WORLDWIDE PDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2021 – 09:52 PM EDT

PDB ID : 1S09
Title : Crystal Structure of the Y144F Mutant of 7,8-Diaminopelargonic Acid Synthase
Authors : Sandmark, J.; Eliot, A.C.; Famm, K.; Schneider, G.; Kirsch, J.F.
Deposited on : 2003-12-30
Resolution : 1.83 Å(reported)

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

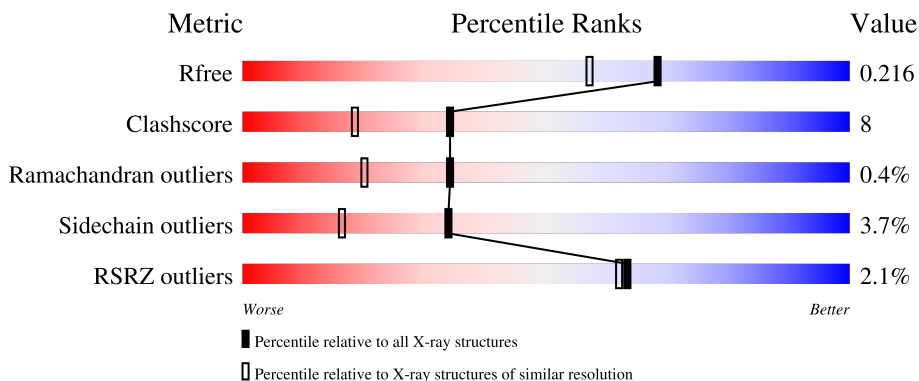|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1   Overall quality at a glance ⓘ

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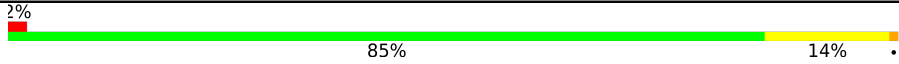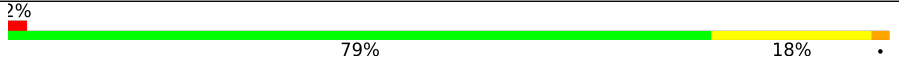*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.83 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	Percentile Ranks	Value
Rfree		0.216
Clashscore		8
Ramachandran outliers		0.4%
Sidechain outliers		3.7%
RSRZ outliers		2.1%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4003 (1.86-1.82)
Clashscore	141614	4233 (1.86-1.82)
Ramachandran outliers	138981	4185 (1.86-1.82)
Sidechain outliers	138945	4186 (1.86-1.82)
RSRZ outliers	127900	3957 (1.86-1.82)

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	429	2% 85% 14% •
1	B	429	2% 79% 18% •

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 7246 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 Adenosylmethionine-8-amino-7-oxononanoate aminotransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	427	Total	C	N	O	P	S	70	3	0
			3319	2107	574	604	1	33			
1	B	428	Total	C	N	O	P	S	27	8	0
			3353	2134	578	607	1	33			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	14	LEU	TRP	SEE REMARK 999	UNP P12995
A	144	PHE	TYR	engineered mutation	UNP P12995
A	274	LLP	LYS	modified residue	UNP P12995
B	14	LEU	TRP	SEE REMARK 999	UNP P12995
B	144	PHE	TYR	engineered mutation	UNP P12995
B	274	LLP	LYS	modified residue	UNP P12995

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Na	0	0
			1	1		
2	B	1	Total	Na	0	0
			1	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	306	Total	O	0	0
			306	306		
3	B	266	Total	O	0	0
			266	266		

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: Adenosylmethionine-8-amino-7-oxononanoate aminotransferase

Chain A:

