



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:53 AM UTC

PDB ID : 2TMN / pdb_00002tmn
Title : CRYSTALLOGRAPHIC STRUCTURAL ANALYSIS OF PHOSPHORAMIDATES AS INHIBITORS AND TRANSITION-STATE ANALOGS OF THERMOLYSIN
Authors : Tronrud, D.E.; Monzingo, A.F.; Matthews, B.W.
Deposited on : 1987-06-29
Resolution : 1.60 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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
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) : 2.49

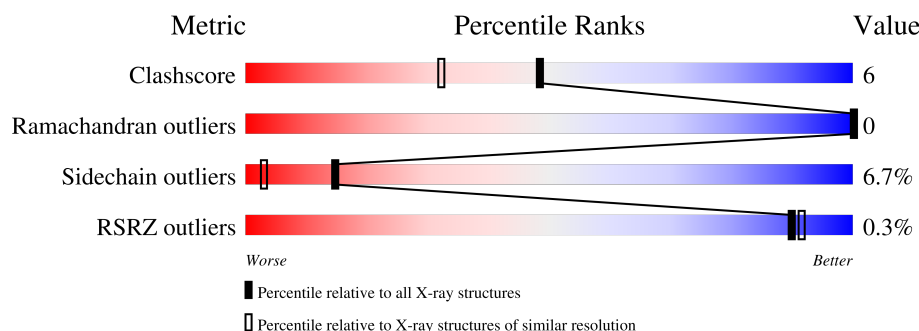
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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))
Clashscore	190562	4931 (1.60-1.60)
Ramachandran outliers	187476	4831 (1.60-1.60)
Sidechain outliers	187428	4830 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

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 $\leq 5\%$. 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	E	316	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 2618 atoms, of which 0 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 Thermolysin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	E	316	Total	C	N	O	S	0	0	0
			2432	1528	408	494	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	37	ASP	ASN	conflict	UNP P00800
E	119	GLU	GLN	conflict	UNP P00800

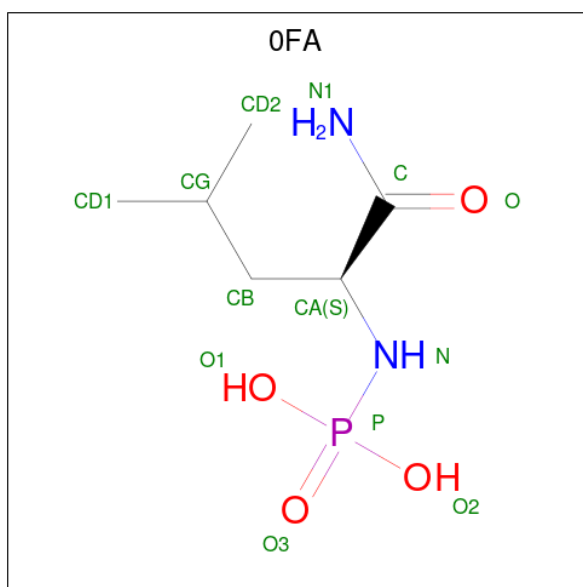
- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	E	4	Total	Ca	0	0
			4	4		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	1	Total	Zn	0	0
			1	1		

- Molecule 4 is N 2 -phosphono-L-leucinamide (CCD ID: 0FA) (formula: C₆H₁₅N₂O₄P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	E	1	Total	C	N	O	P	0	0
			13	6	2	4	1		

