



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 19, 2016 – 09:05 PM GMT

PDB ID : 4ZM9  
Title : Crystal structure of circularly permuted human asparaginase-like protein 1  
Authors : Li, W.Z.; Zhang, Y.  
Deposited on : 2015-05-02  
Resolution : 2.51 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7.1 (RC1), CSD as537be (2016)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026982  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20026982

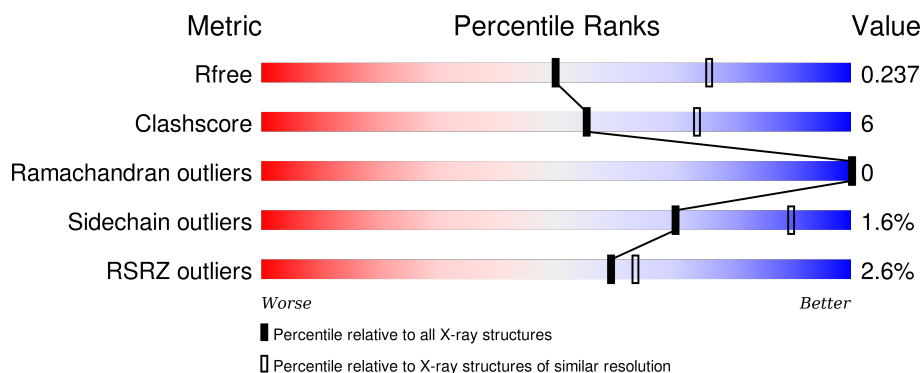
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.51 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))
$R_{free}$	91344	3553 (2.50-2.50)
Clashscore	102246	4242 (2.50-2.50)
Ramachandran outliers	100387	4156 (2.50-2.50)
Sidechain outliers	100360	4158 (2.50-2.50)
RSRZ outliers	91569	3562 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	327	<div> <div>2%</div> <div>80% 10% 9%</div> </div>
1	B	327	<div> <div>2%</div> <div>83% 7% 9%</div> </div>
1	C	327	<div> <div>2%</div> <div>82% 8% 9%</div> </div>
1	D	327	<div> <div>3%</div> <div>82% 8% 9%</div> </div>

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	NA	C	408	-	-	-	X
3	GLY	A	402	-	-	-	X
3	GLY	D	402	-	-	-	X
4	BME	A	404	-	-	-	X
4	BME	A	405	-	-	X	-
4	BME	A	406	-	-	X	X
4	BME	C	403	-	-	-	X
4	BME	C	405	-	-	-	X
4	BME	C	406	-	-	X	X
4	BME	D	404	-	-	-	X
6	FLC	B	403	-	-	-	X
6	FLC	D	403	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 8838 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 Isoaspartyl peptidase/L-asparaginase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	296	Total	C	N	O	S	0	3	0
			2163	1346	379	423	15			
1	B	296	Total	C	N	O	S	0	3	0
			2166	1347	380	424	15			
1	C	296	Total	C	N	O	S	0	3	0
			2163	1346	379	423	15			
1	D	296	Total	C	N	O	S	0	3	0
			2166	1347	380	424	15			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	linker	UNP Q7L266
A	154N	HIS	-	expression tag	UNP Q7L266
A	154O	HIS	-	expression tag	UNP Q7L266
A	154P	HIS	-	expression tag	UNP Q7L266
A	154Q	HIS	-	expression tag	UNP Q7L266
A	154R	HIS	-	expression tag	UNP Q7L266
A	154S	HIS	-	expression tag	UNP Q7L266
A	154T	MET	-	SEE REMARK 999	UNP Q7L266
A	309	GLY	-	linker	UNP Q7L266
A	310	ALA	-	linker	UNP Q7L266
A	311	GLY	-	linker	UNP Q7L266
A	312	SER	-	linker	UNP Q7L266
A	313	GLY	-	linker	UNP Q7L266
A	314	ALA	-	linker	UNP Q7L266
A	315	GLY	-	linker	UNP Q7L266
A	316	SER	-	linker	UNP Q7L266
A	317	GLY	-	linker	UNP Q7L266
A	318	ALA	-	linker	UNP Q7L266
A	319	GLY	-	linker	UNP Q7L266
A	320	GLY	-	linker	UNP Q7L266
B	1	GLY	-	linker	UNP Q7L266

