3:A:401:HOH:O	1.98	0.95
1:C:33:LYS:C	1:C:35:ARG:H	2.13	0.57
1:A:203:ASN:HB3	1:B:204:GLN:HG3	1.92	0.52
1:B:226:LEU:O	1:B:230:LYS:HG3	2.11	0.50
1:A:204:GLN:HG3	1:B:203:ASN:HB3	1.96	0.47
1:A:204:GLN:HA	1:B:203:ASN:O	2.16	0.45
1:B:224:LYS:HA	1:B:227:GLU:HG2	1.99	0.45
1:A:203:ASN:O	1:B:204:GLN:HA	2.17	0.44
1:A:39:ASP:OD2	1:A:42:ASN:HB3	2.18	0.43
1:A:120:LEU:HB3	1:A:133:TYR:HB2	2.00	0.43
1:C:81:ARG:NH1	1:C:88:TYR:CE1	2.86	0.42
1:B:120:LEU:HB3	1:B:133:TYR:HB2	2.01	0.41
1:C:120:LEU:HB3	1:C:133:TYR:HB2	2.01	0.41
1:C:67:PRO:HD3	1:C:108:THR:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	198/212 (93%)	191 (96%)	7 (4%)	0	100	100
1	B	195/212 (92%)	190 (97%)	5 (3%)	0	100	100
1	C	196/212 (92%)	190 (97%)	6 (3%)	0	100	100
All	All	589/636 (93%)	571 (97%)	18 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	178/187 (95%)	177 (99%)	1 (1%)	84	94
1	B	175/187 (94%)	172 (98%)	3 (2%)	56	83
1	C	177/187 (95%)	174 (98%)	3 (2%)	56	83
All	All	530/561 (94%)	523 (99%)	7 (1%)	65	88

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	183	CYS
1	B	158	LYS
1	B	183	CYS
1	B	206	ASP
1	C	37	LEU
1	C	158	LYS
1	C	183	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	197	ASN

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Mol	Chain	Res	Type
1	A	204	GLN
1	B	197	ASN
1	C	57	GLN
1	C	197	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	MLI	A	301	-	6,6,6	1.57	1 (16%)	7,7,7	1.05	0
2	MLI	C	301	-	6,6,6	1.28	1 (16%)	7,7,7	1.02	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	MLI	A	301	-	-	1/4/4/4	-
2	MLI	C	301	-	-	4/4/4/4	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	MLI	C1-C3	2.27	1.54	1.51
2	C	301	MLI	O7-C2	-2.03	1.23	1.30

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	301	MLI	C2-C1-C3-O9
2	C	301	MLI	C2-C1-C3-O8
2	C	301	MLI	C3-C1-C2-O6
2	C	301	MLI	C3-C1-C2-O7
2	A	301	MLI	C2-C1-C3-O8

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	200/212 (94%)	-1.73	0	100	100	29, 53, 97, 107	0
1	B	197/212 (92%)	-1.77	0	100	100	30, 52, 89, 111	0
1	C	198/212 (93%)	-1.66	0	100	100	50, 71, 102, 125	0
All	All	595/636 (93%)	-1.72	0	100	100	29, 60, 98, 125	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	MLI	A	301	7/7	0.98	0.06	54,58,61,61	0
2	MLI	C	301	7/7	0.99	0.04	69,73,75,76	0

6.5 Other polymers (i)

There are no such residues in this entry.