



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:18 PM UTC

PDB ID : 3B07 / pdb_00003b07
Title : Crystal structure of octameric pore form of gamma-hemolysin from *Staphylococcus aureus*
Authors : Yamashita, K.; Kawai, Y.; Tanaka, Y.; Yao, M.; Tanaka, I.
Deposited on : 2011-06-06
Resolution : 2.50 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

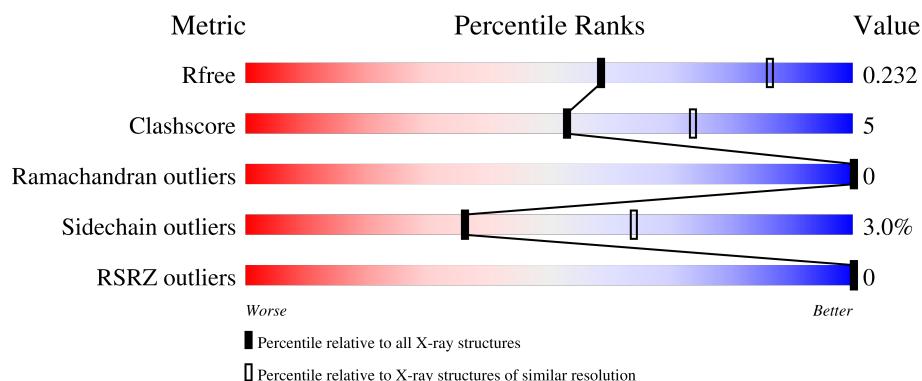
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	309	
1	C	309	
1	E	309	
1	G	309	
2	B	290	

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Mol	Chain	Length	Quality of chain
2	D	290	83% 9%7%
2	F	290	81% 11%7%
2	H	290	83% 10%7%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 18377 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 Gamma-hemolysin component B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	284	Total	C	N	O	S	0	0	0
			2292	1450	391	447	4			
1	C	284	Total	C	N	O	S	0	0	0
			2292	1450	391	447	4			
1	E	284	Total	C	N	O	S	0	0	0
			2292	1450	391	447	4			
1	G	284	Total	C	N	O	S	0	0	0
			2292	1450	391	447	4			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	MET	-	expression tag	UNP Q931F3
A	-7	GLY	-	expression tag	UNP Q931F3
A	-6	HIS	-	expression tag	UNP Q931F3
A	-5	HIS	-	expression tag	UNP Q931F3
A	-4	HIS	-	expression tag	UNP Q931F3
A	-3	HIS	-	expression tag	UNP Q931F3
A	-2	HIS	-	expression tag	UNP Q931F3
A	-1	HIS	-	expression tag	UNP Q931F3
A	0	ALA	-	expression tag	UNP Q931F3
A	1	MET	-	expression tag	UNP Q931F3
C	-8	MET	-	expression tag	UNP Q931F3
C	-7	GLY	-	expression tag	UNP Q931F3
C	-6	HIS	-	expression tag	UNP Q931F3
C	-5	HIS	-	expression tag	UNP Q931F3
C	-4	HIS	-	expression tag	UNP Q931F3
C	-3	HIS	-	expression tag	UNP Q931F3
C	-2	HIS	-	expression tag	UNP Q931F3
C	-1	HIS	-	expression tag	UNP Q931F3
C	0	ALA	-	expression tag	UNP Q931F3
C	1	MET	-	expression tag	UNP Q931F3
E	-8	MET	-	expression tag	UNP Q931F3

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-7	GLY	-	expression tag	UNP Q931F3
E	-6	HIS	-	expression tag	UNP Q931F3
E	-5	HIS	-	expression tag	UNP Q931F3
E	-4	HIS	-	expression tag	UNP Q931F3
E	-3	HIS	-	expression tag	UNP Q931F3
E	-2	HIS	-	expression tag	UNP Q931F3
E	-1	HIS	-	expression tag	UNP Q931F3
E	0	ALA	-	expression tag	UNP Q931F3
E	1	MET	-	expression tag	UNP Q931F3
G	-8	MET	-	expression tag	UNP Q931F3
G	-7	GLY	-	expression tag	UNP Q931F3
G	-6	HIS	-	expression tag	UNP Q931F3
G	-5	HIS	-	expression tag	UNP Q931F3
G	-4	HIS	-	expression tag	UNP Q931F3
G	-3	HIS	-	expression tag	UNP Q931F3
G	-2	HIS	-	expression tag	UNP Q931F3
G	-1	HIS	-	expression tag	UNP Q931F3
G	0	ALA	-	expression tag	UNP Q931F3
G	1	MET	-	expression tag	UNP Q931F3

