



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 22, 2025 – 01:47 AM EDT

PDB ID : 5BSH / pdb_00005bsh
Title : Crystal structure of Medicago truncatula (delta)1-Pyrroline-5-Carboxylate Reductase (MtP5CR) in complex with L-Proline
Authors : Ruszkowski, M.; Nocek, B.; Forlani, G.; Dauter, Z.
Deposited on : 2015-06-02
Resolution : 2.10 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.006 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.42

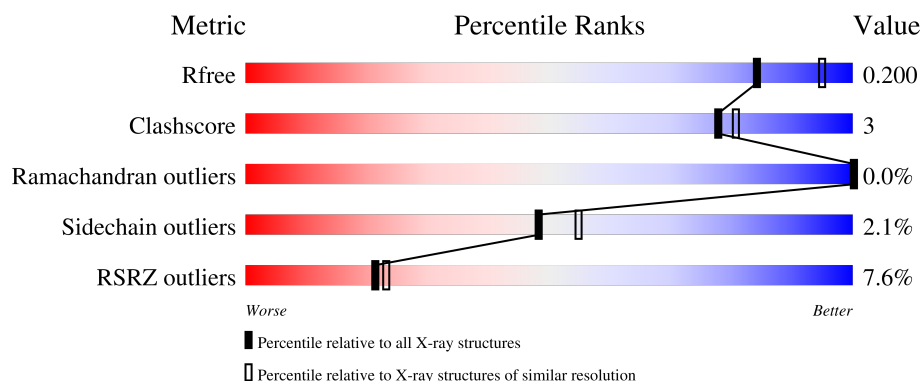
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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}	164625	6234 (2.10-2.10)
Clashscore	180529	6893 (2.10-2.10)
Ramachandran outliers	177936	6839 (2.10-2.10)
Sidechain outliers	177891	6840 (2.10-2.10)
RSRZ outliers	164620	6234 (2.10-2.10)

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	277	<div> <div>3%</div> <div> <div></div> <div>92%</div> <div>6%</div> </div> </div>
1	B	277	<div> <div>4%</div> <div> <div></div> <div>92%</div> <div>6%</div> </div> </div>
1	C	277	<div> <div>4%</div> <div> <div></div> <div>91%</div> <div>5%</div> </div> </div>
1	D	277	<div> <div>13%</div> <div> <div></div> <div>90%</div> <div>7%</div> </div> </div>
1	E	277	<div> <div>4%</div> <div> <div></div> <div>90%</div> <div>7%</div> </div> </div>

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Mol	Chain	Length	Quality of chain
1	F	277	<div><div></div><div>3%</div><div>93%</div><div>5%</div><div></div></div>
1	G	277	<div><div></div><div>23%</div><div>91%</div><div>5%</div><div></div></div>
1	H	277	<div><div></div><div>4%</div><div>91%</div><div>6%</div><div></div></div>
1	I	277	<div><div></div><div>6%</div><div>92%</div><div>5%</div><div></div></div>
1	J	277	<div><div></div><div>8%</div><div>88%</div><div>8%</div><div></div></div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 20686 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 Pyrroline-5-carboxylate reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	272	Total	C	N	O	S	0	3	0
			2012	1270	350	385	7			
1	B	272	Total	C	N	O	S	0	4	0
			2018	1272	351	389	6			
1	C	268	Total	C	N	O	S	0	2	0
			1969	1241	342	379	7			
1	D	268	Total	C	N	O	S	0	2	0
			1970	1241	343	380	6			
1	E	272	Total	C	N	O	S	0	4	0
			2020	1274	351	388	7			
1	F	272	Total	C	N	O	S	0	4	0
			2020	1274	351	388	7			
1	G	263	Total	C	N	O	S	0	1	0
			1925	1213	335	371	6			
1	H	272	Total	C	N	O	S	0	2	0
			2003	1265	348	383	7			
1	I	270	Total	C	N	O	S	0	1	0
			1979	1248	345	380	6			
1	J	271	Total	C	N	O	S	0	2	0
			1995	1258	347	384	6			

There are 30 discrepancies between the modelled and reference sequences:

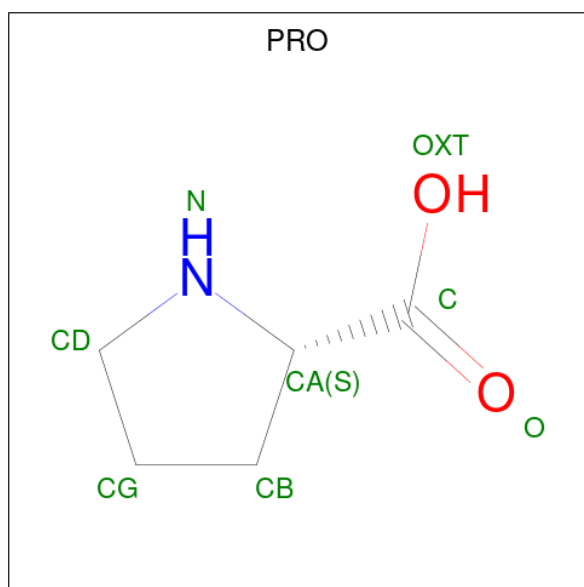
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP G7KRM5
A	-1	ASN	-	expression tag	UNP G7KRM5
A	0	ALA	-	expression tag	UNP G7KRM5
B	-2	SER	-	expression tag	UNP G7KRM5
B	-1	ASN	-	expression tag	UNP G7KRM5
B	0	ALA	-	expression tag	UNP G7KRM5
C	-2	SER	-	expression tag	UNP G7KRM5
C	-1	ASN	-	expression tag	UNP G7KRM5
C	0	ALA	-	expression tag	UNP G7KRM5