• Molecule 1: Adenosylmethionine-8-amino-7-oxononanoate aminotransferase

Chain B:
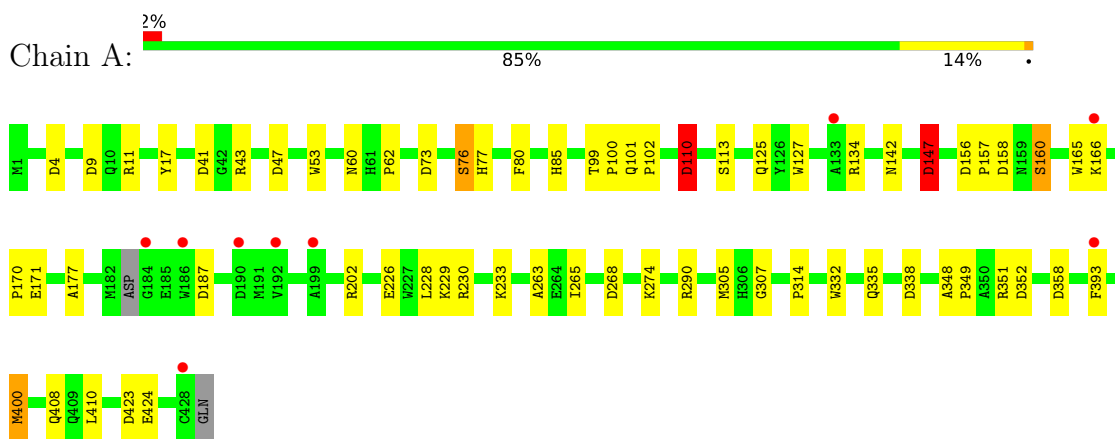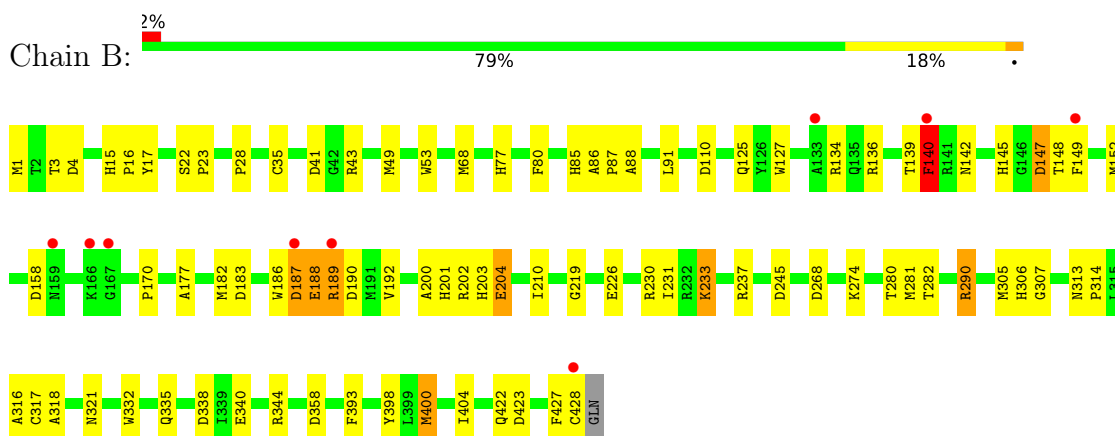
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	58.35Å 55.51Å 120.73Å 90.00° 96.95° 90.00°	Depositor
Resolution (Å)	19.96 – 1.83 19.85 – 1.83	Depositor EDS
% Data completeness (in resolution range)	100.0 (19.96-1.83) 99.5 (19.85-1.83)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$< I/\sigma(I) >$ [1]	1.88 (at 1.82Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.181 , 0.205 0.190 , 0.216	Depositor DCC
R_{free} test set	3411 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å^2)	22.5	Xtriage
Anisotropy	0.050	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 50.3	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7246	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.75% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: LLP, NA

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	0.39	0/3384	0.77	14/4591 (0.3%)
1	B	0.52	6/3442 (0.2%)	0.83	18/4670 (0.4%)
All	All	0.46	6/6826 (0.1%)	0.80	32/9261 (0.3%)

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	B	0	2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	140[A]	PHE	CA-CB	-8.59	1.35	1.53
1	B	140[B]	PHE	CA-CB	-8.59	1.35	1.53
1	B	140[A]	PHE	CB-CG	-6.28	1.40	1.51
1	B	140[B]	PHE	CB-CG	-6.28	1.40	1.51
1	B	183	ASP	C-N	5.45	1.42	1.33
1	B	182	MET	C-N	5.19	1.46	1.34