- Molecule 2 is a protein called Gamma-hemolysin component A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	270	Total	C	N	O	S	0	0	0
			2182	1389	377	413	3			
2	D	270	Total	C	N	O	S	0	0	0
			2182	1389	377	413	3			
2	F	270	Total	C	N	O	S	0	0	0
			2182	1389	377	413	3			
2	H	270	Total	C	N	O	S	0	0	0
			2182	1389	377	413	3			

There are 40 discrepancies between the modelled and reference sequences:

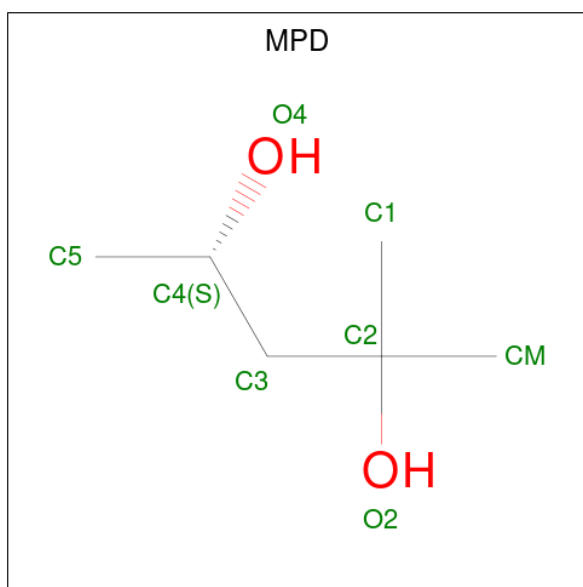
Chain	Residue	Modelled	Actual	Comment	Reference
B	-9	MET	-	expression tag	UNP P0A071
B	-8	GLY	-	expression tag	UNP P0A071
B	-7	HIS	-	expression tag	UNP P0A071
B	-6	HIS	-	expression tag	UNP P0A071
B	-5	HIS	-	expression tag	UNP P0A071
B	-4	HIS	-	expression tag	UNP P0A071
B	-3	HIS	-	expression tag	UNP P0A071

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-2	HIS	-	expression tag	UNP P0A071
B	-1	ALA	-	expression tag	UNP P0A071
B	0	MET	-	expression tag	UNP P0A071
D	-9	MET	-	expression tag	UNP P0A071
D	-8	GLY	-	expression tag	UNP P0A071
D	-7	HIS	-	expression tag	UNP P0A071
D	-6	HIS	-	expression tag	UNP P0A071
D	-5	HIS	-	expression tag	UNP P0A071
D	-4	HIS	-	expression tag	UNP P0A071
D	-3	HIS	-	expression tag	UNP P0A071
D	-2	HIS	-	expression tag	UNP P0A071
D	-1	ALA	-	expression tag	UNP P0A071
D	0	MET	-	expression tag	UNP P0A071
F	-9	MET	-	expression tag	UNP P0A071
F	-8	GLY	-	expression tag	UNP P0A071
F	-7	HIS	-	expression tag	UNP P0A071
F	-6	HIS	-	expression tag	UNP P0A071
F	-5	HIS	-	expression tag	UNP P0A071
F	-4	HIS	-	expression tag	UNP P0A071
F	-3	HIS	-	expression tag	UNP P0A071
F	-2	HIS	-	expression tag	UNP P0A071
F	-1	ALA	-	expression tag	UNP P0A071
F	0	MET	-	expression tag	UNP P0A071
H	-9	MET	-	expression tag	UNP P0A071
H	-8	GLY	-	expression tag	UNP P0A071
H	-7	HIS	-	expression tag	UNP P0A071
H	-6	HIS	-	expression tag	UNP P0A071
H	-5	HIS	-	expression tag	UNP P0A071
H	-4	HIS	-	expression tag	UNP P0A071
H	-3	HIS	-	expression tag	UNP P0A071
H	-2	HIS	-	expression tag	UNP P0A071
H	-1	ALA	-	expression tag	UNP P0A071
H	0	MET	-	expression tag	UNP P0A071

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			8	6	2		
3	C	1	Total	C	O	0	0
			8	6	2		
3	E	1	Total	C	O	0	0
			8	6	2		
3	G	1	Total	C	O	0	0
			8	6	2		

- Molecule 4 is water.