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	SER	-	expression tag	UNP G7KRM5
D	-1	ASN	-	expression tag	UNP G7KRM5
D	0	ALA	-	expression tag	UNP G7KRM5
E	-2	SER	-	expression tag	UNP G7KRM5
E	-1	ASN	-	expression tag	UNP G7KRM5
E	0	ALA	-	expression tag	UNP G7KRM5
F	-2	SER	-	expression tag	UNP G7KRM5
F	-1	ASN	-	expression tag	UNP G7KRM5
F	0	ALA	-	expression tag	UNP G7KRM5
G	-2	SER	-	expression tag	UNP G7KRM5
G	-1	ASN	-	expression tag	UNP G7KRM5
G	0	ALA	-	expression tag	UNP G7KRM5
H	-2	SER	-	expression tag	UNP G7KRM5
H	-1	ASN	-	expression tag	UNP G7KRM5
H	0	ALA	-	expression tag	UNP G7KRM5
I	-2	SER	-	expression tag	UNP G7KRM5
I	-1	ASN	-	expression tag	UNP G7KRM5
I	0	ALA	-	expression tag	UNP G7KRM5
J	-2	SER	-	expression tag	UNP G7KRM5
J	-1	ASN	-	expression tag	UNP G7KRM5
J	0	ALA	-	expression tag	UNP G7KRM5

- Molecule 2 is PROLINE (CCD ID: PRO) (formula: C₅H₉NO₂).



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

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total	C	N	O	0	0
			8	5	1	2		
2	C	1	Total	C	N	O	0	0
			8	5	1	2		
2	D	1	Total	C	N	O	0	0
			8	5	1	2		
2	E	1	Total	C	N	O	0	0
			8	5	1	2		
2	F	1	Total	C	N	O	0	0
			8	5	1	2		
2	G	1	Total	C	N	O	0	0
			8	5	1	2		
2	H	1	Total	C	N	O	0	0
			8	5	1	2		
2	I	1	Total	C	N	O	0	0
			8	5	1	2		
2	J	1	Total	C	N	O	0	0
			8	5	1	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	112	Total	O	0	0
			112	112		
3	B	74	Total	O	0	0
			74	74		
3	C	66	Total	O	0	1
			67	67		
3	D	58	Total	O	0	0
			58	58		
3	E	97	Total	O	0	0
			97	97		
3	F	81	Total	O	0	0
			81	81		
3	G	50	Total	O	0	0
			50	50		
3	H	60	Total	O	0	0
			60	60		
3	I	54	Total	O	0	0
			54	54		
3	J	42	Total	O	0	0
			42	42		

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.

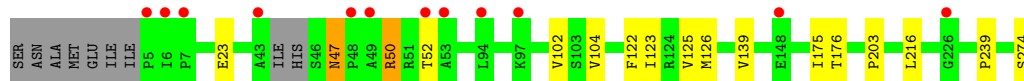
- Molecule 1: Pyrroline-5-carboxylate reductase



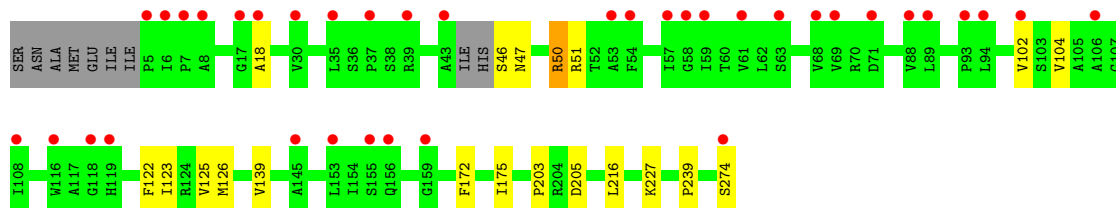
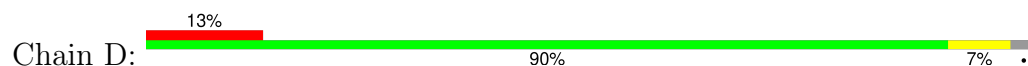
- Molecule 1: Pyrroline-5-carboxylate reductase



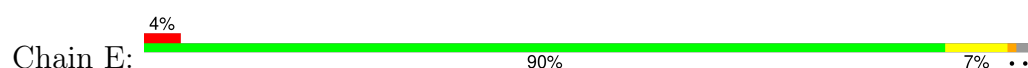
- Molecule 1: Pyrroline-5-carboxylate reductase