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Chain	Residue	Modelled	Actual	Comment	Reference
B	154N	HIS	-	expression tag	UNP Q7L266
B	154O	HIS	-	expression tag	UNP Q7L266
B	154P	HIS	-	expression tag	UNP Q7L266
B	154Q	HIS	-	expression tag	UNP Q7L266
B	154R	HIS	-	expression tag	UNP Q7L266
B	154S	HIS	-	expression tag	UNP Q7L266
B	154T	MET	-	SEE REMARK 999	UNP Q7L266
B	309	GLY	-	linker	UNP Q7L266
B	310	ALA	-	linker	UNP Q7L266
B	311	GLY	-	linker	UNP Q7L266
B	312	SER	-	linker	UNP Q7L266
B	313	GLY	-	linker	UNP Q7L266
B	314	ALA	-	linker	UNP Q7L266
B	315	GLY	-	linker	UNP Q7L266
B	316	SER	-	linker	UNP Q7L266
B	317	GLY	-	linker	UNP Q7L266
B	318	ALA	-	linker	UNP Q7L266
B	319	GLY	-	linker	UNP Q7L266
B	320	GLY	-	linker	UNP Q7L266
C	1	GLY	-	linker	UNP Q7L266
C	154N	HIS	-	expression tag	UNP Q7L266
C	154O	HIS	-	expression tag	UNP Q7L266
C	154P	HIS	-	expression tag	UNP Q7L266
C	154Q	HIS	-	expression tag	UNP Q7L266
C	154R	HIS	-	expression tag	UNP Q7L266
C	154S	HIS	-	expression tag	UNP Q7L266
C	154T	MET	-	SEE REMARK 999	UNP Q7L266
C	309	GLY	-	linker	UNP Q7L266
C	310	ALA	-	linker	UNP Q7L266
C	311	GLY	-	linker	UNP Q7L266
C	312	SER	-	linker	UNP Q7L266
C	313	GLY	-	linker	UNP Q7L266
C	314	ALA	-	linker	UNP Q7L266
C	315	GLY	-	linker	UNP Q7L266
C	316	SER	-	linker	UNP Q7L266
C	317	GLY	-	linker	UNP Q7L266
C	318	ALA	-	linker	UNP Q7L266
C	319	GLY	-	linker	UNP Q7L266
C	320	GLY	-	linker	UNP Q7L266
D	1	GLY	-	linker	UNP Q7L266
D	154N	HIS	-	expression tag	UNP Q7L266
D	154O	HIS	-	expression tag	UNP Q7L266

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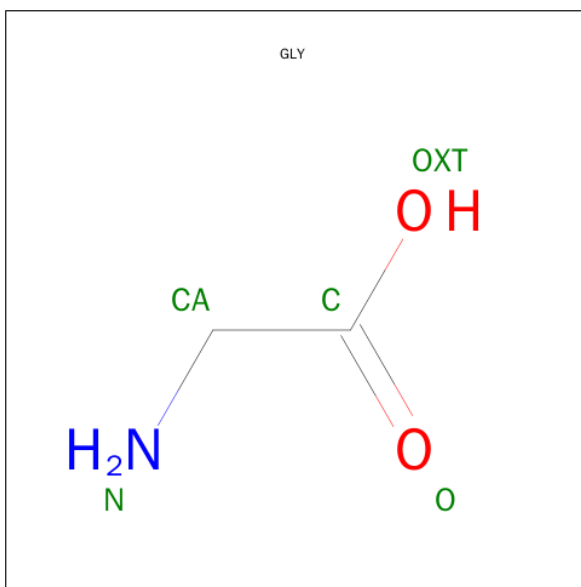
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Chain	Residue	Modelled	Actual	Comment	Reference
D	154P	HIS	-	expression tag	UNP Q7L266
D	154Q	HIS	-	expression tag	UNP Q7L266
D	154R	HIS	-	expression tag	UNP Q7L266
D	154S	HIS	-	expression tag	UNP Q7L266
D	154T	MET	-	SEE REMARK 999	UNP Q7L266
D	309	GLY	-	linker	UNP Q7L266
D	310	ALA	-	linker	UNP Q7L266
D	311	GLY	-	linker	UNP Q7L266
D	312	SER	-	linker	UNP Q7L266
D	313	GLY	-	linker	UNP Q7L266
D	314	ALA	-	linker	UNP Q7L266
D	315	GLY	-	linker	UNP Q7L266
D	316	SER	-	linker	UNP Q7L266
D	317	GLY	-	linker	UNP Q7L266
D	318	ALA	-	linker	UNP Q7L266
D	319	GLY	-	linker	UNP Q7L266
D	320	GLY	-	linker	UNP Q7L266

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

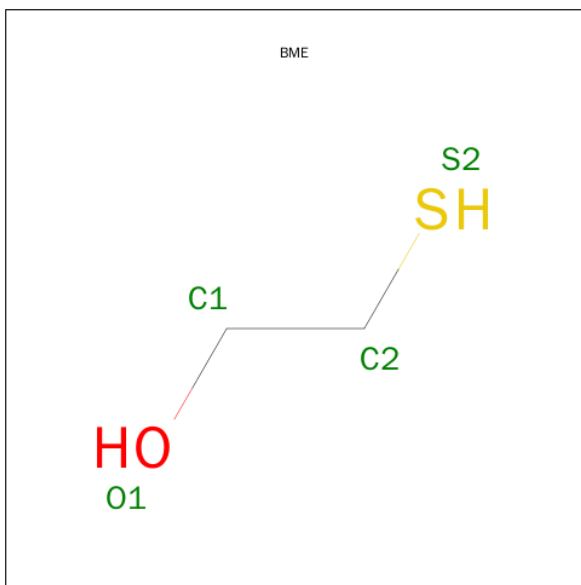
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Na 1 1	0	0
2	A	2	Total Na 2 2	0	0
2	D	1	Total Na 1 1	0	0
2	C	3	Total Na 3 3	0	0

- Molecule 3 is GLYCINE (three-letter code: GLY) (formula: C<sub>2</sub>H<sub>5</sub>NO<sub>2</sub>).