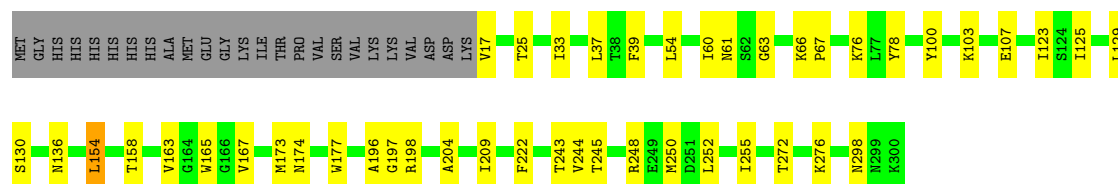
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	69	Total	O	0	0
			69	69		
4	C	61	Total	O	0	0
			61	61		
4	E	53	Total	O	0	0
			53	53		
4	G	59	Total	O	0	0
			59	59		
4	B	49	Total	O	0	0
			49	49		
4	D	60	Total	O	0	0
			60	60		
4	F	48	Total	O	0	0
			48	48		
4	H	50	Total	O	0	0
			50	50		

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.

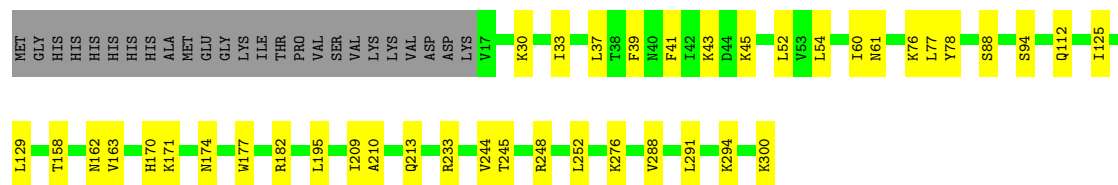
• Molecule 1: Gamma-hemolysin component B

Chain A: 



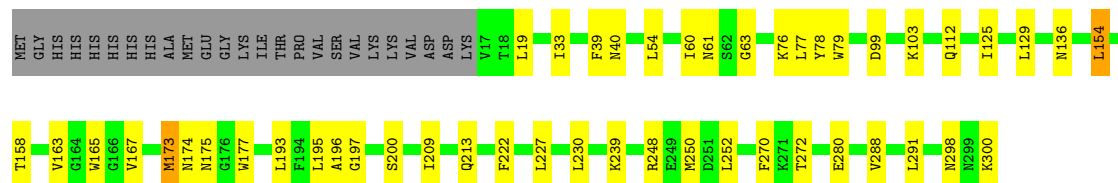
• Molecule 1: Gamma-hemolysin component B

Chain C: 



• Molecule 1: Gamma-hemolysin component B

Chain E: 



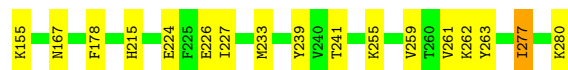
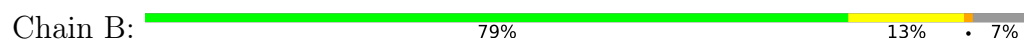
• Molecule 1: Gamma-hemolysin component B

Chain G: 

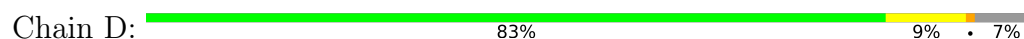




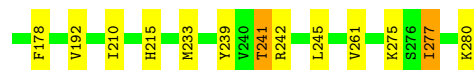
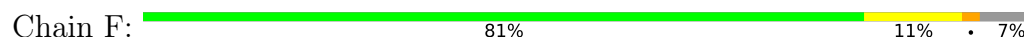
• Molecule 2: Gamma-hemolysin component A



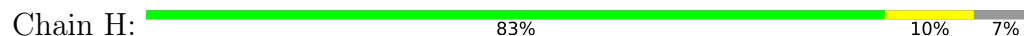
• Molecule 2: Gamma-hemolysin component A



• Molecule 2: Gamma-hemolysin component A



• Molecule 2: Gamma-hemolysin component A



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	206.45Å 206.14Å 190.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.30 – 2.50 43.30 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.9 (43.30-2.50) 98.4 (43.30-2.50)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.16 (at 2.48Å)	Xtriage
Refinement program	PHENIX dev_617	Depositor
R, R_{free}	0.207 , 0.236 0.204 , 0.232	Depositor DCC
R_{free} test set	3962 reflections (2.82%)	wwPDB-VP
Wilson B-factor (Å ²)	34.4	Xtriage
Anisotropy	1.105	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 26.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.436 for -k,-h,-l	Xtriage
Reported twinning fraction	0.443 for -k,-h,-l	Depositor
Outliers	5 of 138828 reflections (0.004%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18377	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 26.07 % 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 2.8191e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: MPD