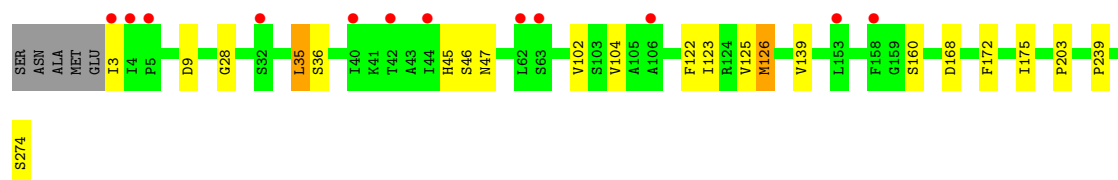


- Molecule 1: Pyrroline-5-carboxylate reductase

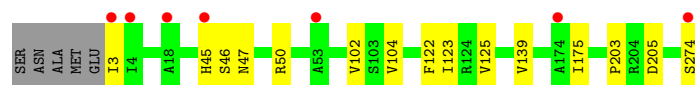


- Molecule 1: Pyrroline-5-carboxylate reductase

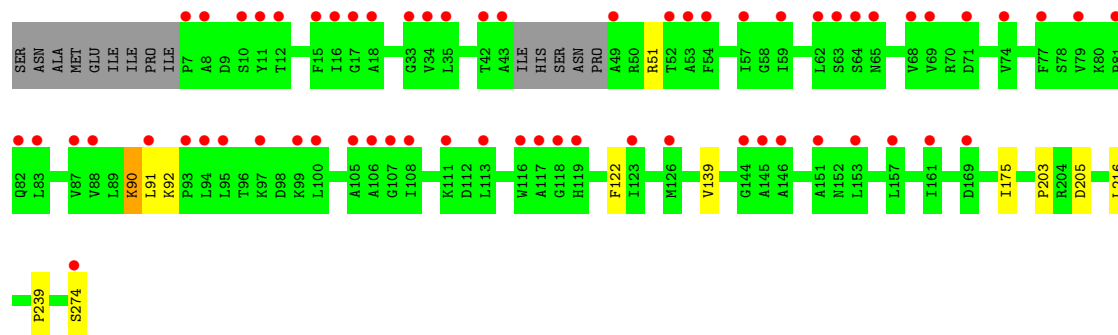
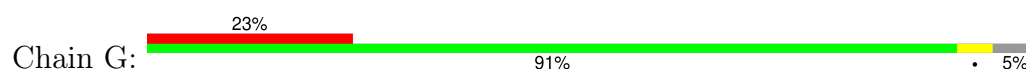




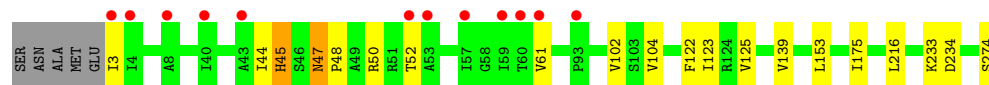
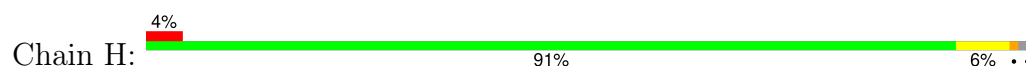
- Molecule 1: Pyrroline-5-carboxylate reductase



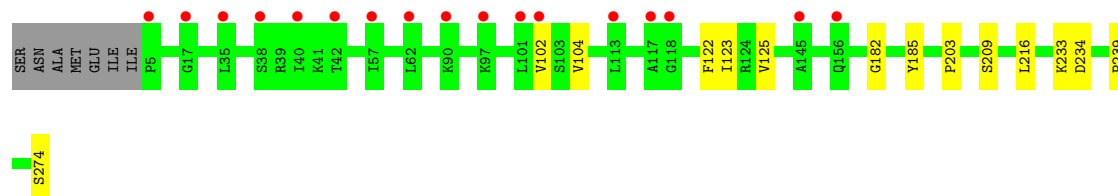
- Molecule 1: Pyrroline-5-carboxylate reductase



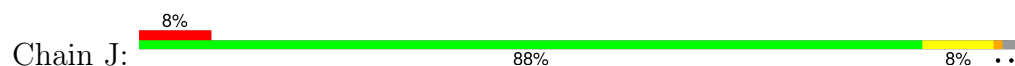
- Molecule 1: Pyrroline-5-carboxylate reductase

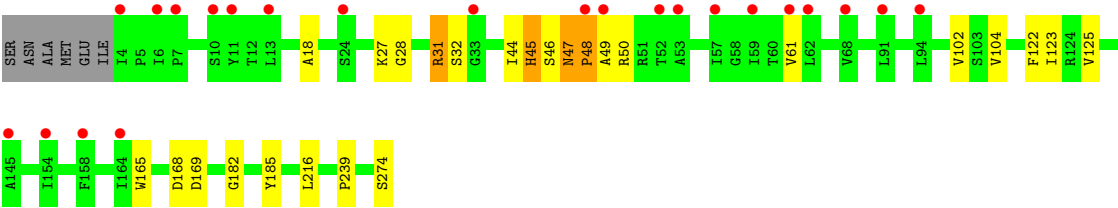


- Molecule 1: Pyrroline-5-carboxylate reductase



- Molecule 1: Pyrroline-5-carboxylate reductase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	87.49Å 100.93Å 101.92Å 67.65° 85.46° 89.44°	Depositor
Resolution (Å)	40.00 – 2.10 40.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	97.0 (40.00-2.10) 97.6 (40.00-2.10)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.01 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.180 , 0.197 0.185 , 0.200	Depositor DCC
R_{free} test set	1928 reflections (1.05%)	wwPDB-VP
Wilson B-factor (Å ²)	42.5	Xtriage
Anisotropy	0.205	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 48.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	20686	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.73% 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