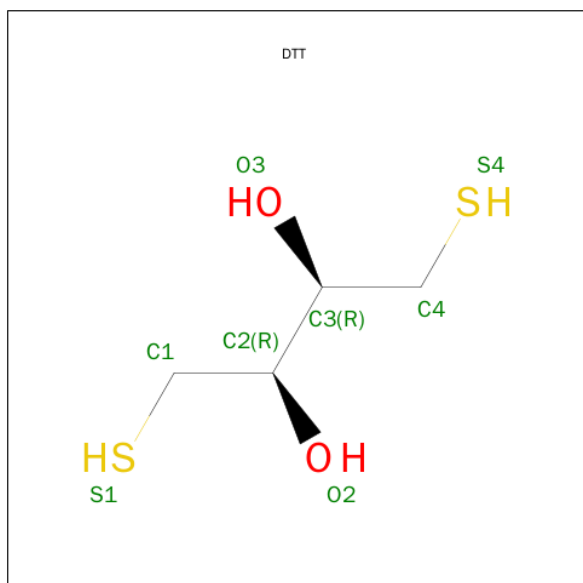
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			5	2	1	2		
3	B	1	Total	C	N	O	0	0
			5	2	1	2		
3	C	1	Total	C	N	O	0	0
			5	2	1	2		
3	D	1	Total	C	N	O	0	0
			5	2	1	2		

- Molecule 4 is BETA-MERCAPTOETHANOL (three-letter code: BME) (formula: C<sub>2</sub>H<sub>6</sub>OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	B	1	Total	C	O	S	0	0
			4	2	1	1		
4	C	1	Total	C	O	S	0	0
			4	2	1	1		
4	C	1	Total	C	O	S	0	0
			4	2	1	1		
4	C	1	Total	C	O	S	0	0
			4	2	1	1		
4	C	1	Total	C	O	S	0	0
			4	2	1	1		
4	D	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 5 is 2,3-DIHYDROXY-1,4-DITHIOBUTANE (three-letter code: DTT) (formula:  $C_4H_{10}O_2S_2$ ).



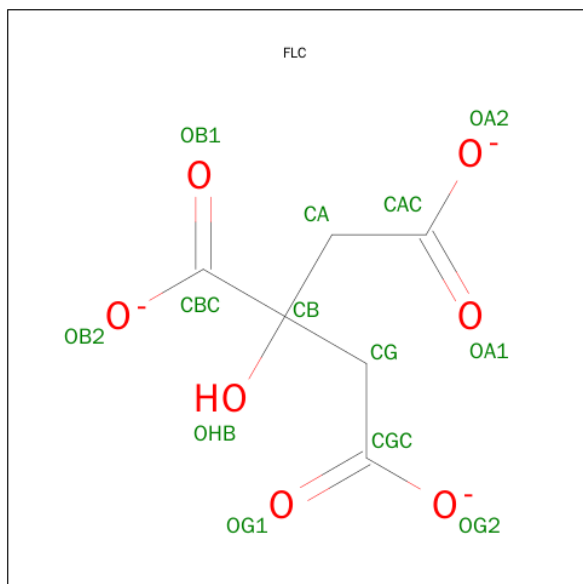
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	S	0	0
			8	4	2	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	C	1	Total	C	O	S	0	0
			8	4	2	2		

- Molecule 6 is CITRATE ANION (three-letter code: FLC) (formula:  $C_6H_5O_7^-$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			13	6	7		
6	D	1	Total	C	O	0	0
			13	6	7		

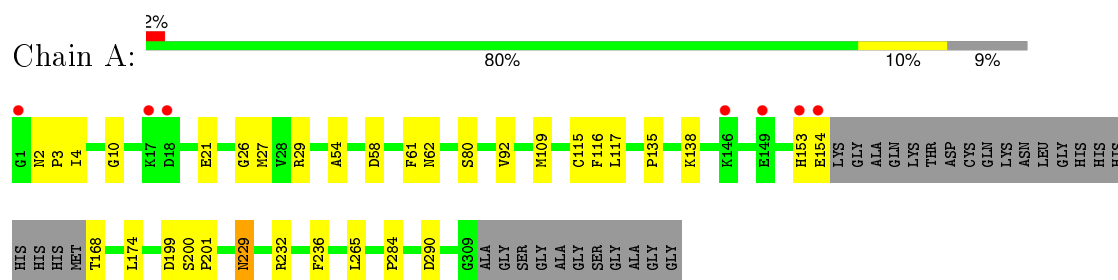
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	21	Total	O	0	0
			21	21		
7	B	19	Total	O	0	0
			19	19		
7	C	15	Total	O	0	0
			15	15		
7	D	16	Total	O	0	0
			16	16		