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	0.57	0/2349	0.75	1/3177 (0.0%)
1	C	0.57	0/2349	0.75	0/3177
1	E	0.57	0/2349	0.76	1/3177 (0.0%)
1	G	0.55	0/2349	0.76	0/3177
2	B	0.59	0/2233	0.81	0/3016
2	D	0.57	0/2233	0.80	0/3016
2	F	0.58	0/2233	0.80	0/3016
2	H	0.57	0/2233	0.80	0/3016
All	All	0.57	0/18328	0.78	2/24772 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	136	ASN	N-CA-C	5.27	117.26	108.99
1	A	136	ASN	N-CA-C	5.10	117.00	108.99

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	2292	0	2183	29	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	2292	0	2183	24	0
1	E	2292	0	2183	30	0
1	G	2292	0	2183	26	0
2	B	2182	0	2165	27	0
2	D	2182	0	2165	13	0
2	F	2182	0	2165	21	0
2	H	2182	0	2165	16	0
3	A	8	0	14	4	0
3	C	8	0	14	2	0
3	E	8	0	14	3	0
3	G	8	0	14	2	0
4	A	69	0	0	1	0
4	B	49	0	0	2	0
4	C	61	0	0	2	0
4	D	60	0	0	1	0
4	E	53	0	0	0	0
4	F	48	0	0	1	0
4	G	59	0	0	0	0
4	H	50	0	0	1	0
All	All	18377	0	17448	178	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 5.

