



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 02:29 PM UTC

PDB ID : 5FAR / pdb_00005far
Title : Crystal structure of dihydroneopterin aldolase from Bacillus anthracis complex with 9-METHYLGUANINE
Authors : Chang, C.; Maltseva, N.; Kim, Y.; Shatsman, S.; Anderson, W.F.; Joachimiak, A.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2015-12-11
Resolution : 2.00 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

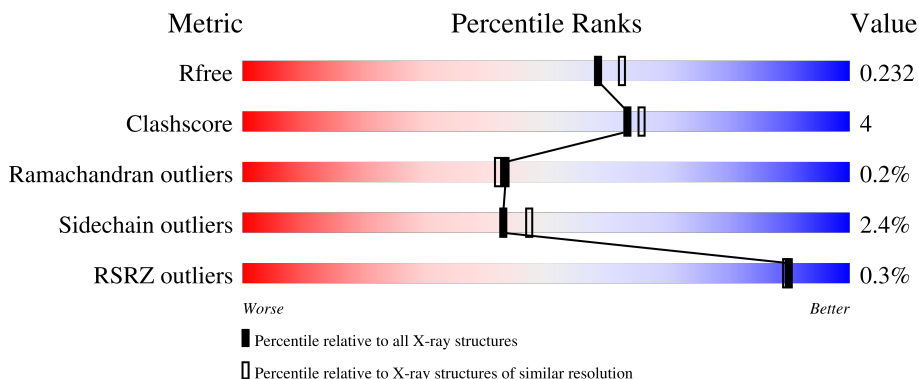
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	A	123	 89% 7%
1	B	123	 91% 6%
1	C	123	 87% 10%
1	D	123	 84% 14%
1	E	123	 82% 14%

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Mol	Chain	Length	Quality of chain
1	F	123	 87% 11% .
1	G	123	 81% 15% ..
1	H	123	 87% 10% ..

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	9MG	A	201	-	X	-	-
2	9MG	C	201	-	X	-	-
2	9MG	E	201	-	X	-	-
2	9MG	F	201	-	X	-	-

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 8178 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 7,8-dihydroneopterin aldolase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	118	964	613	164	184	2	1	0	0	0
1	B	119	1004	635	172	193	2	2	0	3	0
1	C	120	1001	635	169	193	2	2	0	2	0
1	D	120	983	625	166	188	2	2	0	0	0
1	E	119	993	629	167	193	2	2	0	2	0
1	F	120	992	630	167	191	2	2	0	1	0
1	G	120	1002	636	171	190	2	3	0	2	0
1	H	120	1006	638	170	194	2	2	0	3	0

There are 24 discrepancies between the modelled and reference sequences:

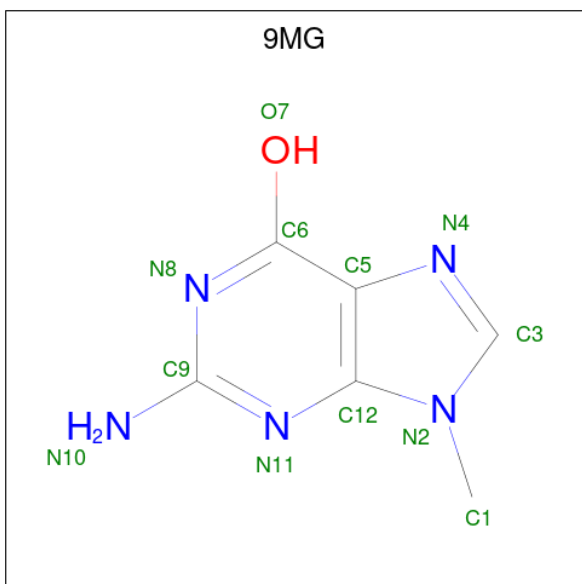
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP J7VEZ6
A	-1	ASN	-	expression tag	UNP J7VEZ6
A	0	ALA	-	expression tag	UNP J7VEZ6
B	-2	SER	-	expression tag	UNP J7VEZ6
B	-1	ASN	-	expression tag	UNP J7VEZ6
B	0	ALA	-	expression tag	UNP J7VEZ6
C	-2	SER	-	expression tag	UNP J7VEZ6
C	-1	ASN	-	expression tag	UNP J7VEZ6
C	0	ALA	-	expression tag	UNP J7VEZ6
D	-2	SER	-	expression tag	UNP J7VEZ6
D	-1	ASN	-	expression tag	UNP J7VEZ6
D	0	ALA	-	expression tag	UNP J7VEZ6
E	-2	SER	-	expression tag	UNP J7VEZ6