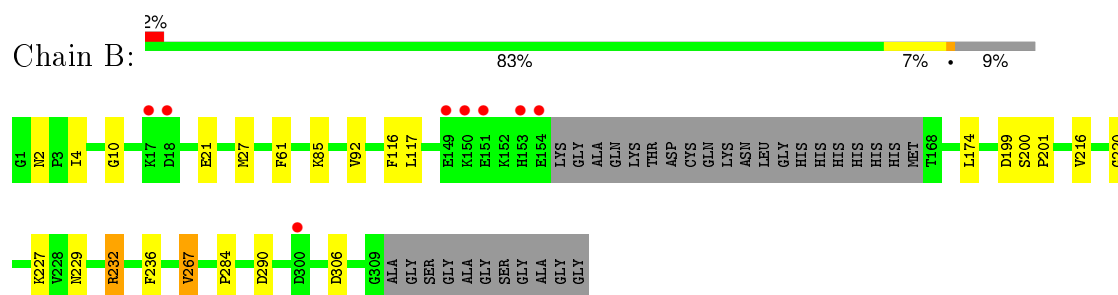
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

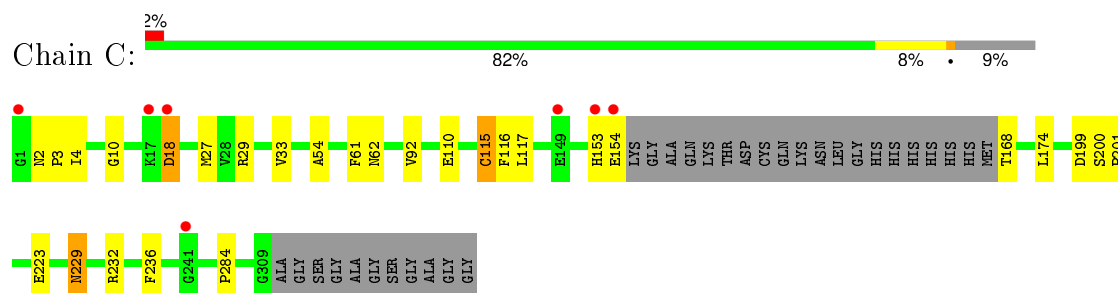
- Molecule 1: Isoaspartyl peptidase/L-asparaginase



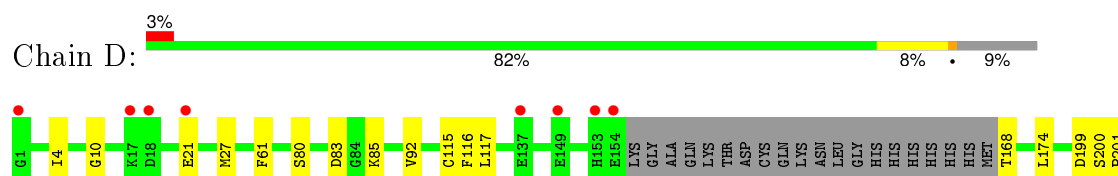
- Molecule 1: Isoaspartyl peptidase/L-asparaginase

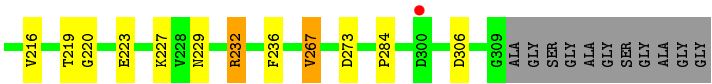


- Molecule 1: Isoaspartyl peptidase/L-asparaginase



- Molecule 1: Isoaspartyl peptidase/L-asparaginase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	104.31Å 111.11Å 122.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.74 – 2.51 39.71 – 2.51	Depositor EDS
% Data completeness (in resolution range)	99.5 (39.74-2.51) 99.5 (39.71-2.51)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.15	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.20 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.204 , 0.233 0.209 , 0.237	Depositor DCC
$R_{free}$ test set	2485 reflections (5.33%)	DCC
Wilson B-factor (Å <sup>2</sup> )	24.5	Xtriage
Anisotropy	0.851	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 34.1	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	11 of 49103 reflections (0.022%)	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8838	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	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 52.49 % 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 4.8273e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: NA, FLC, DTT, BME

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	0.76	0/2201	0.83	1/2975 (0.0%)
1	B	0.80	0/2201	0.86	2/2975 (0.1%)
1	C	0.81	0/2201	0.83	0/2975
1	D	0.78	0/2201	0.86	4/2975 (0.1%)
All	All	0.79	0/8804	0.85	7/11900 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	267	VAL	CB-CA-C	-9.26	93.82	111.40
1	B	267	VAL	CB-CA-C	-9.25	93.82	111.40
1	A	109	MET	CG-SD-CE	6.81	111.10	100.20
1	D	273	ASP	CB-CG-OD1	6.54	124.19	118.30
1	D	232	ARG	NE-CZ-NH1	-6.46	117.07	120.30
1	B	232	ARG	NE-CZ-NH1	-6.17	117.22	120.30
1	D	273	ASP	CB-CA-C	5.34	121.08	110.40