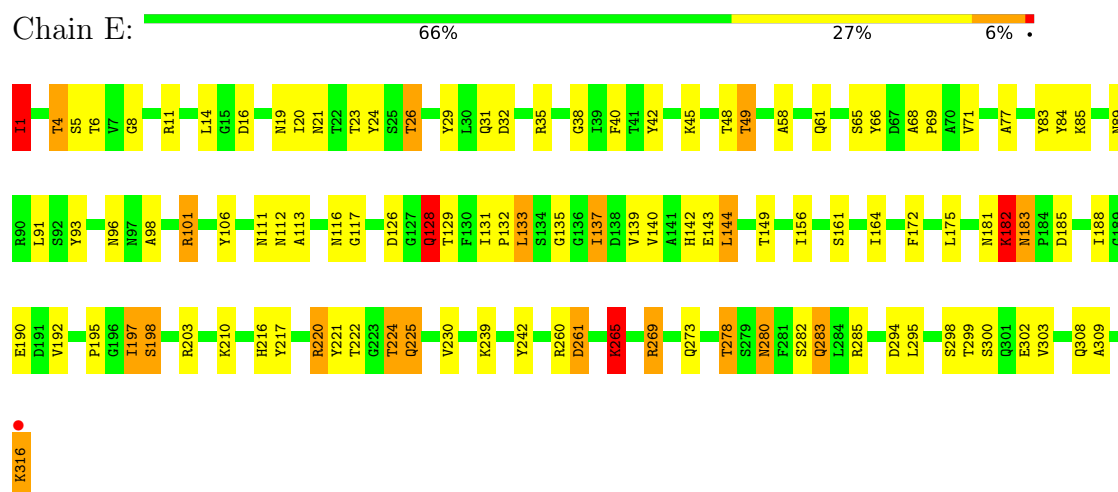
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	E	168	Total O 168 168	0	0

3 Residue-property plots

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: Thermolysin



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	94.10Å 94.10Å 131.40Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	(Not available) – 1.60 81.49 – 1.60	Depositor EDS
% Data completeness (in resolution range)	(Not available) ((Not available)-1.60) 69.1 (81.49-1.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.28 (at 1.60Å)	Xtriage
Refinement program	TNT	Depositor
R, R_{free}	0.179 , (Not available) 0.163 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	14.5	Xtriage
Anisotropy	0.621	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 57.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	2618	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.46% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: 0FA, ZN, CA

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	E	1.76	22/2491 (0.9%)	2.24	101/3391 (3.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	E	2	0

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	242	TYR	CA-C	6.71	1.61	1.52
1	E	203	ARG	NE-CZ	6.64	1.40	1.33
1	E	216	HIS	CA-CB	6.50	1.64	1.53
1	E	164	ILE	N-CA	5.88	1.53	1.46
1	E	183	ASN	C-O	-5.87	1.21	1.23
1	E	299	THR	N-CA	-5.81	1.39	1.46
1	E	316	LYS	C-OXT	5.66	1.34	1.23
1	E	140	VAL	C-N	5.53	1.41	1.34
1	E	77	ALA	N-CA	5.51	1.53	1.46
1	E	98	ALA	C-O	-5.47	1.17	1.23
1	E	183	ASN	N-CA	5.33	1.50	1.46
1	E	172	PHE	C-O	-5.31	1.17	1.24
1	E	192	VAL	N-CA	5.28	1.51	1.46
1	E	111	ASN	CA-CB	5.27	1.60	1.52
1	E	66	TYR	C-N	5.25	1.41	1.33
1	E	8	GLY	N-CA	5.22	1.50	1.44
1	E	308	GLN	CD-OE1	5.17	1.33	1.23
1	E	137	ILE	C-N	5.16	1.40	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	23	THR	CA-C	-5.07	1.46	1.52
1	E	303	VAL	N-CA	-5.06	1.40	1.46
1	E	83	TYR	CA-CB	5.06	1.61	1.53
1	E	203	ARG	C-N	5.02	1.40	1.33