5.1 Standard geometry

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	0.89	0/2041	0.81	0/2761
1	B	0.83	0/2047	0.80	0/2769
1	C	0.79	0/1996	0.79	0/2697
1	D	0.79	0/1997	0.77	0/2698
1	E	0.87	0/2049	0.84	1/2772 (0.0%)
1	F	0.79	0/2049	0.78	0/2772
1	G	0.77	0/1950	0.80	1/2632 (0.0%)
1	H	0.77	1/2032 (0.0%)	0.78	1/2749 (0.0%)
1	I	0.78	0/2008	0.78	0/2715
1	J	0.79	0/2024	0.79	1/2738 (0.0%)
All	All	0.81	1/20193 (0.0%)	0.79	4/27303 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	48	PRO	N-CD	5.17	1.55	1.47

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	47	ASN	C-N-CD	6.23	141.48	128.40
1	E	35	LEU	CA-CB-CG	5.80	128.65	115.30
1	H	47	ASN	C-N-CD	5.65	140.26	128.40
1	G	90	LYS	CD-CE-NZ	5.44	124.20	111.70

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	2012	0	2080	11	0
1	B	2018	0	2078	10	0
1	C	1969	0	2033	10	0
1	D	1970	0	2031	16	0
1	E	2020	0	2083	12	0
1	F	2020	0	2083	8	0
1	G	1925	0	1988	5	0
1	H	2003	0	2073	17	0
1	I	1979	0	2043	8	0
1	J	1995	0	2056	28	0
2	A	8	0	7	0	0
2	B	8	0	7	0	0
2	C	8	0	7	0	0
2	D	8	0	7	0	0
2	E	8	0	7	0	0
2	F	8	0	7	0	0
2	G	8	0	7	0	0
2	H	8	0	7	0	0
2	I	8	0	7	0	0
2	J	8	0	7	0	0
3	A	112	0	0	1	0
3	B	74	0	0	1	0
3	C	67	0	0	1	0
3	D	58	0	0	2	0
3	E	97	0	0	2	0
3	F	81	0	0	1	0
3	G	50	0	0	1	0
3	H	60	0	0	0	0
3	I	54	0	0	0	0
3	J	42	0	0	2	0
All	All	20686	0	20618	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 3.

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:F:205[B]:ASP:OD1	3:F:402:HOH:O	1.55	1.22