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2163	0	2168	38	0
1	B	2166	0	2167	30	0
1	C	2163	0	2168	34	0
1	D	2166	0	2167	29	0
2	A	2	0	0	0	0
2	B	1	0	0	0	0
2	C	3	0	0	0	0
2	D	1	0	0	0	0
3	A	5	0	2	1	0
3	B	5	0	2	1	0
3	C	5	0	2	1	0
3	D	5	0	2	1	0
4	A	16	0	24	16	0
4	B	4	0	6	0	0
4	C	16	0	24	8	0
4	D	4	0	6	0	0
5	A	8	0	10	0	0
5	C	8	0	10	2	0
6	B	13	0	5	2	0
6	D	13	0	5	3	0
7	A	21	0	0	0	0
7	B	19	0	0	0	0
7	C	15	0	0	0	0
7	D	16	0	0	1	0
All	All	8838	0	8768	111	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 6.

All (111) 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:C:54:ALA:O	4:C:406:BME:H22	1.69	0.93
1:C:29:ARG:HH21	4:C:406:BME:H11	1.37	0.89
4:A:405:BME:C1	4:A:406:BME:S2	2.61	0.89
1:A:236[A]:PHE:CE1	1:B:236[A]:PHE:CD2	2.64	0.86
4:A:403:BME:O1	1:B:236[A]:PHE:HE2	1.62	0.83
1:A:2:ASN:ND2	1:A:290:ASP:OD1	2.10	0.83
1:A:54:ALA:O	4:A:406:BME:H22	1.79	0.82
4:A:403:BME:HO1	1:B:236[A]:PHE:HE2	0.83	0.81
1:C:236[A]:PHE:CE1	1:D:236[A]:PHE:CD2	2.74	0.76
6:B:403:FLC:OB1	6:B:403:FLC:OG2	2.03	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:29:ARG:HD2	4:C:406:BME:H11	1.69	0.73
1:A:236[A]:PHE:HE1	1:B:236[A]:PHE:CD2	2.06	0.73
1:A:236[A]:PHE:CE1	1:B:236[A]:PHE:CG	2.77	0.72
1:D:232:ARG:HG3	1:D:236[B]:PHE:CE2	2.28	0.69
1:B:27:MET:HE3	1:B:61:PHE:CE1	2.30	0.67
4:A:405:BME:H12	4:A:406:BME:S2	2.34	0.67
1:B:232:ARG:HG3	1:B:236[B]:PHE:CE2	2.31	0.65
1:A:236[A]:PHE:HD1	1:B:236[A]:PHE:CZ	2.16	0.64
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CD1	2.84	0.64
1:D:219:THR:OG1	6:D:403:FLC:OA1	2.11	0.64
1:C:27:MET:HE3	1:C:61:PHE:CE1	2.35	0.62
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CE1	2.87	0.62
1:D:27:MET:HE3	1:D:61:PHE:CE1	2.35	0.62
1:C:236[A]:PHE:HE1	1:D:236[A]:PHE:CD2	2.16	0.61
1:A:29:ARG:NH2	4:A:406:BME:H11	2.15	0.61
1:A:29:ARG:HH21	4:A:406:BME:H11	1.66	0.61
4:A:404:BME:O1	1:B:227:LYS:NZ	2.32	0.61
1:A:27:MET:HE3	1:A:61:PHE:CE1	2.36	0.61
1:D:216:VAL:HG22	1:D:267:VAL:HG13	1.81	0.60
1:C:236[A]:PHE:CE1	1:D:236[A]:PHE:CG	2.89	0.60
1:A:232:ARG:HG3	1:A:236[A]:PHE:CE2	2.36	0.60
1:C:18:ASP:OD1	1:C:18:ASP:N	2.34	0.60
1:A:58:ASP:HB2	4:A:406:BME:H12	1.83	0.60
1:C:232:ARG:HG3	1:C:236[A]:PHE:CE2	2.36	0.60
1:B:216:VAL:HG22	1:B:267:VAL:HG13	1.83	0.59
1:C:29:ARG:HH21	4:C:406:BME:C1	2.13	0.58
4:A:405:BME:O1	4:A:406:BME:S2	2.62	0.57
1:D:199:ASP:OD1	3:D:402:GLY:N	2.38	0.57
1:A:29:ARG:HH21	4:A:406:BME:C1	2.18	0.56
1:C:236[A]:PHE:CD1	1:D:236[A]:PHE:CE1	2.94	0.55
1:C:236[A]:PHE:HD1	1:D:236[A]:PHE:CZ	2.24	0.55
1:B:199:ASP:OD1	3:B:402:GLY:N	2.38	0.55
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CG	2.95	0.55
1:A:236[B]:PHE:CD2	1:B:236[B]:PHE:CE1	2.95	0.54
1:C:199:ASP:OD1	3:C:402:GLY:N	2.41	0.54
1:A:153:HIS:O	1:A:154:GLU:HB2	2.08	0.54
1:A:236[A]:PHE:HD1	1:B:236[A]:PHE:CE1	2.26	0.53
1:B:10:GLY:O	1:B:284:PRO:HD2	2.08	0.53