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-1	ASN	-	expression tag	UNP J7VEZ6
E	0	ALA	-	expression tag	UNP J7VEZ6
F	-2	SER	-	expression tag	UNP J7VEZ6
F	-1	ASN	-	expression tag	UNP J7VEZ6
F	0	ALA	-	expression tag	UNP J7VEZ6
G	-2	SER	-	expression tag	UNP J7VEZ6
G	-1	ASN	-	expression tag	UNP J7VEZ6
G	0	ALA	-	expression tag	UNP J7VEZ6
H	-2	SER	-	expression tag	UNP J7VEZ6
H	-1	ASN	-	expression tag	UNP J7VEZ6
H	0	ALA	-	expression tag	UNP J7VEZ6

- Molecule 2 is 9-METHYLGUANINE (CCD ID: 9MG) (formula: C₆H₇N₅O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	Total	C	N	O	0	0
			12	6	5	1		
2	B	1	Total	C	N	O	0	0
			12	6	5	1		
2	C	1	Total	C	N	O	0	0
			12	6	5	1		
2	C	1	Total	C	N	O	0	0
			12	6	5	1		
2	E	1	Total	C	N	O	0	0
			12	6	5	1		
2	F	1	Total	C	N	O	0	0
			12	6	5	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	G	1	Total	C	N	O	0	0
			12	6	5	1		
2	H	1	Total	C	N	O	0	0
			12	6	5	1		


- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	10	Total	O	0	0
			10	10		
3	B	17	Total	O	0	0
			17	17		
3	C	20	Total	O	0	0
			20	20		
3	D	6	Total	O	0	0
			6	6		
3	E	15	Total	O	0	0
			15	15		
3	F	26	Total	O	0	0
			26	26		
3	G	23	Total	O	0	0
			23	23		
3	H	20	Total	O	0	0
			20	20		

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: 7,8-dihydroneopterin aldolase

Chain A:  89% 7%




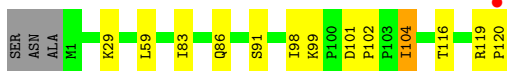
- Molecule 1: 7,8-dihydroneopterin aldolase

Chain B:  91% 6%




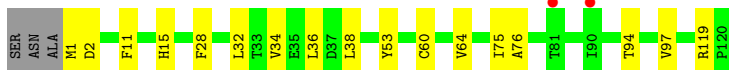
- Molecule 1: 7,8-dihydroneopterin aldolase

Chain C:  87% 10%




- Molecule 1: 7,8-dihydroneopterin aldolase

Chain D:  84% 14%




- Molecule 1: 7,8-dihydroneopterin aldolase

Chain E:  82% 14%




- Molecule 1: 7,8-dihydroneopterin aldolase

Chain F:  87% 11%




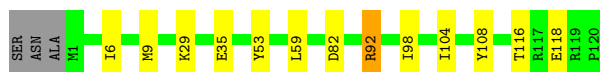
- Molecule 1: 7,8-dihydroneopterin aldolase

Chain G:  81% 15%



- Molecule 1: 7,8-dihydroneopterin aldolase

Chain H:  87% 10%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	63.80Å 138.21Å 63.93Å 90.00° 89.97° 90.00°	Depositor
Resolution (Å)	45.17 – 2.00 45.17 – 2.00	Depositor EDS
% Data completeness (in resolution range)	83.5 (45.17-2.00) 83.5 (45.17-2.00)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.42 (at 2.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0135	Depositor
R, R_{free}	0.193 , 0.233 0.191 , 0.232	Depositor DCC
R_{free} test set	3024 reflections (4.07%)	wwPDB-VP
Wilson B-factor (Å ²)	29.4	Xtrriage
Anisotropy	0.977	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 30.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.39$, $\langle L^2 \rangle = 0.21$	Xtrriage
Estimated twinning fraction	0.210 for -l,k,h 0.197 for h,-k,-l 0.337 for -l,-k,-h	Xtrriage
Reported twinning fraction	0.538 for H, K, L 0.096 for h,-k,-l 0.281 for L, -K, H 0.085 for -L, K, H	Depositor
Outliers	0 of 62363 reflections	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8178	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 23.86 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.2906e-03.*