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:168:ASP:HB3	3:E:453:HOH:O	1.56	1.03
1:E:160:SER:HB3	3:E:443:HOH:O	1.56	1.02
1:D:205:ASP:HB2	3:D:446:HOH:O	1.59	1.02
1:H:44:ILE:HG12	1:H:61:VAL:HG13	1.46	0.94
1:J:168[B]:ASP:OD2	3:J:401:HOH:O	1.91	0.87
1:H:44:ILE:HG12	1:H:61:VAL:CG1	2.12	0.79
1:H:47:ASN:ND2	1:H:50:ARG:HG2	1.98	0.78
1:H:45:HIS:H	1:H:45:HIS:CD2	2.00	0.76
1:J:28:GLY:HA2	1:J:31:ARG:HG2	1.68	0.75
1:C:52:THR:HG22	3:C:454:HOH:O	1.87	0.75
1:J:168[B]:ASP:OD1	3:J:401:HOH:O	2.06	0.73
1:D:18:ALA:O	1:D:50:ARG:NE	2.22	0.72
1:J:28:GLY:O	1:J:31:ARG:HG3	1.91	0.71
1:C:126[B]:MET:HE1	1:C:176:THR:HA	1.74	0.70
1:H:44:ILE:CG1	1:H:61:VAL:CG1	2.71	0.68
1:D:126:MET:HE2	1:D:172:PHE:HD2	1.60	0.67
1:B:205:ASP:HB2	3:B:452:HOH:O	1.95	0.66
1:J:48:PRO:HD2	1:J:49:ALA:H	1.60	0.66
1:D:126:MET:CE	1:D:172:PHE:CD2	2.79	0.66
1:A:205:ASP:HB2	3:A:477:HOH:O	1.98	0.63
1:D:50:ARG:HH11	1:D:50:ARG:HG2	1.64	0.62
1:D:126:MET:HE2	1:D:172:PHE:CD2	2.33	0.62
1:E:28:GLY:HA3	1:E:160:SER:OG	1.99	0.62
1:H:44:ILE:CG1	1:H:61:VAL:HG13	2.26	0.61
1:J:47:ASN:ND2	1:J:50:ARG:HG2	2.14	0.61
1:J:45:HIS:CD2	1:J:46:SER:HB3	2.36	0.61
1:H:44:ILE:HG13	1:H:61:VAL:HG11	1.83	0.60
1:H:44:ILE:CG1	1:H:61:VAL:HG11	2.32	0.59
1:A:239:PRO:HG3	1:I:203:PRO:HA	1.86	0.57
1:D:50:ARG:HG2	1:D:50:ARG:NH1	2.17	0.57
1:B:28:GLY:HA3	1:B:160[B]:SER:OG	2.07	0.55
1:F:139:VAL:HG21	1:F:175:ILE:HD13	1.88	0.55
1:A:139:VAL:HG21	1:A:175:ILE:HD13	1.86	0.55
1:C:139:VAL:HG21	1:C:175:ILE:HD13	1.89	0.55
1:B:139:VAL:HG21	1:B:175:ILE:HD13	1.89	0.55
1:C:203:PRO:HA	1:E:239:PRO:HG3	1.89	0.55
1:G:139:VAL:HG21	1:G:175:ILE:HD13	1.91	0.53
1:H:45:HIS:CD2	1:H:45:HIS:N	2.73	0.53
1:J:168[B]:ASP:OD1	1:J:169:ASP:N	2.42	0.53
1:J:48:PRO:CD	1:J:49:ALA:H	2.22	0.52
1:H:139:VAL:HG21	1:H:175:ILE:HD13	1.91	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:239:PRO:HG3	1:F:203:PRO:HA	1.92	0.51
1:J:31:ARG:HG3	1:J:32:SER:N	2.26	0.51
1:G:203:PRO:HA	1:I:239:PRO:HG3	1.92	0.51
1:D:139:VAL:HG21	1:D:175:ILE:HD13	1.93	0.51
1:J:28:GLY:CA	1:J:31:ARG:HG2	2.37	0.50
1:J:28:GLY:HA2	1:J:31:ARG:CG	2.41	0.50
1:C:23:GLU:OE1	1:C:50:ARG:NH2	2.45	0.49
1:C:47:ASN:OD1	1:C:47:ASN:N	2.46	0.49
1:J:45:HIS:CD2	1:J:45:HIS:C	2.85	0.49
1:E:104:VAL:HA	1:E:125:VAL:O	2.13	0.48
1:I:216:LEU:CD1	1:J:216:LEU:CD1	2.91	0.48
1:G:216:LEU:CD1	1:H:216:LEU:CD1	2.92	0.48
1:D:227:LYS:NZ	3:D:403:HOH:O	2.39	0.47
1:F:47:ASN:OD1	1:F:50:ARG:N	2.34	0.47
1:B:104:VAL:HA	1:B:125:VAL:O	2.14	0.47
1:E:139:VAL:HG21	1:E:175:ILE:HD13	1.95	0.47
1:B:203:PRO:HA	1:J:239:PRO:HG3	1.97	0.46
1:H:104:VAL:HA	1:H:125:VAL:O	2.16	0.46
1:E:203:PRO:HA	1:G:239:PRO:HG3	1.97	0.46
1:J:45:HIS:HD2	1:J:46:SER:N	2.14	0.46
1:J:182:GLY:HA2	1:J:185:TYR:CD2	2.51	0.46
1:G:205:ASP:HB2	3:G:434:HOH:O	2.16	0.45
1:F:3:ILE:O	1:F:3:ILE:HG22	2.16	0.45
1:J:44:ILE:HG12	1:J:61:VAL:HG13	1.97	0.45
1:B:3:ILE:O	1:B:3:ILE:HG22	2.17	0.45
1:H:3:ILE:HG22	1:H:3:ILE:O	2.17	0.45
1:A:3:ILE:HG22	1:A:3:ILE:O	2.17	0.45
1:A:216:LEU:CD1	1:B:216:LEU:CD1	2.95	0.44
1:J:28:GLY:O	1:J:31:ARG:CG	2.61	0.44
1:J:27:LYS:O	1:J:31:ARG:HG2	2.18	0.44
1:A:126[B]:MET:HE1	1:A:176:THR:HA	1.99	0.44
1:C:216:LEU:CD1	1:D:216:LEU:CD1	2.96	0.44
1:J:48:PRO:CD	1:J:49:ALA:N	2.80	0.44
1:A:104:VAL:HA	1:A:125:VAL:O	2.18	0.44
1:A:102:VAL:HA	1:A:123:ILE:O	2.18	0.43
1:B:102:VAL:HA	1:B:123:ILE:O	2.18	0.43
1:E:3:ILE:O	1:E:3:ILE:HG22	2.17	0.43
1:F:102:VAL:HA	1:F:123:ILE:O	2.19	0.43
1:J:31:ARG:HG3	1:J:32:SER:H	1.82	0.43
1:C:102:VAL:HA	1:C:123:ILE:O	2.19	0.43
1:J:102:VAL:HA	1:J:123:ILE:O	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:104:VAL:HA	1:D:125:VAL:O	2.19	0.43
1:H:102:VAL:HA	1:H:123:ILE:O	2.19	0.43
1:J:44:ILE:HG13	1:J:61:VAL:HG11	2.00	0.42
1:A:203:PRO:HA	1:C:239:PRO:HG3	2.01	0.42
1:H:153:LEU:C	1:H:153:LEU:HD23	2.38	0.42
1:H:233:LYS:HE2	1:H:234:ASP:OD1	2.20	0.42
1:D:50:ARG:HH11	1:D:50:ARG:CG	2.32	0.42
1:E:126[B]:MET:HE1	1:E:175:ILE:HG22	2.00	0.42
1:J:104:VAL:HA	1:J:125:VAL:O	2.19	0.42
1:I:104:VAL:HA	1:I:125:VAL:O	2.20	0.42
1:A:139:VAL:HG23	1:A:172:PHE:CZ	2.55	0.42
1:E:126[B]:MET:CE	1:E:175:ILE:HG22	2.49	0.42
1:D:47:ASN:OD1	1:D:50:ARG:N	2.33	0.42
1:J:45:HIS:CD2	1:J:46:SER:N	2.87	0.42
1:F:104:VAL:HA	1:F:125:VAL:O	2.20	0.42
1:D:102:VAL:HA	1:D:123:ILE:O	2.20	0.41
1:I:102:VAL:HA	1:I:123:ILE:O	2.20	0.41
1:I:209:SER:HB3	1:J:165:TRP:CZ2	2.55	0.41
1:C:104:VAL:HA	1:C:125:VAL:O	2.21	0.41
1:I:233:LYS:HE2	1:I:234:ASP:OD1	2.20	0.41
1:B:239:PRO:HG3	1:D:203:PRO:HA	2.03	0.41
1:E:139:VAL:HG23	1:E:172:PHE:CZ	2.56	0.41
1:F:50:ARG:HA	1:F:50:ARG:HD2	1.73	0.41
1:A:165:TRP:CZ2	1:B:209:SER:HB3	2.56	0.40
1:I:182:GLY:HA2	1:I:185:TYR:CD2	2.56	0.40
1:H:44:ILE:HG13	1:H:61:VAL:CG1	2.46	0.40
1:J:18:ALA:CB	1:J:44:ILE:HD13	2.52	0.40
1:E:102:VAL:HA	1:E:123:ILE:O	2.21	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	273/277 (99%)	269 (98%)	4 (2%)	0	100	100
1	B	274/277 (99%)	270 (98%)	4 (2%)	0	100	100
1	C	266/277 (96%)	263 (99%)	3 (1%)	0	100	100
1	D	266/277 (96%)	263 (99%)	3 (1%)	0	100	100
1	E	274/277 (99%)	270 (98%)	4 (2%)	0	100	100
1	F	274/277 (99%)	270 (98%)	4 (2%)	0	100	100
1	G	260/277 (94%)	258 (99%)	2 (1%)	0	100	100
1	H	272/277 (98%)	268 (98%)	4 (2%)	0	100	100
1	I	269/277 (97%)	266 (99%)	3 (1%)	0	100	100
1	J	271/277 (98%)	266 (98%)	4 (2%)	1 (0%)	30	29
All	All	2699/2770 (97%)	2663 (99%)	35 (1%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	J	48	PRO