1:C:153:HIS:O	1:C:154:GLU:HB2	2.09	0.53
1:C:236[A]:PHE:CD1	1:D:236[A]:PHE:CD1	2.97	0.53
4:A:405:BME:H11	4:A:406:BME:S2	2.49	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:58:ASP:HB2	4:A:406:BME:C1	2.39	0.52
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CZ	2.98	0.52
1:D:10:GLY:O	1:D:284:PRO:HD2	2.10	0.52
5:C:407:DTT:O2	5:C:407:DTT:S4	2.67	0.52
1:B:2:ASN:ND2	1:B:290:ASP:OD1	2.44	0.50
1:D:83:ASP:OD1	7:D:501:HOH:O	2.20	0.50
1:A:10:GLY:O	1:A:284:PRO:HD2	2.12	0.49
1:C:10:GLY:O	1:C:284:PRO:HD2	2.13	0.49
1:C:223:GLU:HG3	1:D:115[B]:CYS:SG	2.53	0.48
1:C:29:ARG:HD2	4:C:406:BME:C1	2.43	0.48
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CD2	3.03	0.47
1:B:4:ILE:HD12	1:B:174:LEU:HB3	1.96	0.47
1:A:153:HIS:O	1:A:154:GLU:CB	2.62	0.47
1:C:54:ALA:HB1	4:C:406:BME:H21	1.95	0.47
1:C:153:HIS:O	1:C:154:GLU:CB	2.62	0.46
1:A:26:GLY:HA2	4:A:406:BME:O1	2.16	0.46
1:D:4:ILE:HD12	1:D:174:LEU:HB3	1.97	0.46
1:A:200:SER:N	1:A:201:PRO:CD	2.79	0.46
1:A:236[B]:PHE:CG	1:B:236[B]:PHE:CE1	3.04	0.46
1:C:229:ASN:OD1	1:D:229:ASN:ND2	2.49	0.46
1:C:236[A]:PHE:CD1	1:D:236[A]:PHE:CZ	3.03	0.45
1:C:4:ILE:HD12	1:C:174:LEU:HB3	1.98	0.45
1:A:236[A]:PHE:CD1	1:B:236[A]:PHE:CE2	3.05	0.45
1:C:33:VAL:HG21	4:C:405:BME:H21	1.98	0.45
1:A:4:ILE:HD12	1:A:174:LEU:HB3	1.99	0.44
1:D:220:GLY:O	6:D:403:FLC:OA2	2.35	0.44
1:D:92:VAL:HA	1:D:117:LEU:O	2.18	0.44
1:C:200:SER:N	1:C:201:PRO:CD	2.81	0.44
1:A:62:ASN:O	1:A:168:THR:N	2.51	0.44
1:D:232:ARG:CZ	1:D:236[B]:PHE:CZ	3.01	0.43
1:D:168:THR:HB	6:D:403:FLC:OA1	2.18	0.43
1:A:80:SER:HB3	1:A:201:PRO:HA	2.00	0.43
1:B:92:VAL:HA	1:B:117:LEU:O	2.19	0.43
1:D:80:SER:HB3	1:D:201:PRO:HA	2.00	0.43
1:A:92:VAL:HA	1:A:117:LEU:O	2.19	0.43
1:A:135:PRO:HG2	1:A:138:LYS:HG3	2.00	0.43
1:C:168:THR:N	5:C:407:DTT:H42	2.34	0.42
1:C:115[A]:CYS:SG	1:D:223:GLU:HG3	2.59	0.42
1:C:92:VAL:HA	1:C:117:LEU:O	2.19	0.42
1:C:2:ASN:HA	1:C:3:PRO:HD3	1.85	0.42
1:A:229:ASN:OD1	1:B:229:ASN:ND2	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:403:BME:O1	1:B:236[A]:PHE:CE2	2.48	0.42
1:C:232:ARG:CZ	1:C:236[A]:PHE:CZ	3.02	0.42
4:A:404:BME:HO1	1:B:227:LYS:HZ1	1.65	0.42
1:C:110:GLU:HA	1:C:110:GLU:OE1	2.20	0.42
1:D:200:SER:N	1:D:201:PRO:CD	2.83	0.41
1:C:236[A]:PHE:CD1	1:D:236[A]:PHE:CG	3.08	0.41
1:B:220:GLY:N	6:B:403:FLC:OB1	2.50	0.41
1:D:85:LYS:HB3	1:D:85:LYS:HE2	1.87	0.41
1:A:232:ARG:CZ	1:A:236[A]:PHE:CZ	3.02	0.41
1:D:232:ARG:NH1	1:D:236[B]:PHE:CE1	2.87	0.41
1:B:200:SER:N	1:B:201:PRO:CD	2.84	0.41
4:C:403:BME:O1	1:D:227:LYS:NZ	2.53	0.41
1:A:265:LEU:C	1:A:265:LEU:HD12	2.40	0.41
1:A:2:ASN:HA	1:A:3:PRO:HD3	1.85	0.41
1:C:62:ASN:O	1:C:168:THR:N	2.53	0.41
1:C:236[A]:PHE:HD1	1:D:236[A]:PHE:CE1	2.38	0.41
1:A:200:SER:N	1:A:201:PRO:HD2	2.36	0.41
1:B:85:LYS:HB3	1:B:85:LYS:HE2	1.89	0.41
1:A:199:ASP:OD1	3:A:402:GLY:N	2.54	0.40

There are no symmetry-related clashes.