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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 9MG

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	0.61	0/982	0.86	0/1324
1	B	0.65	0/1021	0.88	0/1373
1	C	0.69	0/1020	0.96	2/1375 (0.1%)
1	D	0.59	0/1002	0.85	0/1351
1	E	0.93	0/1011	1.04	2/1362 (0.1%)
1	F	0.78	0/1011	0.96	1/1363 (0.1%)
1	G	0.89	0/1021	1.02	1/1376 (0.1%)
1	H	0.66	0/1025	0.85	0/1381
All	All	0.73	0/8093	0.93	6/10905 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	104	ILE	CB-CA-C	-6.08	103.87	110.37
1	E	24	LEU	N-CA-C	5.68	117.47	111.28
1	E	75	ILE	CB-CA-C	-5.49	104.94	111.97
1	G	30	VAL	N-CA-C	5.42	115.80	107.77
1	C	104	ILE	N-CA-C	5.14	113.50	107.89
1	F	7	HIS	CB-CA-C	-5.10	100.90	109.72

There are no chirality outliers.

There are no planarity outliers.

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.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	964	0	953	4	0
1	B	1004	0	991	5	0
1	C	1001	0	988	6	0
1	D	983	0	976	8	0
1	E	993	0	977	15	0
1	F	992	0	981	9	0
1	G	1002	0	999	17	0
1	H	1006	0	995	11	0
2	A	12	0	6	0	0
2	B	12	0	6	1	0
2	C	24	0	12	0	0
2	E	12	0	6	0	0
2	F	12	0	6	0	0
2	G	12	0	6	0	0
2	H	12	0	6	1	0
3	A	10	0	0	0	0
3	B	17	0	0	0	0
3	C	20	0	0	0	0
3	D	6	0	0	0	0
3	E	15	0	0	0	0
3	F	26	0	0	0	0
3	G	23	0	0	0	0
3	H	20	0	0	1	0
All	All	8178	0	7908	64	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 4.