All (101) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	260	ARG	N-CA-C	13.16	125.63	111.28
1	E	183	ASN	CB-CA-C	-12.17	102.56	111.20
1	E	112	ASN	OD1-CG-ND2	-12.07	110.53	122.60
1	E	278	THR	N-CA-CB	-11.96	92.20	110.73
1	E	197	ILE	CA-CB-CG1	11.29	129.59	110.40
1	E	6	THR	OG1-CB-CG2	-10.37	88.57	109.30
1	E	101	ARG	CG-CD-NE	-10.36	89.22	112.00
1	E	21	ASN	OD1-CG-ND2	-9.94	112.66	122.60
1	E	269	ARG	CD-NE-CZ	-9.19	111.53	124.40
1	E	316	LYS	CB-CA-C	8.81	126.83	110.10
1	E	11	ARG	CD-NE-CZ	-8.60	112.36	124.40
1	E	182	LYS	CG-CD-CE	8.55	130.97	111.30
1	E	4	THR	OG1-CB-CG2	-8.54	92.22	109.30
1	E	133	LEU	N-CA-C	8.24	121.19	111.71
1	E	220	ARG	N-CA-CB	-8.22	97.42	109.83
1	E	96	ASN	CB-CG-ND2	-7.78	104.72	116.40
1	E	316	LYS	CB-CG-CD	-7.61	93.81	111.30
1	E	269	ARG	NE-CZ-NH1	-7.53	113.97	121.50
1	E	183	ASN	O-C-N	-7.45	118.10	121.53
1	E	48	THR	CA-C-O	7.06	127.72	119.32
1	E	14	LEU	CD1-CG-CD2	-7.01	95.38	110.80
1	E	269	ARG	O-C-N	-7.00	114.70	122.12
1	E	183	ASN	N-CA-CB	-6.90	104.00	111.66
1	E	156	ILE	CA-CB-CG2	6.85	122.14	110.50
1	E	49	THR	N-CA-CB	-6.83	99.36	109.95
1	E	117	GLY	N-CA-C	-6.78	106.63	114.69
1	E	278	THR	OG1-CB-CG2	6.74	122.78	109.30
1	E	224	THR	OG1-CB-CG2	6.69	122.68	109.30
1	E	84	TYR	N-CA-CB	6.67	119.93	110.12
1	E	308	GLN	CG-CD-OE1	6.65	134.09	120.80
1	E	16	ASP	CA-CB-CG	6.64	119.24	112.60
1	E	61	GLN	CA-CB-CG	-6.63	100.84	114.10
1	E	58	ALA	N-CA-C	6.63	119.51	111.82
1	E	144	LEU	CD1-CG-CD2	-6.55	96.38	110.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	1	ILE	CA-CB-CG2	6.51	121.57	110.50
1	E	309	ALA	O-C-N	-6.33	115.30	122.08
1	E	161	SER	CA-CB-OG	-6.33	98.44	111.10
1	E	210	LYS	N-CA-CB	-6.27	100.23	110.14
1	E	298	SER	N-CA-C	6.20	119.94	112.38
1	E	26	THR	N-CA-CB	6.17	120.92	110.49
1	E	26	THR	CB-CA-C	6.16	122.68	110.42
1	E	101	ARG	CD-NE-CZ	6.16	133.02	124.40
1	E	113	ALA	N-CA-C	-6.03	99.89	109.23
1	E	220	ARG	NE-CZ-NH2	-6.03	113.78	119.20
1	E	308	GLN	CG-CD-NE2	-6.02	107.37	116.40
1	E	295	LEU	N-CA-C	6.01	119.09	111.69
1	E	96	ASN	OD1-CG-ND2	6.00	128.60	122.60
1	E	260	ARG	CD-NE-CZ	5.98	132.78	124.40
1	E	260	ARG	CB-CA-C	5.97	120.70	110.79