All (178) 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)
2:B:72:MET:HE3	2:B:74:TRP:CD1	2.08	0.88
2:D:165:THR:HG22	2:D:167:ASN:H	1.54	0.73
1:A:196:ALA:O	3:A:301:MPD:HM3	1.90	0.72
2:H:120:ALA:N	2:H:121:PRO:HA	2.05	0.72
2:D:120:ALA:N	2:D:121:PRO:HA	2.05	0.71
1:G:54:LEU:C	1:G:54:LEU:HD23	2.15	0.71
2:B:120:ALA:N	2:B:121:PRO:HA	2.06	0.71
2:F:165:THR:HG22	2:F:167:ASN:H	1.57	0.70
2:F:120:ALA:N	2:F:121:PRO:HA	2.04	0.70
1:A:107:GLU:HB2	2:H:141:ASN:OD1	1.94	0.68
1:A:37:LEU:HD21	1:A:244:VAL:HG21	1.75	0.68
1:G:177:TRP:NE1	3:G:301:MPD:H53	2.10	0.67
1:C:210:ALA:HB3	1:C:213:GLN:HE21	1.59	0.67
2:D:165:THR:HG23	2:D:166:PRO:HD2	1.77	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:82:LEU:C	2:H:82:LEU:HD23	2.21	0.66
1:G:37:LEU:HD21	1:G:244:VAL:HG21	1.77	0.65
1:E:280:GLU:HB2	1:E:291:LEU:HD13	1.79	0.65
1:G:195:LEU:O	3:G:301:MPD:HM3	1.97	0.64
1:A:17:VAL:N	4:A:331:HOH:O	2.32	0.62
1:E:173:MET:CE	2:F:135:ILE:HD11	2.31	0.61
2:D:261:VAL:HG22	2:D:277:ILE:HD12	1.83	0.61
2:F:261:VAL:HG22	2:F:277:ILE:HD12	1.83	0.61
2:B:72:MET:HE1	2:B:178:PHE:HB2	1.81	0.61
2:F:165:THR:HG23	2:F:166:PRO:HD2	1.85	0.59
1:A:177:TRP:CD1	3:A:301:MPD:H53	2.38	0.59
2:B:167:ASN:HA	2:D:109:LEU:HD11	1.84	0.59
1:A:39:PHE:CE1	1:A:54:LEU:HD13	2.38	0.59
1:E:195:LEU:O	3:E:301:MPD:HM3	2.02	0.59
1:C:125:ILE:HG12	1:C:129:LEU:HD11	1.84	0.58
2:B:261:VAL:HG22	2:B:277:ILE:HD12	1.85	0.58
1:C:76:LYS:HD2	1:C:252:LEU:HD11	1.85	0.57
1:A:174:ASN:OD1	1:A:209:ILE:HG21	2.05	0.57
1:E:63:GLY:O	1:E:250:MET:HE3	2.04	0.57
1:C:37:LEU:HD21	1:C:244:VAL:HG21	1.85	0.57
2:F:63:LEU:HD12	2:F:69:ILE:HB	1.88	0.56
1:G:124:SER:C	1:G:125:ILE:HD12	2.30	0.56
1:E:174:ASN:OD1	1:E:209:ILE:HG21	2.05	0.56
2:B:226:GLU:HG2	2:B:262:LYS:HG2	1.88	0.56
1:A:25:THR:HG22	2:B:90:ASP:OD2	2.06	0.56
2:F:82:LEU:HD23	2:F:82:LEU:C	2.31	0.55
2:F:149:GLN:HB3	2:F:154:VAL:HG23	1.89	0.55
1:C:174:ASN:OD1	1:C:209:ILE:HG21	2.07	0.55
1:G:78:TYR:CZ	1:G:252:LEU:HD13	2.41	0.55
1:E:78:TYR:CZ	1:E:252:LEU:HD13	2.42	0.54
1:C:39:PHE:CD1	1:C:54:LEU:HD13	2.42	0.54
1:G:174:ASN:OD1	1:G:209:ILE:HG21	2.08	0.54
1:A:78:TYR:CZ	1:A:252:LEU:HD13	2.43	0.54
1:E:39:PHE:CE1	1:E:54:LEU:HD13	2.42	0.54
1:C:210:ALA:HB3	1:C:213:GLN:NE2	2.22	0.54
1:C:245:THR:HG23	1:C:276:LYS:HG3	1.89	0.53
2:B:109:LEU:HD11	2:H:167:ASN:HA	1.90	0.53
1:A:154:LEU:HD12	1:A:165:TRP:CD1	2.43	0.52
1:G:129:LEU:HD23	1:G:130:SER:H	1.74	0.52
2:D:197:LEU:HD11	4:D:305:HOH:O	2.09	0.52
2:H:228:THR:HG23	2:H:260:THR:HG22	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:77:LEU:C	1:G:77:LEU:HD12	2.34	0.52
2:B:72:MET:HE1	2:B:178:PHE:CD2	2.45	0.52
2:D:82:LEU:C	2:D:82:LEU:HD23	2.34	0.52
1:A:76:LYS:HD2	1:A:252:LEU:HD11	1.91	0.52
1:E:177:TRP:CD1	3:E:301:MPD:HO4	2.27	0.52
1:G:19:LEU:HD23	2:H:40:LYS:HE3	1.91	0.52
2:H:149:GLN:HB3	2:H:154:VAL:HG23	1.92	0.52