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	211/212 (100%)	209 (99%)	2 (1%)	75	82
1	B	212/212 (100%)	208 (98%)	4 (2%)	52	59
1	C	206/212 (97%)	202 (98%)	4 (2%)	52	59
1	D	206/212 (97%)	201 (98%)	5 (2%)	44	49
1	E	212/212 (100%)	202 (95%)	10 (5%)	22	22
1	F	212/212 (100%)	208 (98%)	4 (2%)	52	59
1	G	200/212 (94%)	194 (97%)	6 (3%)	36	40
1	H	210/212 (99%)	206 (98%)	4 (2%)	52	59
1	I	207/212 (98%)	205 (99%)	2 (1%)	73	79

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	J	209/212 (99%)	205 (98%)	4 (2%)	52 59
All	All	2085/2120 (98%)	2040 (98%)	45 (2%)	48 53

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	PHE
1	A	274	SER
1	B	51	ARG
1	B	52	THR
1	B	122	PHE
1	B	274	SER
1	C	47	ASN
1	C	50	ARG
1	C	122	PHE
1	C	274	SER
1	D	46	SER
1	D	50	ARG
1	D	51	ARG
1	D	122	PHE
1	D	274	SER
1	E	9	ASP
1	E	35	LEU
1	E	36	SER
1	E	45	HIS
1	E	46	SER
1	E	47	ASN
1	E	122	PHE
1	E	126[A]	MET
1	E	126[B]	MET
1	E	274	SER
1	F	45	HIS
1	F	46	SER
1	F	122	PHE
1	F	274	SER
1	G	51	ARG
1	G	90	LYS
1	G	91	LEU
1	G	92	LYS
1	G	122	PHE
1	G	274	SER
1	H	45	HIS

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Mol	Chain	Res	Type
1	H	52	THR
1	H	122	PHE
1	H	274	SER
1	I	122	PHE
1	I	274	SER
1	J	31	ARG
1	J	45	HIS
1	J	122	PHE
1	J	274	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	45	HIS
1	H	45	HIS
1	J	45	HIS

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](#)

10 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	PRO	H	301	-	8,8,8	0.80	0	10,10,10	1.09	0
2	PRO	D	301	-	8,8,8	0.79	0	10,10,10	1.16	0
2	PRO	G	301	-	8,8,8	0.78	0	10,10,10	1.08	0
2	PRO	C	301	-	8,8,8	0.92	0	10,10,10	1.11	0
2	PRO	I	301	-	8,8,8	0.81	0	10,10,10	1.08	0
2	PRO	J	301	-	8,8,8	0.93	1 (12%)	10,10,10	1.14	0
2	PRO	B	301	-	8,8,8	0.94	1 (12%)	10,10,10	1.20	0
2	PRO	F	301	-	8,8,8	0.73	0	10,10,10	1.10	0
2	PRO	E	301	-	8,8,8	0.96	1 (12%)	10,10,10	1.07	0
2	PRO	A	301	-	8,8,8	0.95	1 (12%)	10,10,10	1.18	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
2	PRO	H	301	-	-	0/4/11/11	0/1/1/1
2	PRO	D	301	-	-	0/4/11/11	0/1/1/1
2	PRO	G	301	-	-	0/4/11/11	0/1/1/1
2	PRO	C	301	-	-	2/4/11/11	0/1/1/1
2	PRO	I	301	-	-	0/4/11/11	0/1/1/1
2	PRO	J	301	-	-	2/4/11/11	0/1/1/1
2	PRO	B	301	-	-	2/4/11/11	0/1/1/1
2	PRO	F	301	-	-	0/4/11/11	0/1/1/1
2	PRO	E	301	-	-	2/4/11/11	0/1/1/1
2	PRO	A	301	-	-	4/4/11/11	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	301	PRO	O-C	2.17	1.28	1.22
2	B	301	PRO	O-C	2.16	1.28	1.22
2	J	301	PRO	O-C	2.09	1.28	1.22
2	A	301	PRO	O-C	2.04	1.28	1.22

There are no bond angle outliers.