1	E	188	ILE	N-CA-C	5.90	116.36	107.75
1	E	198	SER	CA-CB-OG	-5.90	99.30	111.10
1	E	181	ASN	CA-C-O	5.87	128.27	121.28
1	E	89	ASN	CA-CB-CG	-5.87	106.73	112.60
1	E	129	THR	N-CA-C	-5.87	104.83	112.23
1	E	182	LYS	CA-C-O	-5.85	115.64	122.37
1	E	144	LEU	CA-C-O	5.77	126.54	120.42
1	E	35	ARG	NE-CZ-NH1	5.77	127.27	121.50
1	E	261	ASP	CB-CA-C	-5.77	101.82	110.88
1	E	222	THR	CA-C-O	5.76	126.18	119.32
1	E	135	GLY	O-C-N	-5.76	116.16	122.84
1	E	126	ASP	CB-CA-C	-5.74	100.51	110.09
1	E	49	THR	CB-CA-C	5.69	119.11	109.84
1	E	143	GLU	CA-C-O	5.62	126.73	120.82
1	E	230	VAL	CA-CB-CG1	5.62	119.95	110.40
1	E	197	ILE	CA-C-O	5.59	126.40	120.48
1	E	261	ASP	N-CA-CB	-5.58	101.91	110.01
1	E	19	ASN	OD1-CG-ND2	-5.51	117.09	122.60
1	E	282	SER	CB-CA-C	5.51	121.25	110.67
1	E	106	TYR	N-CA-CB	-5.51	101.41	109.95
1	E	140	VAL	CA-CB-CG1	-5.51	101.04	110.40
1	E	66	TYR	CA-C-N	5.49	128.09	120.29
1	E	66	TYR	C-N-CA	5.49	128.09	120.29
1	E	65	SER	CA-CB-OG	-5.48	100.13	111.10
1	E	5	SER	N-CA-CB	5.43	117.96	109.97
1	E	149	THR	CA-C-O	5.42	126.30	120.55
1	E	112	ASN	CB-CG-OD1	5.41	131.62	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	283	GLN	N-CA-CB	5.40	118.15	110.16
1	E	190	GLU	N-CA-C	5.39	118.65	111.75
1	E	1	ILE	O-C-N	-5.39	114.38	123.00
1	E	308	GLN	CA-CB-CG	5.38	124.86	114.10
1	E	224	THR	CA-CB-OG1	5.36	117.64	109.60
1	E	139	VAL	CA-C-N	5.34	127.49	120.60
1	E	139	VAL	C-N-CA	5.34	127.49	120.60
1	E	192	VAL	CA-CB-CG2	5.31	119.42	110.40
1	E	71	VAL	CA-CB-CG2	5.30	119.40	110.40
1	E	19	ASN	CA-CB-CG	-5.27	107.33	112.60
1	E	26	THR	CA-CB-OG1	5.26	117.49	109.60
1	E	265	LYS	CA-CB-CG	-5.25	103.61	114.10
1	E	142	HIS	CA-C-N	5.24	127.26	120.44
1	E	142	HIS	C-N-CA	5.24	127.26	120.44
1	E	93	TYR	N-CA-C	5.18	118.86	112.54
1	E	45	LYS	CB-CA-C	-5.17	104.25	111.80
1	E	224	THR	CA-CB-CG2	5.12	119.20	110.50
1	E	308	GLN	N-CA-CB	5.12	117.38	109.91
1	E	161	SER	CB-CA-C	5.11	120.49	110.67
1	E	273	GLN	CB-CG-CD	5.08	121.23	112.60
1	E	4	THR	CB-CA-C	5.06	118.10	109.75
1	E	260	ARG	NE-CZ-NH2	-5.05	114.66	119.20
1	E	198	SER	CB-CA-C	-5.02	100.93	109.51
1	E	84	TYR	CA-C-O	5.01	125.87	120.55
1	E	128	GLN	CA-C-O	5.01	126.18	119.47

