



wwPDB X-ray Structure Validation Summary Report ⓘ

May 23, 2022 – 12:08 PM EDT

PDB ID : 7MY7
Title : Se-CrtE N-term His-tag structure
Authors : Peat, T.S.; Newman, J.
Deposited on : 2021-05-20
Resolution : 2.36 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.28.1
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)	:	2.28.1

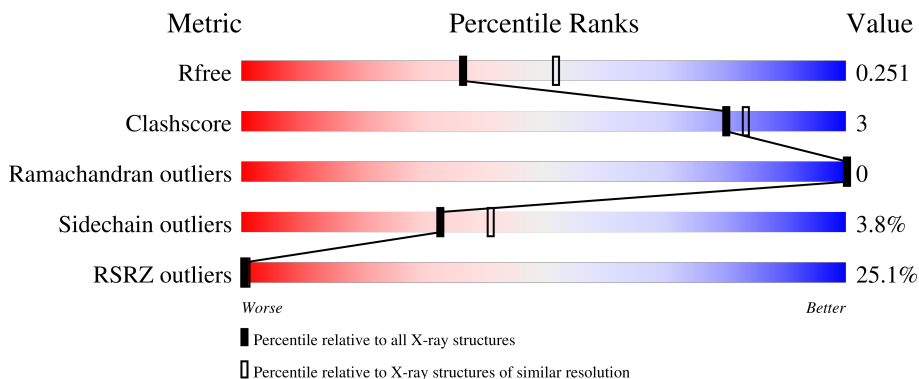
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.36 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}	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	AAA	322	<div> <div>12%</div> <div>80% 5% • 15%</div> </div>
1	BBB	322	<div> <div>5%</div> <div>79% 7% 15%</div> </div>
1	CCC	322	<div> <div>34%</div> <div>61% • 34%</div> </div>
1	DDD	322	<div> <div>29%</div> <div>75% 5% • 20%</div> </div>

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 7581 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 Farnesyl-diphosphate synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAA	275	Total	C	N	O	S	0	2	0
			2094	1320	358	409	7			
1	BBB	275	Total	C	N	O	S	0	0	0
			2055	1297	350	401	7			
1	CCC	213	Total	C	N	O	S	0	0	0
			1512	947	265	293	7			
1	DDD	259	Total	C	N	O	S	0	0	0
			1845	1161	317	360	7			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	-20	MET	-	expression tag	UNP Q31Q61
AAA	-19	GLY	-	expression tag	UNP Q31Q61
AAA	-18	SER	-	expression tag	UNP Q31Q61
AAA	-17	SER	-	expression tag	UNP Q31Q61
AAA	-16	HIS	-	expression tag	UNP Q31Q61
AAA	-15	HIS	-	expression tag	UNP Q31Q61
AAA	-14	HIS	-	expression tag	UNP Q31Q61
AAA	-13	HIS	-	expression tag	UNP Q31Q61
AAA	-12	HIS	-	expression tag	UNP Q31Q61
AAA	-11	HIS	-	expression tag	UNP Q31Q61
AAA	-10	SER	-	expression tag	UNP Q31Q61
AAA	-9	SER	-	expression tag	UNP Q31Q61
AAA	-8	GLY	-	expression tag	UNP Q31Q61
AAA	-7	LEU	-	expression tag	UNP Q31Q61
AAA	-6	VAL	-	expression tag	UNP Q31Q61
AAA	-5	PRO	-	expression tag	UNP Q31Q61
AAA	-4	ARG	-	expression tag	UNP Q31Q61
AAA	-3	GLY	-	expression tag	UNP Q31Q61
AAA	-2	SER	-	expression tag	UNP Q31Q61
AAA	-1	HIS	-	expression tag	UNP Q31Q61
AAA	0	MET	-	expression tag	UNP Q31Q61