1:A:198:ARG:NH2	3:A:301:MPD:H51	2.25	0.51
2:B:72:MET:HE1	2:B:178:PHE:CB	2.40	0.51
1:E:125:ILE:HG12	1:E:129:LEU:CD2	2.39	0.51
1:A:125:ILE:HG22	1:A:129:LEU:CD2	2.40	0.51
1:E:61:ASN:O	1:E:248:ARG:HD3	2.10	0.51
1:G:61:ASN:O	1:G:248:ARG:HD3	2.10	0.51
1:C:61:ASN:O	1:C:248:ARG:HD3	2.10	0.51
1:A:158:THR:HG23	1:A:163:VAL:HA	1.92	0.51
1:A:61:ASN:O	1:A:248:ARG:HD3	2.11	0.50
1:E:39:PHE:CD1	1:E:54:LEU:HD13	2.47	0.50
1:C:39:PHE:CE1	1:C:54:LEU:HD13	2.47	0.50
1:E:76:LYS:HD2	1:E:252:LEU:HD11	1.93	0.50
2:B:149:GLN:HB3	2:B:154:VAL:HG23	1.93	0.50
2:D:149:GLN:HB3	2:D:154:VAL:HG23	1.94	0.50
1:E:270:PHE:HA	1:E:300:LYS:HD2	1.93	0.49
1:E:175:ASN:OD1	1:E:213:GLN:OE1	2.29	0.49
1:G:76:LYS:HD2	1:G:252:LEU:HD11	1.93	0.49
1:A:66:LYS:HG2	1:A:67:PRO:HD2	1.94	0.49
2:D:79:ASN:C	2:D:80:ILE:HD12	2.37	0.49
1:A:39:PHE:CD1	1:A:54:LEU:HD13	2.48	0.49
1:E:173:MET:HE1	2:F:135:ILE:HD11	1.94	0.48
1:C:77:LEU:C	1:C:77:LEU:HD12	2.38	0.48
1:G:39:PHE:CZ	1:G:288:VAL:HG11	2.48	0.48
1:A:197:GLY:HA2	3:A:301:MPD:H13	1.96	0.48
1:C:78:TYR:CZ	1:C:252:LEU:HD13	2.48	0.48
1:C:39:PHE:CZ	1:C:288:VAL:HG11	2.50	0.47
2:H:166:PRO:O	2:H:167:ASN:OD1	2.32	0.47
1:E:99:ASP:OD1	1:E:103:LYS:NZ	2.40	0.47
2:D:165:THR:HG23	2:D:166:PRO:CD	2.43	0.47
1:E:154:LEU:HD12	1:E:165:TRP:CD1	2.49	0.47
1:E:167:VAL:HG21	1:E:222:PHE:CZ	2.50	0.47
1:A:63:GLY:O	1:A:250:MET:HE3	2.15	0.46
1:G:94:SER:HB2	1:G:233:ARG:HD3	1.97	0.46
1:E:158:THR:HG23	1:E:163:VAL:HA	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:197:GLY:HA3	1:E:200:SER:OG	2.16	0.46
1:E:19:LEU:HD11	1:E:40:ASN:HB3	1.98	0.46
2:B:23:LYS:NZ	4:B:380:HOH:O	2.40	0.46
1:G:78:TYR:CE1	1:G:252:LEU:HD13	2.50	0.46
1:A:243:THR:HG21	1:A:276:LYS:HE3	1.97	0.46
1:C:158:THR:HG23	1:C:163:VAL:HA	1.98	0.46
1:E:77:LEU:C	1:E:77:LEU:HD12	2.41	0.46
1:C:177:TRP:NE1	3:C:301:MPD:H53	2.31	0.45
2:B:259:VAL:HG21	2:B:277:ILE:HD11	1.99	0.45
1:A:33:ILE:HG12	1:A:60:ILE:HG23	1.98	0.45
1:C:195:LEU:O	3:C:301:MPD:HM3	2.16	0.45
1:G:33:ILE:HG12	1:G:60:ILE:HG23	1.98	0.45
1:C:94:SER:HB2	1:C:233:ARG:HD3	1.98	0.45
1:G:175:ASN:OD1	1:G:176:GLY:N	2.50	0.45
2:H:66:TYR:HB3	2:H:68:TYR:CE2	2.52	0.45
1:E:230:LEU:N	1:E:230:LEU:HD12	2.32	0.45
2:B:72:MET:HE1	2:B:178:PHE:HD2	1.80	0.45
1:C:182:ARG:HG3	4:C:394:HOH:O	2.17	0.44
1:A:167:VAL:HG21	1:A:222:PHE:CZ	2.53	0.44
2:D:69:ILE:HA	2:D:239:TYR:HB3	2.00	0.44
1:A:123:ILE:HD12	1:A:130:SER:O	2.18	0.44
1:G:99:ASP:OD1	1:G:103:LYS:NZ	2.44	0.44
1:G:88:SER:OG	1:G:162:ASN:OD1	2.31	0.44
1:A:78:TYR:CE1	1:A:252:LEU:HD13	2.53	0.44
2:B:83:LYS:NZ	4:B:436:HOH:O	2.50	0.43
1:A:100:TYR:O	1:A:103:LYS:NZ	2.49	0.43
2:F:24:ARG:HB3	2:F:280:LYS:OXT	2.19	0.43
2:F:69:ILE:HA	2:F:239:TYR:HB3	2.01	0.43
1:A:272:THR:HB	1:A:298:ASN:HB2	2.00	0.43
2:H:82:LEU:C	2:H:82:LEU:CD2	2.91	0.43
1:C:170:HIS:CD2	1:C:171:LYS:HG2	2.54	0.43
1:A:173:MET:HE3	1:A:173:MET:HB3	1.94	0.43