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	140[A]	PHE	CB-CG-CD2	-10.01	113.79	120.80
1	B	140[B]	PHE	CB-CG-CD2	-10.01	113.79	120.80
1	B	147[A]	ASP	CB-CA-C	7.27	124.94	110.40
1	B	147[B]	ASP	CB-CA-C	7.27	124.94	110.40
1	B	268	ASP	CB-CG-OD2	6.98	124.58	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	423	ASP	CB-CG-OD2	6.54	124.18	118.30
1	B	290	ARG	NE-CZ-NH2	-6.32	117.14	120.30
1	B	4	ASP	CB-CG-OD2	6.22	123.89	118.30
1	A	187	ASP	CB-CG-OD2	6.14	123.82	118.30
1	A	73	ASP	CB-CG-OD2	6.09	123.78	118.30
1	B	110	ASP	CB-CG-OD2	6.02	123.72	118.30
1	B	358	ASP	CB-CG-OD2	5.89	123.61	118.30
1	B	147[A]	ASP	CB-CG-OD2	5.80	123.52	118.30
1	B	147[B]	ASP	CB-CG-OD2	5.80	123.52	118.30
1	B	140[A]	PHE	CB-CG-CD1	5.71	124.80	120.80
1	B	140[B]	PHE	CB-CG-CD1	5.71	124.80	120.80
1	A	158	ASP	CB-CG-OD2	5.68	123.42	118.30
1	B	338	ASP	CB-CG-OD2	5.57	123.32	118.30
1	B	187	ASP	CB-CG-OD2	5.56	123.31	118.30
1	B	158	ASP	CB-CG-OD2	5.55	123.30	118.30
1	B	290	ARG	NE-CZ-NH1	5.34	122.97	120.30
1	A	147[A]	ASP	CB-CG-OD2	5.31	123.08	118.30
1	A	147[B]	ASP	CB-CG-OD2	5.31	123.08	118.30
1	A	358	ASP	CB-CG-OD2	5.28	123.05	118.30
1	A	11	ARG	NE-CZ-NH2	-5.27	117.66	120.30
1	A	338	ASP	CB-CG-OD2	5.26	123.03	118.30
1	A	47	ASP	CB-CG-OD2	5.21	122.99	118.30
1	A	423	ASP	CB-CG-OD2	5.19	122.97	118.30
1	A	352	ASP	CB-CG-OD2	5.14	122.93	118.30
1	A	9	ASP	CB-CG-OD2	5.08	122.87	118.30
1	A	268	ASP	CB-CG-OD2	5.07	122.86	118.30
1	A	110	ASP	CB-CG-OD2	5.02	122.82	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	140[A]	PHE	Sidechain
1	B	140[B]	PHE	Sidechain

5.2 Too-close contacts (i)

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.

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3319	0	3262	34	2
1	B	3353	0	3288	82	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	306	0	0	5	4
3	B	266	0	0	3	2
All	All	7246	0	6550	110	5

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 8.