All (64) 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:G:119[B]:ARG:NE	1:G:119[B]:ARG:HA	2.11	0.65
1:G:119[A]:ARG:HB3	1:G:119[A]:ARG:NH2	2.12	0.65
1:E:29:LYS:HB2	1:E:98:ILE:HB	1.82	0.61
1:E:59:LEU:C	1:E:59:LEU:HD23	2.26	0.61
1:C:99:LYS:O	1:C:102:PRO:HD3	2.01	0.60
1:A:112:ALA:HB3	1:B:5:TYR:HB2	1.85	0.59
1:G:119[A]:ARG:HH21	1:G:119[A]:ARG:CB	2.15	0.59
1:C:104:ILE:HD11	1:D:53:TYR:CD1	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:59:LEU:HD23	1:B:59:LEU:C	2.29	0.58
1:G:59:LEU:C	1:G:59:LEU:HD23	2.30	0.56
1:G:59:LEU:HD23	1:G:59:LEU:O	2.04	0.56
1:B:101:ASP:OD1	1:F:27:ARG:NH1	2.38	0.56
1:G:119[A]:ARG:HB3	1:G:119[A]:ARG:HH21	1.71	0.55
1:E:8:ASP:OD1	1:E:29:LYS:HD3	2.07	0.54
1:D:76:ALA:HB2	1:D:97:VAL:HG23	1.90	0.54
1:D:32:LEU:HD21	1:D:34:VAL:HG13	1.89	0.53
1:E:76:ALA:HB2	1:E:97:VAL:HG23	1.91	0.53
1:F:29:LYS:HB2	1:F:98:ILE:HB	1.90	0.52
1:E:53:TYR:CD1	1:H:104:ILE:HD11	2.45	0.52
1:G:104:ILE:HD11	1:H:53:TYR:CD1	2.46	0.51
1:E:114:GLU:OE1	1:F:5:TYR:OH	2.27	0.50
1:E:96:LYS:HG3	1:E:114:GLU:HB2	1.95	0.49
1:B:32:LEU:HD21	1:B:34:VAL:HG13	1.94	0.49
1:A:29:LYS:HB2	1:A:98:ILE:HB	1.95	0.49
1:F:59:LEU:HD23	1:F:59:LEU:C	2.38	0.48
1:E:104:ILE:HD11	1:F:53:TYR:CD1	2.48	0.48
1:F:104:ILE:HD11	1:G:53:TYR:CD1	2.49	0.48
1:C:86[B]:GLN:O	1:C:86[B]:GLN:NE2	2.47	0.48
1:G:94:THR:HA	1:G:115:ILE:O	2.14	0.47
1:E:37[B]:ASP:O	1:E:37[B]:ASP:OD1	2.33	0.47
1:G:9:MSE:O	1:G:29:LYS:HA	2.15	0.47
1:E:53:TYR:CE1	1:H:104:ILE:HD11	2.50	0.46
1:H:92:ARG:HD3	1:H:116:THR:HG23	1.97	0.46
1:C:29:LYS:HB2	1:C:98:ILE:HB	1.97	0.46
1:H:59:LEU:C	1:H:59:LEU:HD23	2.40	0.46
1:G:119[B]:ARG:NE	1:G:119[B]:ARG:CA	2.75	0.46
1:B:51:VAL:O	2:B:201:9MG:N10	2.42	0.45
1:E:36:LEU:HD23	1:E:36:LEU:N	2.32	0.45
1:G:119[A]:ARG:NH2	1:G:119[A]:ARG:CB	2.78	0.45
1:A:9:MSE:O	1:A:29:LYS:HA	2.17	0.44
1:G:62:LYS:O	1:G:66:ASP:HB2	2.17	0.44
1:D:2:ASP:HB3	1:D:38:LEU:HD12	2.00	0.44
1:H:59:LEU:HD21	1:H:82:ASP:HB2	2.00	0.43
1:G:55:GLU:OE1	1:G:87:TYR:OH	2.30	0.43
1:F:9:MSE:O	1:F:29:LYS:HA	2.17	0.43
1:D:15:HIS:ND1	1:D:75:ILE:HD11	2.34	0.43
1:E:8:ASP:O	1:H:108:TYR:HA	2.18	0.43
1:H:35:GLU:OE2	1:H:92:ARG:HD2	2.19	0.43
1:G:104:ILE:HD11	1:H:53:TYR:CE1	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:15:HIS:HB2	1:D:28:PHE:CZ	2.53	0.42
2:H:201:9MG:H11	3:H:316:HOH:O	2.19	0.42
1:E:15:HIS:CG	1:E:75:ILE:HD11	2.55	0.42
1:C:59:LEU:C	1:C:59:LEU:HD23	2.45	0.42
1:D:11:PHE:CD2	1:D:64:VAL:HG21	2.54	0.42
1:E:15:HIS:HB2	1:E:28:PHE:CZ	2.54	0.42
1:F:32:LEU:HD11	1:F:83:ILE:HD11	2.01	0.42
1:F:59:LEU:HD23	1:F:59:LEU:O	2.19	0.42
1:E:95:ILE:O	1:E:114:GLU:HA	2.20	0.41
1:H:29[A]:LYS:HB2	1:H:98:ILE:HB	2.03	0.41
1:H:6:ILE:HB	1:H:9:MSE:HE2	2.02	0.41
1:A:24:LEU:HD12	1:G:24:LEU:HD12	2.03	0.41
1:D:60:CYS:O	1:D:64:VAL:HG23	2.20	0.41
1:C:119:ARG:HA	1:C:120:PRO:HD3	1.98	0.40
1:G:5:TYR:CE1	1:G:33:THR:HG23	2.56	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	116/123 (94%)	112 (97%)	4 (3%)	0	100	100
1	B	120/123 (98%)	118 (98%)	2 (2%)	0	100	100
1	C	120/123 (98%)	110 (92%)	9 (8%)	1 (1%)	16	11
1	D	118/123 (96%)	114 (97%)	4 (3%)	0	100	100
1	E	119/123 (97%)	113 (95%)	6 (5%)	0	100	100
1	F	119/123 (97%)	111 (93%)	7 (6%)	1 (1%)	16	11
1	G	119/123 (97%)	117 (98%)	2 (2%)	0	100	100
1	H	121/123 (98%)	119 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	952/984 (97%)	914 (96%)	36 (4%)	2 (0%)	43	42