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Chain	Residue	Modelled	Actual	Comment	Reference
BBB	-20	MET	-	expression tag	UNP Q31Q61
BBB	-19	GLY	-	expression tag	UNP Q31Q61
BBB	-18	SER	-	expression tag	UNP Q31Q61
BBB	-17	SER	-	expression tag	UNP Q31Q61
BBB	-16	HIS	-	expression tag	UNP Q31Q61
BBB	-15	HIS	-	expression tag	UNP Q31Q61
BBB	-14	HIS	-	expression tag	UNP Q31Q61
BBB	-13	HIS	-	expression tag	UNP Q31Q61
BBB	-12	HIS	-	expression tag	UNP Q31Q61
BBB	-11	HIS	-	expression tag	UNP Q31Q61
BBB	-10	SER	-	expression tag	UNP Q31Q61
BBB	-9	SER	-	expression tag	UNP Q31Q61
BBB	-8	GLY	-	expression tag	UNP Q31Q61
BBB	-7	LEU	-	expression tag	UNP Q31Q61
BBB	-6	VAL	-	expression tag	UNP Q31Q61
BBB	-5	PRO	-	expression tag	UNP Q31Q61
BBB	-4	ARG	-	expression tag	UNP Q31Q61
BBB	-3	GLY	-	expression tag	UNP Q31Q61
BBB	-2	SER	-	expression tag	UNP Q31Q61
BBB	-1	HIS	-	expression tag	UNP Q31Q61
BBB	0	MET	-	expression tag	UNP Q31Q61
CCC	-20	MET	-	expression tag	UNP Q31Q61
CCC	-19	GLY	-	expression tag	UNP Q31Q61
CCC	-18	SER	-	expression tag	UNP Q31Q61
CCC	-17	SER	-	expression tag	UNP Q31Q61
CCC	-16	HIS	-	expression tag	UNP Q31Q61
CCC	-15	HIS	-	expression tag	UNP Q31Q61
CCC	-14	HIS	-	expression tag	UNP Q31Q61
CCC	-13	HIS	-	expression tag	UNP Q31Q61
CCC	-12	HIS	-	expression tag	UNP Q31Q61
CCC	-11	HIS	-	expression tag	UNP Q31Q61
CCC	-10	SER	-	expression tag	UNP Q31Q61
CCC	-9	SER	-	expression tag	UNP Q31Q61
CCC	-8	GLY	-	expression tag	UNP Q31Q61
CCC	-7	LEU	-	expression tag	UNP Q31Q61
CCC	-6	VAL	-	expression tag	UNP Q31Q61
CCC	-5	PRO	-	expression tag	UNP Q31Q61
CCC	-4	ARG	-	expression tag	UNP Q31Q61
CCC	-3	GLY	-	expression tag	UNP Q31Q61
CCC	-2	SER	-	expression tag	UNP Q31Q61
CCC	-1	HIS	-	expression tag	UNP Q31Q61
CCC	0	MET	-	expression tag	UNP Q31Q61

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Chain	Residue	Modelled	Actual	Comment	Reference
DDD	-20	MET	-	expression tag	UNP Q31Q61
DDD	-19	GLY	-	expression tag	UNP Q31Q61
DDD	-18	SER	-	expression tag	UNP Q31Q61
DDD	-17	SER	-	expression tag	UNP Q31Q61
DDD	-16	HIS	-	expression tag	UNP Q31Q61
DDD	-15	HIS	-	expression tag	UNP Q31Q61
DDD	-14	HIS	-	expression tag	UNP Q31Q61
DDD	-13	HIS	-	expression tag	UNP Q31Q61
DDD	-12	HIS	-	expression tag	UNP Q31Q61
DDD	-11	HIS	-	expression tag	UNP Q31Q61
DDD	-10	SER	-	expression tag	UNP Q31Q61
DDD	-9	SER	-	expression tag	UNP Q31Q61
DDD	-8	GLY	-	expression tag	UNP Q31Q61
DDD	-7	LEU	-	expression tag	UNP Q31Q61
DDD	-6	VAL	-	expression tag	UNP Q31Q61
DDD	-5	PRO	-	expression tag	UNP Q31Q61
DDD	-4	ARG	-	expression tag	UNP Q31Q61
DDD	-3	GLY	-	expression tag	UNP Q31Q61
DDD	-2	SER	-	expression tag	UNP Q31Q61
DDD	-1	HIS	-	expression tag	UNP Q31Q61
DDD	0	MET	-	expression tag	UNP Q31Q61