All (110) 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:B:202:ARG:HG3	1:B:203[B]:HIS:HD2	1.05	1.12
1:B:202:ARG:HG3	1:B:203[B]:HIS:CD2	1.98	0.98
1:B:202:ARG:CG	1:B:203[B]:HIS:HD2	1.78	0.96
1:A:17:TYR:OH	1:A:147[B]:ASP:OD1	1.82	0.95
1:B:140[A]:PHE:CE1	1:B:210:ILE:CG2	2.50	0.94
1:B:317:CYS:O	1:B:321:ASN:ND2	2.10	0.85
1:B:125:GLN:HE22	1:B:305:MET:H	1.28	0.82
1:B:202:ARG:CG	1:B:203[B]:HIS:CD2	2.59	0.81
1:B:201:HIS:HA	1:B:203[B]:HIS:CE1	2.16	0.81
1:B:140[A]:PHE:CE1	1:B:210:ILE:HG22	2.17	0.80
1:B:68:MET:HE3	1:B:281:MET:HE1	1.64	0.78
1:B:68:MET:CE	1:B:281:MET:HE1	2.13	0.77
1:A:125:GLN:HE22	1:A:305:MET:H	1.32	0.77
1:B:136:ARG:CD	1:B:204:GLU:OE1	2.35	0.74
1:B:226:GLU:OE1	1:B:230:ARG:NH1	2.21	0.74
1:B:427:PHE:O	1:B:428:CYS:HB2	1.88	0.73
1:B:140[A]:PHE:CE1	1:B:210:ILE:HG21	2.25	0.71
1:A:226:GLU:OE1	1:A:230:ARG:NH1	2.24	0.70
1:A:4:ASP:OD1	3:A:1623:HOH:O	2.08	0.70
1:B:140[A]:PHE:CD1	1:B:210:ILE:HG22	2.27	0.70
1:B:186:TRP:HE1	1:B:188:GLU:HG2	1.55	0.69
1:B:68:MET:CE	1:B:281:MET:CE	2.70	0.69
1:A:147[B]:ASP:HB3	1:B:306:HIS:CE1	2.28	0.69
1:B:142:ASN:HD22	1:B:177:ALA:HB2	1.57	0.68
1:A:53:TRP:CH2	1:A:400:MET:HE1	2.29	0.66
1:A:62:PRO:O	3:A:1599:HOH:O	2.13	0.66
1:A:113:SER:OG	1:A:147[A]:ASP:OD1	2.13	0.66
1:B:140[A]:PHE:HE1	1:B:210:ILE:CG2	2.03	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:136:ARG:HD3	1:B:204:GLU:OE1	1.96	0.65
1:A:228:LEU:HB3	1:A:265:ILE:HD13	1.79	0.64
1:B:201:HIS:HD2	1:B:204:GLU:OE2	1.80	0.64
1:A:142:ASN:HD22	1:A:177:ALA:HB2	1.63	0.63
1:B:68:MET:HE3	1:B:281:MET:CE	2.28	0.63
1:B:53:TRP:H	1:B:400:MET:CE	2.12	0.63
1:A:41:ASP:OD2	1:A:43:ARG:NE	2.33	0.60
1:B:53:TRP:H	1:B:400:MET:HE1	1.67	0.59
1:B:17:TYR:OH	1:B:147[B]:ASP:OD1	2.23	0.56
1:B:202:ARG:HG2	1:B:203[B]:HIS:CD2	2.41	0.56
1:B:189:ARG:O	1:B:192:VAL:HG13	2.06	0.56
1:B:136:ARG:HD2	1:B:204:GLU:OE1	2.05	0.56
1:A:76:SER:OG	1:B:280:THR:O	2.24	0.55
1:B:49:MET:O	1:B:400:MET:HE2	2.06	0.55
1:A:147[A]:ASP:HB2	1:B:306:HIS:CE1	2.41	0.54
1:A:53:TRP:CZ2	1:A:400:MET:HE1	2.42	0.54
1:B:145:HIS:HE1	3:B:1528:HOH:O	1.90	0.53
1:B:53:TRP:N	1:B:400:MET:HE1	2.22	0.53
1:B:340:GLU:O	1:B:344:ARG:HG3	2.09	0.53
1:B:202:ARG:N	1:B:203[B]:HIS:NE2	2.56	0.53
1:A:332:TRP:HA	1:A:335:GLN:HE21	1.72	0.52
1:B:149[A]:PHE:CZ	1:B:170:PRO:HD3	2.44	0.52
1:A:156:ASP:O	1:A:160:SER:HB2	2.09	0.52