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	83	ILE
1	F	42	GLY

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	106/109 (97%)	103 (97%)	3 (3%)	38	41
1	B	111/109 (102%)	110 (99%)	1 (1%)	70	78
1	C	111/109 (102%)	108 (97%)	3 (3%)	39	42
1	D	109/109 (100%)	105 (96%)	4 (4%)	30	30
1	E	110/109 (101%)	109 (99%)	1 (1%)	70	78
1	F	110/109 (101%)	109 (99%)	1 (1%)	70	78
1	G	111/109 (102%)	103 (93%)	8 (7%)	13	10
1	H	112/109 (103%)	110 (98%)	2 (2%)	51	58
All	All	880/872 (101%)	857 (97%)	23 (3%)	43	44

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	ASP
1	A	53	TYR
1	A	66	ASP
1	B	111	VAL
1	C	91	SER
1	C	101	ASP
1	C	116	THR
1	D	1	MSE

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Mol	Chain	Res	Type
1	D	36	LEU
1	D	94	THR
1	D	119	ARG
1	E	74	SER
1	F	119	ARG
1	G	1[A]	MSE
1	G	1[B]	MSE
1	G	62	LYS
1	G	85	LYS
1	G	86	GLN
1	G	91	SER
1	G	119[A]	ARG
1	G	119[B]	ARG
1	H	92	ARG
1	H	118	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	26	GLN
1	A	78	ASN
1	C	7	HIS
1	C	26	GLN
1	E	26	GLN
1	G	78	ASN
1	H	22	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

8 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	9MG	H	201	-	13,13,13	2.04	5 (38%)	17,19,19	3.08	8 (47%)
2	9MG	A	201	-	13,13,13	2.18	5 (38%)	17,19,19	3.23	9 (52%)
2	9MG	F	201	-	13,13,13	2.10	6 (46%)	17,19,19	3.07	8 (47%)
2	9MG	G	201	-	13,13,13	2.11	5 (38%)	17,19,19	3.09	8 (47%)
2	9MG	C	201	-	13,13,13	2.09	6 (46%)	17,19,19	3.26	8 (47%)
2	9MG	C	202	-	13,13,13	2.08	4 (30%)	17,19,19	3.26	9 (52%)
2	9MG	E	201	-	13,13,13	2.06	5 (38%)	17,19,19	3.06	9 (52%)
2	9MG	B	201	-	13,13,13	2.07	5 (38%)	17,19,19	3.20	8 (47%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	9MG	H	201	-	-	-	0/2/2/2
2	9MG	A	201	-	-	-	0/2/2/2
2	9MG	F	201	-	-	-	0/2/2/2
2	9MG	G	201	-	-	-	0/2/2/2
2	9MG	C	201	-	-	-	0/2/2/2
2	9MG	C	202	-	-	-	0/2/2/2
2	9MG	E	201	-	-	-	0/2/2/2
2	9MG	B	201	-	-	-	0/2/2/2

All (41) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	201	9MG	C5-C12	4.89	1.47	1.39
2	C	201	9MG	C5-C12	4.87	1.47	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	9MG	C5-C12	4.87	1.47	1.39
2	G	201	9MG	C5-C12	4.86	1.47	1.39
2	C	202	9MG	C5-C12	4.76	1.47	1.39
2	B	201	9MG	C5-C12	4.73	1.47	1.39
2	H	201	9MG	C5-C12	4.66	1.47	1.39
2	E	201	9MG	C5-C12	4.61	1.47	1.39
2	C	202	9MG	C5-C6	3.44	1.49	1.41
2	E	201	9MG	C5-C6	3.23	1.48	1.41
2	H	201	9MG	C5-C6	3.22	1.48	1.41
2	F	201	9MG	C5-C6	3.21	1.48	1.41
2	A	201	9MG	C5-C6	3.17	1.48	1.41
2	G	201	9MG	C5-C6	3.16	1.48	1.41
2	B	201	9MG	C5-C6	3.13	1.48	1.41
2	C	201	9MG	C5-C6	3.06	1.48	1.41
2	B	201	9MG	C5-N4	-2.58	1.34	1.39
2	C	201	9MG	C5-N4	-2.53	1.34	1.39
2	A	201	9MG	C5-N4	-2.47	1.34	1.39
2	G	201	9MG	C3-N4	2.47	1.36	1.31
2	G	201	9MG	C5-N4	-2.44	1.34	1.39
2	C	202	9MG	C3-N4	2.41	1.36	1.31
2	E	201	9MG	C12-N2	-2.41	1.33	1.37
2	F	201	9MG	C12-N2	-2.40	1.33	1.37
2	E	201	9MG	C5-N4	-2.39	1.34	1.39
2	B	201	9MG	C3-N4	2.27	1.36	1.31
2	E	201	9MG	C3-N4	2.26	1.36	1.31
2	G	201	9MG	C12-N2	-2.25	1.33	1.37
2	A	201	9MG	C3-N4	2.24	1.36	1.31
2	F	201	9MG	C3-N4	2.24	1.36	1.31
2	H	201	9MG	C3-N4	2.22	1.36	1.31
2	H	201	9MG	C12-N2	-2.21	1.33	1.37
2	F	201	9MG	C5-N4	-2.20	1.35	1.39
2	H	201	9MG	C5-N4	-2.15	1.35	1.39
2	B	201	9MG	C12-N2	-2.13	1.33	1.37
2	F	201	9MG	C12-N11	2.13	1.37	1.34
2	C	202	9MG	C5-N4	-2.10	1.35	1.39
2	C	201	9MG	C12-N2	-2.08	1.33	1.37
2	C	201	9MG	C12-N11	2.03	1.36	1.34
2	C	201	9MG	C3-N4	2.02	1.35	1.31
2	A	201	9MG	C12-N2	-2.00	1.34	1.37