## 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	295/327 (90%)	286 (97%)	9 (3%)	0	100	100
1	B	295/327 (90%)	287 (97%)	8 (3%)	0	100	100
1	C	295/327 (90%)	286 (97%)	9 (3%)	0	100	100
1	D	295/327 (90%)	287 (97%)	8 (3%)	0	100	100
All	All	1180/1308 (90%)	1146 (97%)	34 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	226/242 (93%)	221 (98%)	5 (2%)	60	84
1	B	226/242 (93%)	223 (99%)	3 (1%)	76	92
1	C	226/242 (93%)	221 (98%)	5 (2%)	60	84
1	D	226/242 (93%)	223 (99%)	3 (1%)	76	92
All	All	904/968 (93%)	888 (98%)	16 (2%)	70	88

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	GLU
1	A	115[A]	CYS
1	A	115[B]	CYS
1	A	116	PHE
1	A	229	ASN
1	B	21	GLU
1	B	116	PHE
1	B	306	ASP
1	C	18	ASP
1	C	115[A]	CYS
1	C	115[B]	CYS
1	C	116	PHE
1	C	229	ASN
1	D	21	GLU
1	D	116	PHE
1	D	306	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 25 ligands modelled in this entry, 7 are monoatomic - leaving 18 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	$\# Z  > 2$
3	GLY	A	402	-	1,4,4	0.76	0	0,4,4	0.00	-
4	BME	A	403	-	3,3,3	0.38	0	1,2,2	0.34	0
4	BME	A	404	-	3,3,3	0.27	0	1,2,2	1.88	0
4	BME	A	405	-	3,3,3	0.39	0	1,2,2	0.20	0
4	BME	A	406	-	3,3,3	0.19	0	1,2,2	0.24	0
5	DTT	A	407	-	7,7,7	0.50	0	4,8,8	5.66	3 (75%)
3	GLY	B	402	-	1,4,4	1.03	0	0,4,4	0.00	-
6	FLC	B	403	-	3,12,12	1.41	0	3,17,17	2.31	2 (66%)
4	BME	B	404	-	3,3,3	0.24	0	1,2,2	0.13	0
3	GLY	C	402	-	1,4,4	1.08	0	0,4,4	0.00	-
4	BME	C	403	-	3,3,3	0.18	0	1,2,2	2.66	1 (100%)
4	BME	C	404	-	3,3,3	0.55	0	1,2,2	2.12	1 (100%)
4	BME	C	405	-	3,3,3	0.66	0	1,2,2	0.63	0
4	BME	C	406	-	3,3,3	0.32	0	1,2,2	0.30	0
5	DTT	C	407	-	7,7,7	0.61	0	4,8,8	2.90	2 (50%)
3	GLY	D	402	-	1,4,4	1.07	0	0,4,4	0.00	-

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	FLC	D	403	-	3,12,12	0.67	0	3,17,17	5.34	3 (100%)
4	BME	D	404	-	3,3,3	0.19	0	1,2,2	2.59	1 (100%)

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	GLY	A	402	-	-	0/0/2/2	0/0/0/0
4	BME	A	403	-	-	0/1/1/1	0/0/0/0
4	BME	A	404	-	-	0/1/1/1	0/0/0/0
4	BME	A	405	-	-	0/1/1/1	0/0/0/0
4	BME	A	406	-	-	0/1/1/1	0/0/0/0
5	DTT	A	407	-	-	0/8/8/8	0/0/0/0
3	GLY	B	402	-	-	0/0/2/2	0/0/0/0
6	FLC	B	403	-	-	0/6/16/16	0/0/0/0
4	BME	B	404	-	-	0/1/1/1	0/0/0/0
3	GLY	C	402	-	-	0/0/2/2	0/0/0/0
4	BME	C	403	-	-	0/1/1/1	0/0/0/0
4	BME	C	404	-	-	0/1/1/1	0/0/0/0
4	BME	C	405	-	-	0/1/1/1	0/0/0/0
4	BME	C	406	-	-	0/1/1/1	0/0/0/0
5	DTT	C	407	-	-	0/8/8/8	0/0/0/0
3	GLY	D	402	-	-	0/0/2/2	0/0/0/0
6	FLC	D	403	-	-	0/6/16/16	0/0/0/0
4	BME	D	404	-	-	0/1/1/1	0/0/0/0