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301	PRO	OXT-C-CA-CB
2	J	301	PRO	O-C-CA-CB
2	A	301	PRO	O-C-CA-CB
2	A	301	PRO	OXT-C-CA-CB
2	B	301	PRO	O-C-CA-CB
2	C	301	PRO	OXT-C-CA-CB
2	J	301	PRO	OXT-C-CA-CB
2	E	301	PRO	OXT-C-CA-CB
2	A	301	PRO	O-C-CA-N
2	A	301	PRO	OXT-C-CA-N
2	C	301	PRO	O-C-CA-CB
2	E	301	PRO	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

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, 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	272/277 (98%)	0.09	9 (3%) 49 51	21, 55, 85, 125	3 (1%)
1	B	272/277 (98%)	0.32	12 (4%) 39 42	22, 67, 109, 142	4 (1%)
1	C	268/277 (96%)	0.34	12 (4%) 39 41	22, 65, 111, 146	2 (0%)
1	D	268/277 (96%)	0.65	37 (13%) 8 8	22, 84, 145, 157	2 (0%)
1	E	272/277 (98%)	0.16	12 (4%) 39 42	21, 55, 89, 115	4 (1%)
1	F	272/277 (98%)	0.10	7 (2%) 57 59	22, 59, 95, 132	4 (1%)
1	G	263/277 (94%)	0.98	63 (23%) 2 2	26, 93, 175, 246	1 (0%)
1	H	272/277 (98%)	0.31	12 (4%) 39 42	24, 66, 112, 167	2 (0%)
1	I	270/277 (97%)	0.57	17 (6%) 27 29	23, 76, 129, 154	1 (0%)
1	J	271/277 (97%)	0.66	23 (8%) 18 19	28, 80, 130, 163	2 (0%)
All	All	2700/2770 (97%)	0.42	204 (7%) 21 23	21, 65, 134, 246	25 (0%)

All (204) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	8	ALA	5.3
1	G	88	VAL	5.3
1	I	5	PRO	5.1
1	G	95	LEU	5.0
1	D	43	ALA	4.9
1	G	93	PRO	4.9
1	G	94	LEU	4.7
1	G	54	PHE	4.6
1	J	59	ILE	4.5
1	J	49	ALA	4.3
1	D	8	ALA	4.3
1	G	7	PRO	4.2
1	G	145	ALA	4.1

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Mol	Chain	Res	Type	RSRZ
1	D	5	PRO	4.0
1	C	49	ALA	4.0
1	E	106	ALA	4.0
1	B	158	PHE	4.0
1	B	157	LEU	4.0
1	G	34	VAL	3.9
1	E	4	ILE	3.9
1	A	52	THR	3.9
1	G	53	ALA	3.8
1	J	52	THR	3.8
1	G	43	ALA	3.8
1	G	119	HIS	3.7
1	J	53	ALA	3.6
1	J	4	ILE	3.6
1	B	4	ILE	3.6
1	G	49	ALA	3.6
1	D	145	ALA	3.5
1	C	7	PRO	3.5
1	G	68	VAL	3.5
1	G	274	SER	3.4
1	G	113	LEU	3.4
1	J	13	LEU	3.4
1	D	53	ALA	3.4
1	G	64	SER	3.4
1	D	89	LEU	3.3
1	H	4	ILE	3.3
1	H	52	THR	3.3
1	G	16	ILE	3.3
1	C	5	PRO	3.2
1	D	7	PRO	3.2
1	G	100	LEU	3.2
1	G	116	TRP	3.2
1	H	60	THR	3.2
1	J	7	PRO	3.2
1	C	43	ALA	3.2
1	G	146	ALA	3.2
1	I	38	SER	3.1
1	H	53	ALA	3.1
1	G	81	PRO	3.1
1	J	48	PRO	3.1
1	J	164	ILE	3.1
1	J	10	SER	3.1