All (67) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	202	9MG	C5-C12-N11	-8.01	118.74	127.18
2	A	201	9MG	C5-C12-N11	-8.00	118.75	127.18
2	C	201	9MG	C5-C12-N11	-7.97	118.78	127.18
2	B	201	9MG	C5-C12-N11	-7.96	118.80	127.18
2	C	201	9MG	N11-C12-N2	7.91	135.93	126.13
2	A	201	9MG	N11-C12-N2	7.75	135.73	126.13
2	H	201	9MG	C5-C12-N11	-7.71	119.05	127.18
2	B	201	9MG	N11-C12-N2	7.70	135.66	126.13
2	C	202	9MG	N11-C12-N2	7.54	135.47	126.13
2	G	201	9MG	C5-C12-N11	-7.44	119.35	127.18
2	H	201	9MG	N11-C12-N2	7.37	135.25	126.13
2	E	201	9MG	C5-C12-N11	-7.32	119.47	127.18
2	F	201	9MG	C5-C12-N11	-7.32	119.47	127.18
2	F	201	9MG	N11-C12-N2	7.32	135.19	126.13
2	E	201	9MG	N11-C12-N2	7.18	135.02	126.13
2	G	201	9MG	N11-C12-N2	7.11	134.94	126.13
2	C	202	9MG	C12-C5-N4	-3.41	106.68	110.58
2	G	201	9MG	C12-C5-N4	-3.38	106.71	110.58
2	B	201	9MG	C12-C5-N4	-3.19	106.94	110.58
2	F	201	9MG	C12-C5-N4	-3.13	107.01	110.58
2	A	201	9MG	C12-C5-N4	-3.08	107.06	110.58
2	C	202	9MG	C9-N11-C12	3.07	121.75	113.51
2	E	201	9MG	C12-C5-N4	-3.04	107.10	110.58
2	H	201	9MG	C12-C5-N4	-3.04	107.11	110.58
2	C	201	9MG	C12-C5-N4	-3.00	107.15	110.58
2	G	201	9MG	C9-N8-C6	2.97	122.70	116.31
2	A	201	9MG	C9-N11-C12	2.92	121.32	113.51
2	C	201	9MG	C9-N8-C6	2.89	122.53	116.31
2	C	201	9MG	C9-N11-C12	2.88	121.22	113.51
2	C	202	9MG	C5-N4-C3	2.83	107.90	103.45
2	E	201	9MG	N2-C3-N4	-2.79	110.36	114.27
2	C	202	9MG	N2-C3-N4	-2.78	110.36	114.27
2	H	201	9MG	C9-N11-C12	2.78	120.95	113.51
2	B	201	9MG	C9-N11-C12	2.77	120.94	113.51
2	F	201	9MG	C9-N11-C12	2.76	120.92	113.51
2	E	201	9MG	C9-N11-C12	2.76	120.90	113.51
2	E	201	9MG	C9-N8-C6	2.74	122.22	116.31
2	F	201	9MG	C9-N8-C6	2.73	122.19	116.31
2	G	201	9MG	C5-N4-C3	2.71	107.71	103.45
2	G	201	9MG	N2-C3-N4	-2.70	110.47	114.27
2	B	201	9MG	C5-N4-C3	2.70	107.70	103.45
2	G	201	9MG	C9-N11-C12	2.70	120.73	113.51
2	B	201	9MG	N2-C3-N4	-2.65	110.55	114.27