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	407	DTT	C3-C4-S4	-9.60	98.58	113.75
6	D	403	FLC	CB-CG-CGC	-6.47	104.85	114.95
6	D	403	FLC	CB-CA-CAC	-6.23	105.22	114.95
5	A	407	DTT	C2-C1-S1	-5.01	105.84	113.75
5	C	407	DTT	C3-C4-S4	-2.92	109.14	113.75
4	C	403	BME	O1-C1-C2	-2.66	100.22	111.15
4	D	404	BME	O1-C1-C2	-2.59	100.50	111.15
6	B	403	FLC	CG-CB-CA	-2.57	103.47	109.85
6	D	403	FLC	CG-CB-CA	-2.25	104.28	109.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	404	BME	O1-C1-C2	2.12	119.87	111.15
6	B	403	FLC	CB-CG-CGC	3.05	119.72	114.95
5	A	407	DTT	O3-C3-C2	3.12	116.02	109.79
5	C	407	DTT	O3-C3-C2	4.88	119.53	109.79

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

14 monomers are involved in 35 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	402	GLY	1	0
4	A	403	BME	3	0
4	A	404	BME	2	0
4	A	405	BME	4	0
4	A	406	BME	11	0
3	B	402	GLY	1	0
6	B	403	FLC	2	0
3	C	402	GLY	1	0
4	C	403	BME	1	0
4	C	405	BME	1	0
4	C	406	BME	6	0
5	C	407	DTT	2	0
3	D	402	GLY	1	0
6	D	403	FLC	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 ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	296/327 (90%)	-0.15	7 (2%) 62 66	12, 22, 55, 77	0
1	B	296/327 (90%)	-0.04	8 (2%) 58 62	12, 25, 54, 86	0
1	C	296/327 (90%)	-0.14	7 (2%) 62 66	13, 23, 54, 83	0
1	D	296/327 (90%)	-0.14	9 (3%) 54 59	12, 25, 56, 86	0
All	All	1184/1308 (90%)	-0.11	31 (2%) 59 63	12, 24, 55, 86	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	GLY	5.4
1	B	300	ASP	4.2
1	B	153	HIS	4.2
1	A	153	HIS	4.1
1	B	18	ASP	4.0
1	B	149	GLU	3.8
1	C	1	GLY	3.8
1	C	153	HIS	3.8
1	B	154	GLU	3.5
1	D	300	ASP	3.5
1	D	149	GLU	3.3
1	C	17	LYS	3.3
1	D	153	HIS	3.3
1	B	17	LYS	3.3
1	A	17	LYS	3.3
1	C	154	GLU	3.1
1	C	18	ASP	2.8
1	D	17	LYS	2.8
1	A	149	GLU	2.8
1	A	154	GLU	2.7
1	D	18	ASP	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	18	ASP	2.6
1	C	241	GLY	2.5
1	B	151	GLU	2.3
1	D	21	GLU	2.3
1	D	1	GLY	2.3
1	D	154	GLU	2.3
1	A	146	LYS	2.3
1	B	150	LYS	2.2
1	D	137	GLU	2.2
1	C	149	GLU	2.1

## 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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
4	BME	C	406	4/4	0.86	0.67	21.25	73,74,77,87	0
4	BME	A	406	4/4	0.89	0.57	10.41	57,63,69,86	0
4	BME	C	405	4/4	0.86	0.36	8.20	33,47,52,65	0
2	NA	C	408	1/1	0.86	0.31	8.09	52,52,52,52	0
4	BME	D	404	4/4	0.86	0.24	4.12	40,42,46,48	0
6	FLC	D	403	13/13	0.87	0.23	3.24	49,59,65,69	0
3	GLY	D	402	5/5	0.97	0.19	2.78	23,26,28,29	0
4	BME	C	403	4/4	0.88	0.21	2.73	46,46,47,52	0
6	FLC	B	403	13/13	0.79	0.21	2.73	48,57,65,68	0
4	BME	A	404	4/4	0.79	0.19	2.53	47,47,51,56	0
3	GLY	A	402	5/5	0.98	0.17	2.04	22,25,27,27	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	DTT	A	407	8/8	0.71	0.22	1.83	50,55,64,74	0
4	BME	A	403	4/4	0.68	0.25	1.57	61,63,66,68	0
4	BME	B	404	4/4	0.92	0.17	1.56	38,42,46,46	0
2	NA	A	408	1/1	0.93	0.16	1.47	33,33,33,33	0
3	GLY	B	402	5/5	0.97	0.21	1.38	22,22,23,25	0
4	BME	C	404	4/4	0.90	0.17	1.19	31,38,41,53	0
5	DTT	C	407	8/8	0.84	0.17	0.72	43,51,57,63	0
4	BME	A	405	4/4	0.89	0.15	0.60	34,36,40,45	0
2	NA	D	401	1/1	0.93	0.12	0.13	30,30,30,30	0
3	GLY	C	402	5/5	0.97	0.12	-0.35	23,24,27,28	0
2	NA	B	401	1/1	0.91	0.11	-0.46	28,28,28,28	0
2	NA	A	401	1/1	0.99	0.08	-1.28	19,19,19,19	0
2	NA	C	409	1/1	0.98	0.09	-1.68	33,33,33,33	0
2	NA	C	401	1/1	0.98	0.05	-3.06	21,21,21,21	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.