1:A:127:TRP:CD2	1:A:134:ARG:HD2	2.46	0.52
1:A:228:LEU:HB3	1:A:265:ILE:CD1	2.40	0.51
1:B:139:THR:C	1:B:140[A]:PHE:CD1	2.82	0.51
1:A:77:HIS:HA	1:A:314:PRO:HD2	1.91	0.51
1:B:68:MET:HE1	1:B:281:MET:HE1	1.91	0.50
1:B:201:HIS:CD2	1:B:204:GLU:OE2	2.64	0.50
1:B:186:TRP:NE1	1:B:188:GLU:HG2	2.27	0.48
1:B:140[A]:PHE:CZ	1:B:231:ILE:HD11	2.49	0.48
1:B:125:GLN:NE2	1:B:305:MET:H	2.05	0.47
1:B:140[A]:PHE:HZ	1:B:231:ILE:HD11	1.79	0.47
1:B:145:HIS:HD2	1:B:245:ASP:OD2	1.97	0.47
1:A:165:TRP:CH2	1:B:125:GLN:HG3	2.48	0.47
1:B:77:HIS:HA	1:B:314:PRO:HD2	1.96	0.47
1:B:53:TRP:N	1:B:400:MET:CE	2.77	0.47
1:B:203[B]:HIS:ND1	3:B:1755:HOH:O	2.04	0.47
1:A:53:TRP:CZ3	1:A:400:MET:HE1	2.50	0.46
1:B:127:TRP:CD2	1:B:134:ARG:HD2	2.50	0.46
1:A:53:TRP:CZ3	1:A:400:MET:CE	2.99	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:201:HIS:CA	1:B:203[B]:HIS:CE1	2.92	0.46
1:B:142:ASN:HD22	1:B:177:ALA:CB	2.27	0.46
1:A:85:HIS:HE1	3:A:1502:HOH:O	1.98	0.45
1:A:348:ALA:N	1:A:349:PRO:CD	2.80	0.45
1:B:68:MET:HE1	1:B:281:MET:CE	2.44	0.45
1:B:85:HIS:CE1	1:B:88:ALA:HB2	2.51	0.45
1:B:22:SER:N	1:B:23:PRO:HD3	2.33	0.44
1:B:91:LEU:CA	1:B:321:ASN:OD1	2.65	0.44
1:A:160:SER:HB3	3:A:1731:HOH:O	2.17	0.44
1:A:348:ALA:HB3	1:A:349:PRO:HD3	2.00	0.43
1:B:422:GLN:NE2	3:B:1760:HOH:O	2.51	0.43
1:A:147[A]:ASP:OD2	3:A:1658:HOH:O	2.21	0.43
1:B:1:MET:HE3	1:B:28:PRO:HB2	2.01	0.43
1:B:15:HIS:HB3	1:B:16:PRO:HD2	2.01	0.43
1:B:140[A]:PHE:HZ	1:B:231:ILE:CD1	2.31	0.43
1:B:188:GLU:OE2	1:B:230:ARG:NH2	2.51	0.42
1:B:148:THR:O	1:B:152:MET:HG3	2.19	0.42
1:B:187:ASP:O	1:B:190:ASP:HB2	2.20	0.42
1:B:318:ALA:HA	1:B:321:ASN:HD22	1.84	0.42
1:B:49:MET:O	1:B:400:MET:CE	2.67	0.42
1:B:200:ALA:O	1:B:203[B]:HIS:CE1	2.72	0.42
1:A:170:PRO:HD3	1:B:149[A]:PHE:CZ	2.55	0.42
1:B:86:ALA:HB3	1:B:87:PRO:HD3	2.01	0.42
1:A:229:LYS:HG3	1:A:263:ALA:HB1	2.01	0.42
1:B:41:ASP:OD2	1:B:43:ARG:NE	2.53	0.42
1:B:91:LEU:HA	1:B:321:ASN:OD1	2.21	0.41
1:B:202:ARG:N	1:B:203[B]:HIS:CD2	2.89	0.41
1:A:99:THR:HB	1:A:100:PRO:HD2	2.02	0.41
1:A:101:GLN:HB3	1:A:102:PRO:HD3	2.02	0.41
1:A:156:ASP:HA	1:A:157:PRO:HD3	1.96	0.41
1:B:35[A]:CYS:SG	1:B:404:ILE:HG13	2.61	0.41
1:B:398:TYR:HE1	1:B:400:MET:SD	2.44	0.41
1:B:332:TRP:HA	1:B:335:GLN:HE21	1.86	0.40
1:A:110:ASP:HB3	1:B:282:THR:HG21	2.04	0.40
1:B:313:ASN:ND2	1:B:316:ALA:H	2.20	0.40