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	201	9MG	N2-C3-N4	-2.61	110.61	114.27
2	C	202	9MG	C9-N8-C6	2.60	121.91	116.31
2	E	201	9MG	C5-N4-C3	2.59	107.52	103.45
2	A	201	9MG	C5-N4-C3	2.59	107.52	103.45
2	C	201	9MG	C5-N4-C3	2.53	107.42	103.45
2	A	201	9MG	C9-N8-C6	2.53	121.75	116.31
2	F	201	9MG	C5-N4-C3	2.50	107.37	103.45
2	H	201	9MG	N2-C3-N4	-2.47	110.79	114.27
2	A	201	9MG	N2-C3-N4	-2.45	110.82	114.27
2	H	201	9MG	C9-N8-C6	2.44	121.56	116.31
2	H	201	9MG	C5-N4-C3	2.44	107.28	103.45
2	B	201	9MG	C9-N8-C6	2.42	121.53	116.31
2	C	201	9MG	N2-C3-N4	-2.35	110.97	114.27
2	F	201	9MG	N10-C9-N11	2.19	120.51	117.22
2	C	202	9MG	N11-C9-N8	-2.18	122.14	125.48
2	C	201	9MG	N11-C9-N8	-2.16	122.17	125.48
2	E	201	9MG	N11-C9-N8	-2.09	122.28	125.48
2	A	201	9MG	N11-C9-N8	-2.08	122.29	125.48
2	C	202	9MG	N10-C9-N11	2.08	120.34	117.22
2	A	201	9MG	O7-C6-N8	2.07	122.66	117.24
2	E	201	9MG	N10-C9-N11	2.07	120.33	117.22
2	H	201	9MG	N10-C9-N11	2.06	120.31	117.22
2	B	201	9MG	N10-C9-N11	2.02	120.25	117.22
2	G	201	9MG	N11-C9-N8	-2.00	122.42	125.48

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	201	9MG	1	0
2	B	201	9MG	1	0

5.7 Other polymers [\(i\)](#)

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	117/123 (95%)	-0.49	0 100 100	37, 62, 74, 81	4 (3%)
1	B	117/123 (95%)	-0.57	0 100 100	21, 50, 66, 73	6 (5%)
1	C	118/123 (95%)	-0.65	1 (0%) 82 82	25, 51, 64, 76	2 (1%)
1	D	118/123 (95%)	-0.28	2 (1%) 69 68	41, 58, 77, 88	1 (0%)
1	E	117/123 (95%)	-0.83	0 100 100	23, 34, 56, 67	3 (2%)
1	F	118/123 (95%)	-0.75	0 100 100	27, 39, 54, 70	1 (0%)
1	G	118/123 (95%)	-0.81	0 100 100	25, 35, 51, 54	2 (1%)
1	H	118/123 (95%)	-0.62	0 100 100	17, 44, 68, 82	6 (5%)
All	All	941/984 (95%)	-0.62	3 (0%) 90 89	17, 45, 70, 88	25 (2%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	81	THR	2.3
1	D	90	ILE	2.2
1	C	120	PRO	2.0

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	9MG	A	201	12/12	0.96	0.07	47,53,55,56	0
2	9MG	B	201	12/12	0.97	0.06	49,51,52,54	0
2	9MG	C	201	12/12	0.98	0.06	42,45,47,48	0
2	9MG	C	202	12/12	0.98	0.04	46,49,51,51	0
2	9MG	E	201	12/12	0.98	0.05	46,47,48,49	0
2	9MG	F	201	12/12	0.98	0.05	42,44,45,46	0
2	9MG	G	201	12/12	0.98	0.05	41,43,43,44	0
2	9MG	H	201	12/12	0.98	0.06	41,47,51,51	0

6.5 Other polymers [i](#)

There are no such residues in this entry.