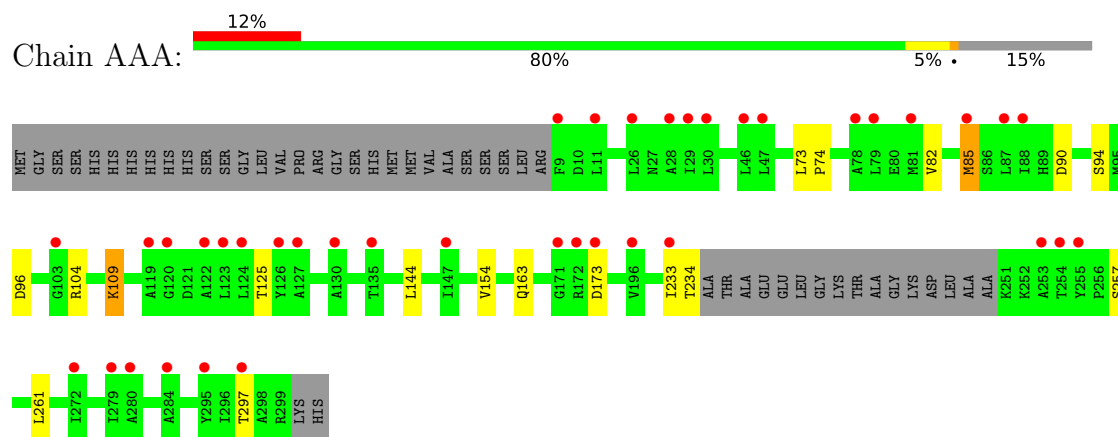
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	AAA	41	Total O 41 41	0	0
2	BBB	31	Total O 31 31	0	0
2	CCC	3	Total O 3 3	0	0

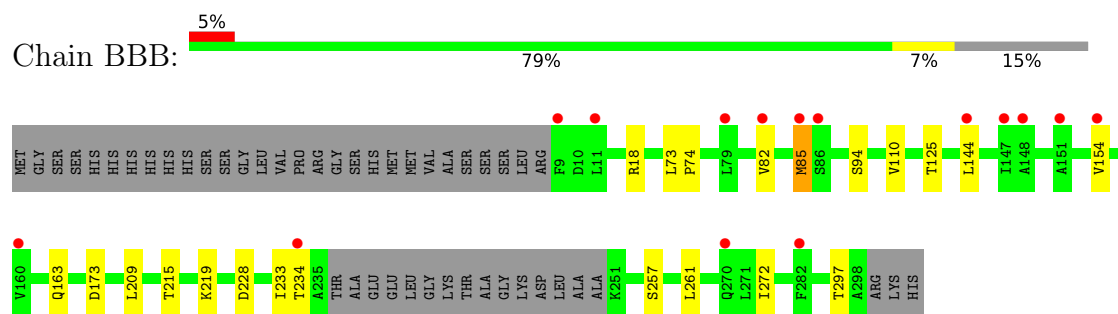
3 Residue-property plots [i](#)

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.