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Mol	Chain	Res	Type	RSRZ
1	J	68	VAL	3.1
1	B	7	PRO	3.1
1	G	83	LEU	3.0
1	C	48	PRO	3.0
1	I	145	ALA	3.0
1	D	274	SER	2.9
1	G	11	TYR	2.9
1	J	11	TYR	2.9
1	G	69	VAL	2.9
1	E	3	ILE	2.9
1	D	94	LEU	2.8
1	G	87	VAL	2.8
1	G	91	LEU	2.8
1	F	53	ALA	2.8
1	G	107	GLY	2.8
1	G	71	ASP	2.8
1	D	68	VAL	2.8
1	C	6	ILE	2.8
1	G	161	ILE	2.8
1	G	18	ALA	2.8
1	C	52	THR	2.8
1	E	62	LEU	2.7
1	G	62	LEU	2.7
1	G	153	LEU	2.7
1	G	117	ALA	2.7
1	I	117	ALA	2.7
1	G	77	PHE	2.7
1	D	108	ILE	2.7
1	G	59	ILE	2.7
1	H	3	ILE	2.7
1	D	61	VAL	2.7
1	G	126	MET	2.7
1	D	59	ILE	2.7
1	I	97	LYS	2.7
1	G	105	ALA	2.7
1	D	156	GLN	2.7
1	I	17	GLY	2.6
1	F	4	ILE	2.6
1	H	57	ILE	2.6
1	G	17	GLY	2.6
1	D	35	LEU	2.6
1	G	108	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
1	J	6	ILE	2.6
1	J	57	ILE	2.6
1	G	144	GLY	2.5
1	I	42	THR	2.5
1	I	57	ILE	2.5
1	G	97	LYS	2.5
1	I	101	LEU	2.5
1	H	93	PRO	2.4
1	E	63	SER	2.4
1	G	99	LYS	2.4
1	D	118	GLY	2.4
1	A	53	ALA	2.4
1	D	93	PRO	2.4
1	F	274	SER	2.4
1	J	154	ILE	2.4
1	D	159	GLY	2.4
1	B	52	THR	2.4
1	J	61	VAL	2.4
1	E	158	PHE	2.4
1	A	44	ILE	2.4
1	H	59	ILE	2.4
1	B	35	LEU	2.4
1	D	153	LEU	2.4
1	C	148	GLU	2.4
1	A	49	ALA	2.4
1	B	43	ALA	2.4
1	G	118	GLY	2.4
1	G	169	ASP	2.4
1	D	57	ILE	2.4
1	H	40	ILE	2.4
1	I	40	ILE	2.4
1	D	58	GLY	2.3
1	F	3	ILE	2.3
1	A	89	LEU	2.3
1	C	53	ALA	2.3
1	J	145	ALA	2.3
1	G	10	SER	2.3
1	B	6	ILE	2.3
1	D	6	ILE	2.3
1	A	47	ASN	2.3
1	F	45	HIS	2.3
1	I	35	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	J	91	LEU	2.3
1	G	106	ALA	2.3
1	A	63	SER	2.3
1	D	37	PRO	2.3
1	G	74	VAL	2.3
1	C	226	GLY	2.3
1	G	65	ASN	2.3
1	G	151	ALA	2.3
1	H	61	VAL	2.2
1	I	90	LYS	2.2
1	D	39	ARG	2.2
1	C	94	LEU	2.2
1	H	43	ALA	2.2
1	E	5	PRO	2.2
1	E	40	ILE	2.2
1	E	44	ILE	2.2
1	A	94	LEU	2.2
1	E	42	THR	2.2
1	G	12	THR	2.2
1	C	97	LYS	2.2
1	G	111	LYS	2.2
1	I	113	LEU	2.1
1	A	274	SER	2.1
1	D	155	SER	2.1
1	D	17	GLY	2.1
1	G	33	GLY	2.1
1	D	102	VAL	2.1
1	D	54	PHE	2.1
1	I	62	LEU	2.1
1	J	62	LEU	2.1
1	B	9	ASP	2.1
1	D	63	SER	2.1
1	B	49	ALA	2.1
1	D	18	ALA	2.1
1	H	8	ALA	2.1
1	D	116	TRP	2.1
1	D	119	HIS	2.1
1	I	156	GLN	2.1
1	D	88	VAL	2.1
1	G	35	LEU	2.1
1	G	42	THR	2.1
1	G	57	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	G	63	SER	2.1
1	G	123	ILE	2.1
1	J	94	LEU	2.1
1	D	106	ALA	2.1
1	F	18	ALA	2.1
1	D	30	VAL	2.1
1	D	69	VAL	2.1
1	B	32	SER	2.1
1	G	157	LEU	2.1
1	J	158	PHE	2.1
1	G	79	VAL	2.0
1	E	32	SER	2.0
1	J	24	SER	2.0
1	E	153	LEU	2.0
1	G	52	THR	2.0
1	G	82	GLN	2.0
1	G	15	PHE	2.0
1	I	118	GLY	2.0
1	J	33	GLY	2.0
1	F	174	ALA	2.0
1	B	125	VAL	2.0
1	I	102	VAL	2.0
1	D	71	ASP	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 monosaccharides 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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	PRO	F	301	8/8	0.73	0.25	52,94,106,109	0
2	PRO	B	301	8/8	0.79	0.21	44,74,87,93	0
2	PRO	G	301	8/8	0.79	0.22	48,91,93,96	0
2	PRO	H	301	8/8	0.84	0.15	51,78,82,85	0
2	PRO	D	301	8/8	0.85	0.14	47,64,66,68	0
2	PRO	I	301	8/8	0.85	0.14	50,80,88,90	0
2	PRO	E	301	8/8	0.86	0.21	46,81,90,94	0
2	PRO	C	301	8/8	0.87	0.13	49,68,74,75	0
2	PRO	A	301	8/8	0.88	0.13	49,77,83,83	0
2	PRO	J	301	8/8	0.88	0.19	53,76,85,91	0

6.5 Other polymers [i](#)

There are no such residues in this entry.