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	E	224	THR	CB
1	E	260	ARG	CA

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	E	2432	0	2267	26	0
2	E	4	0	0	0	0
3	E	1	0	0	0	0
4	E	13	0	13	0	0
5	E	168	0	0	4	1
All	All	2618	0	2280	26	1

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 6.

All (26) 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:E:269:ARG:NH1	1:E:294:ASP:OD2	2.00	0.94
1:E:285:ARG:HD3	1:E:316:LYS:HD3	1.48	0.93
1:E:116:ASN:O	5:E:326:HOH:O	1.94	0.84
1:E:265:LYS:HE2	5:E:411:HOH:O	1.95	0.64
1:E:280:ASN:ND2	1:E:283:GLN:H	1.95	0.64
1:E:285:ARG:HD3	1:E:316:LYS:CD	2.27	0.60
1:E:280:ASN:HD22	1:E:283:GLN:H	1.49	0.59
1:E:137:ILE:H	1:E:182:LYS:HZ2	1.49	0.58
1:E:221:TYR:OH	1:E:225:GLN:HG3	2.03	0.57
1:E:4:THR:HG22	1:E:24:TYR:HB3	1.88	0.56
1:E:32:ASP:O	1:E:38:GLY:HA2	2.06	0.55
1:E:31:GLN:HG3	1:E:40:PHE:CE1	2.46	0.50
1:E:128:GLN:O	1:E:195:PRO:HD2	2.12	0.50
1:E:280:ASN:HD22	1:E:280:ASN:C	2.22	0.48
1:E:42:TYR:HE2	1:E:101:ARG:HG2	1.79	0.47
1:E:137:ILE:H	1:E:182:LYS:NZ	2.13	0.47
1:E:239:LYS:NZ	5:E:472:HOH:O	2.48	0.46
1:E:85:LYS:HG3	1:E:91:LEU:HD23	1.99	0.44
1:E:300:SER:HB2	1:E:302:GLU:OE1	2.17	0.44
1:E:1:ILE:HG21	1:E:29:TYR:CD2	2.54	0.43
1:E:133:LEU:HD12	1:E:133:LEU:N	2.34	0.42
1:E:68:ALA:HB3	1:E:69:PRO:HD3	2.01	0.41
1:E:217:TYR:O	1:E:220:ARG:HB2	2.19	0.41
1:E:131:ILE:HB	1:E:132:PRO:CD	2.51	0.41
1:E:175:LEU:HD23	1:E:175:LEU:HA	1.90	0.40
1:E:220:ARG:HD2	5:E:487:HOH:O	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:441:HOH:O	5:E:441:HOH:O[7_555]	1.41	0.79

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	E	314/316 (99%)	303 (96%)	11 (4%)	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	E	252/252 (100%)	235 (93%)	17 (7%)	15	3

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	1	ILE
1	E	20	ILE
1	E	26	THR
1	E	49	THR
1	E	128	GLN
1	E	144	LEU
1	E	182	LYS
1	E	183	ASN

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Mol	Chain	Res	Type
1	E	185	ASP
1	E	197	ILE
1	E	198	SER
1	E	224	THR
1	E	225	GLN
1	E	261	ASP
1	E	265	LYS
1	E	278	THR
1	E	280	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	21	ASN
1	E	96	ASN
1	E	97	ASN
1	E	112	ASN
1	E	159	ASN
1	E	183	ASN
1	E	273	GLN
1	E	280	ASN
1	E	290	GLN
1	E	301	GLN

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 ⓘ

Of 6 ligands modelled in this entry, 5 are monoatomic - leaving 1 for Mogul analysis.

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	$\# Z > 2$
4	0FA	E	322	3	12,12,12	5.56	2 (16%)	14,17,17	1.79	3 (21%)

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
4	0FA	E	322	3	-	0/11/13/13	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	322	0FA	P-N	18.95	1.85	1.61
4	E	322	0FA	P-O3	2.33	1.49	1.46

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	322	0FA	O3-P-N	-3.73	106.85	112.75
4	E	322	0FA	CD2-CG-CB	-3.47	98.60	111.08
4	E	322	0FA	O-C-CA	-2.56	116.42	120.22

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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, 95th 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	E	316/316 (100%)	-0.58	1 (0%) 90 91	7, 14, 28, 37	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	316	LYS	2.2

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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, 95th 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	CA	E	319	1/1	0.98	0.04	12,12,12,12	0
4	0FA	E	322	13/13	0.98	0.04	10,14,17,17	0
2	CA	E	320	1/1	0.99	0.02	16,16,16,16	0
2	CA	E	317	1/1	0.99	0.02	11,11,11,11	0
3	ZN	E	321	1/1	1.00	0.02	11,11,11,11	0
2	CA	E	318	1/1	1.00	0.02	13,13,13,13	0

6.5 Other polymers [i](#)

There are no such residues in this entry.