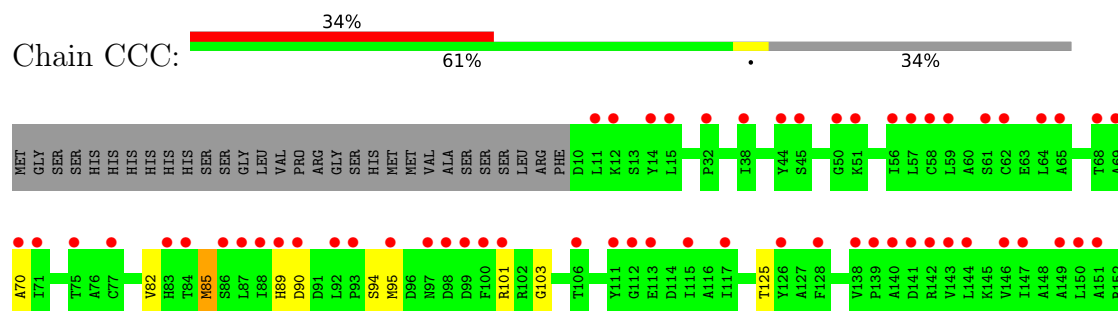
- Molecule 1: Farnesyl-diphosphate synthase

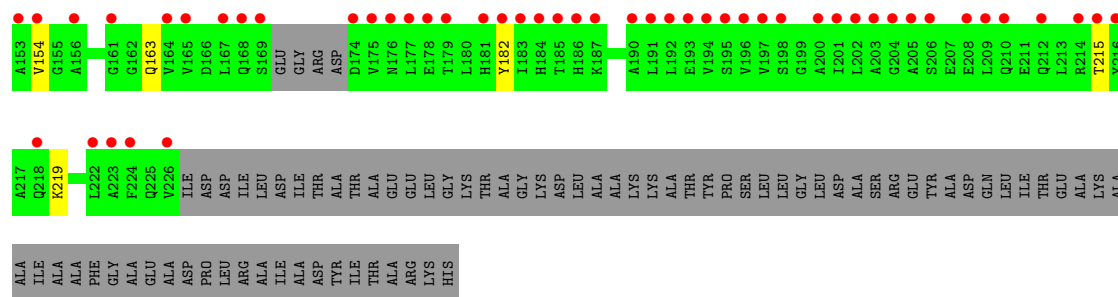


- Molecule 1: Farnesyl-diphosphate synthase

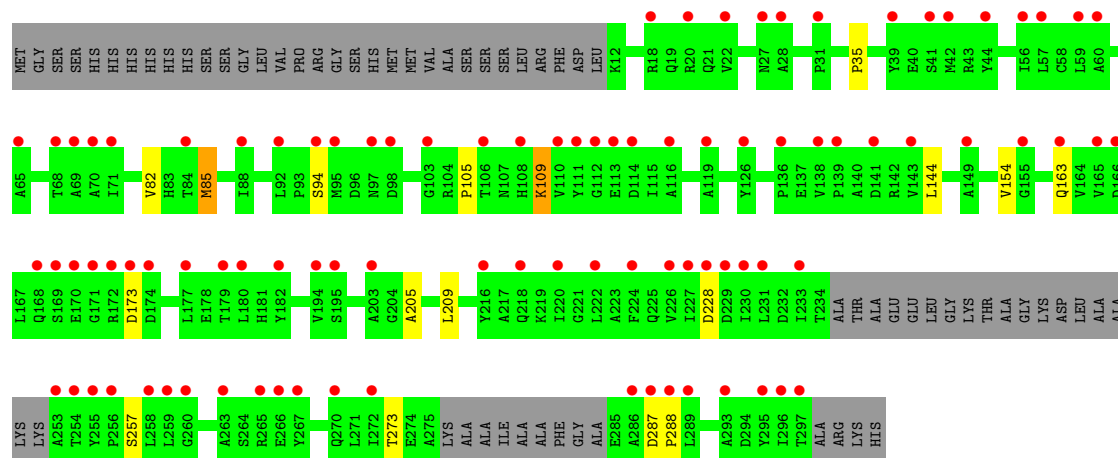
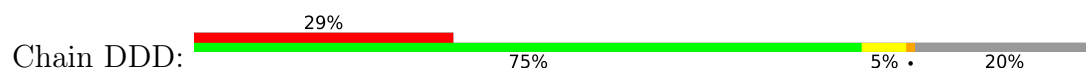