All (5) 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)
1:A:351:ARG:O	1:A:408:GLN:NE2[2_645]	1.70	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1741:HOH:O	3:B:1717:HOH:O[1_655]	1.98	0.22
1:A:171:GLU:OE2	3:A:1794:HOH:O[1_545]	2.11	0.09
3:A:1688:HOH:O	3:A:1753:HOH:O[1_655]	2.12	0.08
3:A:1795:HOH:O	3:B:1609:HOH:O[1_655]	2.14	0.06

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	425/429 (99%)	415 (98%)	9 (2%)	1 (0%)	47	33
1	B	433/429 (101%)	421 (97%)	10 (2%)	2 (0%)	29	15
All	All	858/858 (100%)	836 (97%)	19 (2%)	3 (0%)	34	27

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	307	GLY
1	B	307	GLY
1	B	219	GLY

5.3.2 Protein sidechains ⓘ

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	345/344 (100%)	329 (95%)	16 (5%)	27	10

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	350/344 (102%)	336 (96%)	14 (4%)	31	14
All	All	695/688 (101%)	665 (96%)	30 (4%)	34	12

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	60	ASN
1	A	76	SER
1	A	80	PHE
1	A	110	ASP
1	A	147[A]	ASP
1	A	147[B]	ASP
1	A	160	SER
1	A	166	LYS
1	A	202	ARG
1	A	233	LYS
1	A	290	ARG
1	A	393[A]	PHE
1	A	393[B]	PHE
1	A	400	MET
1	A	410	LEU
1	A	424	GLU
1	B	3	THR
1	B	80	PHE
1	B	140[A]	PHE
1	B	140[B]	PHE
1	B	188	GLU
1	B	189	ARG
1	B	204	GLU
1	B	233[A]	LYS
1	B	233[B]	LYS
1	B	237	ARG
1	B	290	ARG
1	B	393[A]	PHE
1	B	393[B]	PHE
1	B	400	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	85	HIS

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Mol	Chain	Res	Type
1	A	125	GLN
1	A	135	GLN
1	A	142	ASN
1	A	313	ASN
1	A	335	GLN
1	B	63	GLN
1	B	125	GLN
1	B	135	GLN
1	B	142	ASN
1	B	145	HIS
1	B	201	HIS
1	B	262	HIS
1	B	313	ASN
1	B	335	GLN
1	B	342	GLN
1	B	346	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\#|Z| > 2$
1	LLP	A	274	1	23,24,25	1.73	1 (4%)	25,32,34	2.04	4 (16%)
1	LLP	B	274	1	23,24,25	1.61	3 (13%)	25,32,34	1.77	4 (16%)

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
1	LLP	A	274	1	-	5/16/17/19	0/1/1/1
1	LLP	B	274	1	-	5/16/17/19	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	274	LLP	O3-C3	-6.16	1.22	1.37
1	B	274	LLP	O3-C3	-5.46	1.24	1.37
1	B	274	LLP	C4-C4'	2.31	1.51	1.46
1	B	274	LLP	C2-N1	2.02	1.37	1.33

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	274	LLP	OP4-C5'-C5	7.41	123.46	109.35
1	B	274	LLP	OP4-C5'-C5	5.71	120.23	109.35
1	B	274	LLP	C4-C4'-NZ	-4.45	103.90	124.31
1	A	274	LLP	C4-C4'-NZ	-3.78	106.96	124.31
1	A	274	LLP	OP3-P-OP4	-2.52	100.01	106.73
1	B	274	LLP	OP3-P-OP4	-2.28	100.66	106.73
1	A	274	LLP	C3-C4-C4'	-2.16	116.38	120.41
1	B	274	LLP	C5-C6-N1	-2.12	120.28	123.82

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	274	LLP	C4-C4'-NZ-CE
1	A	274	LLP	C3-C4-C4'-NZ
1	A	274	LLP	CG-CD-CE-NZ
1	B	274	LLP	C3-C4-C4'-NZ
1	A	274	LLP	C5-C4-C4'-NZ
1	A	274	LLP	CD-CE-NZ-C4'
1	B	274	LLP	C5-C4-C4'-NZ
1	B	274	LLP	CD-CE-NZ-C4'
1	B	274	LLP	C4-C4'-NZ-CE
1	B	274	LLP	CG-CD-CE-NZ

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

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	A	426/429 (99%)	0.12	9 (2%)	63	62	13, 22, 36, 48	16 (3%)
1	B	426/429 (99%)	0.21	9 (2%)	63	62	14, 24, 36, 45	5 (1%)
All	All	852/858 (99%)	0.16	18 (2%)	63	62	13, 23, 36, 48	21 (2%)

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	428	CYS	7.7
1	A	133	ALA	3.7
1	B	133	ALA	3.6
1	B	166	LYS	3.5
1	B	140[A]	PHE	3.2
1	B	149[A]	PHE	3.0
1	A	199	ALA	2.6
1	A	186	TRP	2.6
1	B	167	GLY	2.4
1	A	166	LYS	2.4
1	A	393[A]	PHE	2.3
1	A	428	CYS	2.2
1	B	159	ASN	2.2
1	A	184	GLY	2.2
1	A	192	VAL	2.2
1	B	189	ARG	2.2
1	B	187	ASP	2.1
1	A	190	ASP	2.1

6.2 Non-standard residues in protein, DNA, RNA chains (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
1	LLP	B	274	24/25	0.96	0.09	14,16,21,22	0
1	LLP	A	274	24/25	0.97	0.08	14,17,21,22	0

6.3 Carbohydrates ⓘ

There are no monosaccharides 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, 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	NA	B	1502	1/1	0.97	0.21	11,11,11,11	0
2	NA	A	1501	1/1	0.98	0.17	9,9,9,9	0

6.5 Other polymers ⓘ

There are no such residues in this entry.