1:E:173:MET:CE	2:F:135:ILE:CD1	2.97	0.43
2:B:69:ILE:HA	2:B:239:TYR:HB3	2.01	0.43
2:D:24:ARG:HB3	2:D:280:LYS:OXT	2.18	0.43
2:H:69:ILE:HA	2:H:239:TYR:HB3	2.00	0.43
2:H:24:ARG:HB3	2:H:280:LYS:OXT	2.18	0.42
1:G:54:LEU:C	1:G:54:LEU:CD2	2.85	0.42
1:G:100:TYR:O	1:G:103:LYS:NZ	2.52	0.42
2:F:56:SER:O	2:F:233:MET:HE1	2.19	0.42
2:F:239:TYR:O	2:F:245:LEU:HD12	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:117:PHE:CD2	2:H:117:PHE:C	2.98	0.42
2:B:73:ILE:HG22	2:B:233:MET:HE3	2.01	0.42
2:F:85:LYS:N	4:F:317:HOH:O	2.40	0.42
1:C:41:PHE:CE1	1:C:52:LEU:HD13	2.55	0.42
2:H:264:GLU:HB3	2:H:273:LYS:HG2	2.00	0.42
1:E:196:ALA:O	3:E:301:MPD:HM2	2.18	0.42
2:B:24:ARG:HB3	2:B:280:LYS:OXT	2.19	0.42
2:F:117:PHE:HD1	2:F:118:GLN:N	2.16	0.42
1:A:245:THR:OG1	1:A:276:LYS:HG3	2.19	0.42
1:G:54:LEU:HD23	1:G:54:LEU:O	2.18	0.42
1:C:33:ILE:HG12	1:C:60:ILE:HG23	2.02	0.42
1:E:272:THR:HB	1:E:298:ASN:HB2	2.02	0.42
1:C:291:LEU:HD12	1:C:291:LEU:HA	1.94	0.41
1:E:78:TYR:CE1	1:E:252:LEU:HD13	2.55	0.41
2:B:63:LEU:HD23	2:B:71:ARG:NH1	2.35	0.41
2:F:95:LEU:HB2	2:F:210:ILE:CG2	2.50	0.41
2:F:241:THR:HG23	2:F:242:ARG:HG3	2.01	0.41
1:G:158:THR:HG23	1:G:163:VAL:HA	2.02	0.41
2:B:82:LEU:C	2:B:82:LEU:HD23	2.45	0.41
1:E:33:ILE:HG12	1:E:60:ILE:HG23	2.03	0.41
1:G:276:LYS:HD2	1:G:294:LYS:NZ	2.36	0.41
2:D:44:ASP:HB2	2:D:215:HIS:HB3	2.02	0.41
1:E:79:TRP:CZ2	1:E:193:LEU:HD21	2.56	0.41
1:G:272:THR:HB	1:G:298:ASN:HB2	2.02	0.41
1:C:88:SER:OG	1:C:162:ASN:OD1	2.31	0.41
1:A:204:ALA:O	1:A:255:ILE:HD11	2.21	0.41
2:B:227:ILE:HD12	2:B:263:TYR:CE1	2.56	0.41
1:C:45:LYS:NZ	4:C:336:HOH:O	2.54	0.41
1:G:167:VAL:HG21	1:G:222:PHE:CZ	2.56	0.41
2:B:226:GLU:OE2	2:B:262:LYS:HE3	2.20	0.41
2:B:72:MET:HE3	2:B:74:TRP:NE1	2.35	0.41
2:H:197:LEU:HD11	4:H:408:HOH:O	2.20	0.41
2:B:44:ASP:HB2	2:B:215:HIS:HB3	2.02	0.40
2:F:44:ASP:HB2	2:F:215:HIS:HB3	2.02	0.40
2:F:178:PHE:O	2:F:192:VAL:HG13	2.21	0.40
1:E:39:PHE:CZ	1:E:288:VAL:HG11	2.56	0.40
2:F:63:LEU:HD23	2:F:71:ARG:NH1	2.36	0.40
2:H:44:ASP:HB2	2:H:215:HIS:HB3	2.02	0.40
2:B:105:VAL:HG22	2:B:135:ILE:HG12	2.03	0.40
2:B:63:LEU:CD2	2:B:71:ARG:NH1	2.85	0.40
2:B:224:GLU:OE2	2:B:262:LYS:HD3	2.22	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	282/309 (91%)	270 (96%)	12 (4%)	0	100	100
1	C	282/309 (91%)	270 (96%)	12 (4%)	0	100	100
1	E	282/309 (91%)	270 (96%)	12 (4%)	0	100	100
1	G	282/309 (91%)	270 (96%)	12 (4%)	0	100	100
2	B	268/290 (92%)	264 (98%)	4 (2%)	0	100	100
2	D	268/290 (92%)	263 (98%)	5 (2%)	0	100	100
2	F	268/290 (92%)	264 (98%)	4 (2%)	0	100	100
2	H	268/290 (92%)	264 (98%)	4 (2%)	0	100	100
All	All	2200/2396 (92%)	2135 (97%)	65 (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	249/271 (92%)	248 (100%)	1 (0%)	84	93
1	C	249/271 (92%)	244 (98%)	5 (2%)	48	75
1	E	249/271 (92%)	244 (98%)	5 (2%)	48	75
1	G	249/271 (92%)	242 (97%)	7 (3%)	38	66