- Molecule 1: Farnesyl-diphosphate synthase





• Molecule 1: Farnesyl-diphosphate synthase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	155.51Å 56.44Å 144.81Å 90.00° 100.38° 90.00°	Depositor
Resolution (Å)	48.65 – 2.36 48.65 – 2.36	Depositor EDS
% Data completeness (in resolution range)	99.5 (48.65-2.36) 99.5 (48.65-2.36)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.45 (at 2.37Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.218 , 0.247 0.226 , 0.251	Depositor DCC
R_{free} test set	2566 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	47.9	Xtriage
Anisotropy	0.175	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 42.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7581	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	AAA	0.70	0/2126	0.80	1/2891 (0.0%)
1	BBB	0.68	0/2087	0.77	0/2844
1	CCC	0.69	0/1535	0.73	0/2100
1	DDD	0.69	0/1873	0.73	0/2562
All	All	0.69	0/7621	0.76	1/10397 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	104	ARG	O-C-N	-5.88	109.93	121.10

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	AAA	2094	0	2087	11	0
1	BBB	2055	0	2034	15	0
1	CCC	1512	0	1430	12	1
1	DDD	1845	0	1741	10	1
2	AAA	41	0	0	0	0
2	BBB	31	0	0	2	0
2	CCC	3	0	0	0	0
All	All	7581	0	7292	40	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

The worst 5 of 40 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:BBB:272:ILE:HG13	1:BBB:297:THR:HG23	1.52	0.92
1:AAA:90[A]:ASP:OD2	1:AAA:96:ASP:OD2	1.88	0.91
1:BBB:272:ILE:HG13	1:BBB:297:THR:CG2	2.02	0.89
1:BBB:110:VAL:CG1	1:CCC:70:ALA:HB2	2.05	0.84
1:BBB:110:VAL:HG13	1:CCC:70:ALA:HB2	1.63	0.81

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:CCC:103:GLY:O	1:DDD:273:THR:O[1_565]	1.91	0.29

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	AAA	273/322 (85%)	270 (99%)	3 (1%)	0	100	100
1	BBB	271/322 (84%)	265 (98%)	6 (2%)	0	100	100
1	CCC	209/322 (65%)	206 (99%)	3 (1%)	0	100	100
1	DDD	253/322 (79%)	248 (98%)	5 (2%)	0	100	100
All	All	1006/1288 (78%)	989 (98%)	17 (2%)	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	AAA	215/252 (85%)	207 (96%)	8 (4%)	34	42
1	BBB	208/252 (82%)	198 (95%)	10 (5%)	25	30
1	CCC	143/252 (57%)	140 (98%)	3 (2%)	53	65
1	DDD	174/252 (69%)	167 (96%)	7 (4%)	31	39
All	All	740/1008 (73%)	712 (96%)	28 (4%)	33	41

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	BBB	233	ILE
1	DDD	257	SER
1	BBB	261	LEU
1	DDD	163	GLN
1	BBB	257	SER

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

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	AAA	275/322 (85%)	1.11	39 (14%) 2 4	26, 47, 84, 110	0
1	BBB	275/322 (85%)	0.81	15 (5%) 25 36	29, 49, 82, 100	0
1	CCC	213/322 (66%)	2.40	109 (51%) 0 0	68, 97, 124, 146	0
1	DDD	259/322 (80%)	1.83	94 (36%) 0 0	68, 94, 120, 145	0
All	All	1022/1288 (79%)	1.48	257 (25%) 0 1	26, 74, 117, 146	0

The worst 5 of 257 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	CCC	203	ALA	12.2
1	DDD	171	GLY	8.7
1	DDD	253	ALA	8.6
1	CCC	11	LEU	8.3
1	CCC	177	LEU	8.2

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.