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	241/257 (94%)	231 (96%)	10 (4%)	27	53
2	D	241/257 (94%)	227 (94%)	14 (6%)	18	38
2	F	241/257 (94%)	231 (96%)	10 (4%)	27	53
2	H	241/257 (94%)	234 (97%)	7 (3%)	37	65
All	All	1960/2112 (93%)	1901 (97%)	59 (3%)	36	64

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	154	LEU
1	C	30	LYS
1	C	43	LYS
1	C	112	GLN
1	C	294	LYS
1	C	300	LYS
1	E	112	GLN
1	E	154	LEU
1	E	173	MET
1	E	227	LEU
1	E	239	LYS
1	G	66	LYS
1	G	105	GLN
1	G	107	GLU
1	G	112	GLN
1	G	129	LEU
1	G	133	LEU
1	G	294	LYS
2	B	23	LYS
2	B	42	ASN
2	B	85	LYS
2	B	116	ASN
2	B	122	SER
2	B	149	GLN
2	B	155	LYS
2	B	241	THR
2	B	255	LYS
2	B	277	ILE
2	D	15	LYS
2	D	23	LYS
2	D	42	ASN
2	D	65	LYS

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Mol	Chain	Res	Type
2	D	85	LYS
2	D	109	LEU
2	D	116	ASN
2	D	122	SER
2	D	126	SER
2	D	138	ASN
2	D	149	GLN
2	D	165	THR
2	D	242	ARG
2	D	277	ILE
2	F	23	LYS
2	F	85	LYS
2	F	116	ASN
2	F	122	SER
2	F	126	SER
2	F	149	GLN
2	F	165	THR
2	F	241	THR
2	F	275	LYS
2	F	277	ILE
2	H	23	LYS
2	H	61	SER
2	H	116	ASN
2	H	140	LYS
2	H	149	GLN
2	H	242	ARG
2	H	275	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	134	ASN
1	A	147	GLN
1	A	286	HIS
1	C	144	ASN
1	C	147	GLN
1	C	175	ASN
1	C	213	GLN
1	C	285	ASN
1	E	136	ASN
1	E	147	GLN
1	E	211	GLN

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Mol	Chain	Res	Type
1	E	286	HIS
1	E	298	ASN
1	G	134	ASN
1	G	144	ASN
1	G	147	GLN
1	G	199	GLN
1	G	211	GLN
1	G	234	GLN
1	G	286	HIS
2	B	42	ASN
2	B	195	ASN
2	B	196	GLN
2	D	18	GLN
2	D	196	GLN
2	F	51	GLN
2	F	196	GLN
2	H	18	GLN
2	H	196	GLN

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 [i](#)

4 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	$\# Z > 2$
3	MPD	G	301	-	7,7,7	0.31	0	9,10,10	0.21	0
3	MPD	C	301	-	7,7,7	0.30	0	9,10,10	0.21	0
3	MPD	A	301	-	7,7,7	0.29	0	9,10,10	0.26	0
3	MPD	E	301	-	7,7,7	0.31	0	9,10,10	0.22	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
3	MPD	G	301	-	-	1/5/5/5	-
3	MPD	C	301	-	-	2/5/5/5	-
3	MPD	A	301	-	-	2/5/5/5	-
3	MPD	E	301	-	-	1/5/5/5	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	MPD	O2-C2-C3-C4
3	C	301	MPD	O2-C2-C3-C4
3	E	301	MPD	O2-C2-C3-C4
3	A	301	MPD	C1-C2-C3-C4
3	C	301	MPD	C1-C2-C3-C4
3	G	301	MPD	C1-C2-C3-C4

There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	301	MPD	2	0
3	C	301	MPD	2	0
3	A	301	MPD	4	0
3	E	301	MPD	3	0

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 [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	284/309 (91%)	-1.13	0 100 100	23, 37, 73, 124	0
1	C	284/309 (91%)	-1.21	0 100 100	24, 37, 76, 90	0
1	E	284/309 (91%)	-1.11	0 100 100	22, 38, 76, 120	0
1	G	284/309 (91%)	-1.18	0 100 100	25, 41, 73, 89	0
2	B	270/290 (93%)	-1.11	0 100 100	20, 40, 81, 100	0
2	D	270/290 (93%)	-1.14	0 100 100	24, 40, 80, 108	0
2	F	270/290 (93%)	-1.09	0 100 100	25, 38, 79, 102	0
2	H	270/290 (93%)	-1.11	0 100 100	28, 41, 78, 119	0
All	All	2216/2396 (92%)	-1.14	0 100 100	20, 39, 78, 124	0

There are no RSRZ outliers to report.

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($\text{\AA}^2$)	Q<0.9
3	MPD	A	301	8/8	0.98	0.05	58,63,64,72	0
3	MPD	C	301	8/8	0.98	0.08	62,73,81,82	0
3	MPD	E	301	8/8	0.98	0.10	62,74,80,84	0
3	MPD	G	301	8/8	0.98	0.09	56,64,73,75	0

6.5 Other polymers [i](#)

There are no such residues in this entry.