



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 23, 2023 – 04:21 PM EST

PDB ID : 3CSW
Title : Crystal structure of a putative branched-chain amino acid aminotransferase (TM0831) from *Thermotoga maritima* at 2.15 Å resolution
Authors : Joint Center for Structural Genomics (JCSG)
Deposited on : 2008-04-10
Resolution : 2.15 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.31.2
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) : 2.31.2

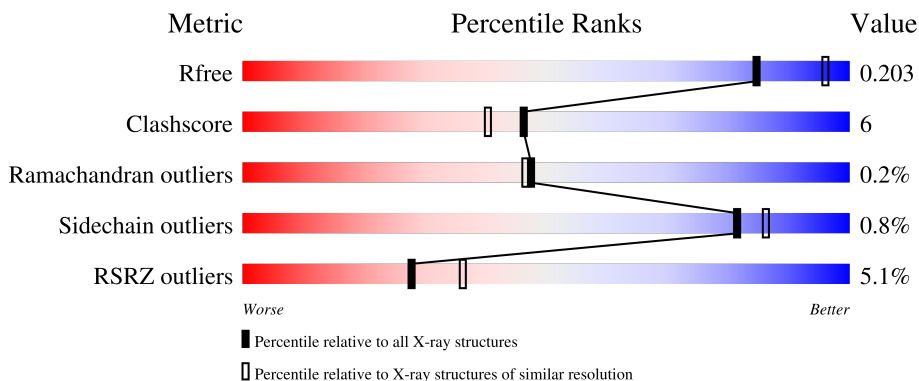
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 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	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

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	285	 5% 85% 11% .
1	B	285	 2% 88% 8% .
1	C	285	 8% 86% 10% .
1	D	285	 5% 87% 9% .

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
3	UNL	A	301	-	-	X	-
3	UNL	C	301	-	-	X	-
3	UNL	D	275	-	-	X	-
5	MPD	A	303	-	-	X	-

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 9636 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 Putative branched-chain-amino-acid aminotransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	274	2222	1449	360	409	2	2	0	7	0
1	B	274	2246	1465	366	411	2	2	0	8	0
1	C	275	2216	1444	362	406	2	2	0	6	0
1	D	274	2186	1422	357	403	2	2	0	3	0

There are 52 discrepancies between the modelled and reference sequences:

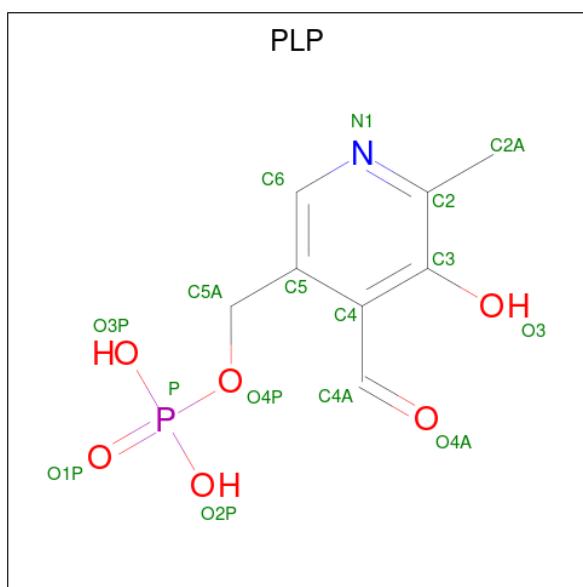
Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MSE	-	expression tag	UNP P74921
A	-10	GLY	-	expression tag	UNP P74921
A	-9	SER	-	expression tag	UNP P74921
A	-8	ASP	-	expression tag	UNP P74921
A	-7	LYS	-	expression tag	UNP P74921
A	-6	ILE	-	expression tag	UNP P74921
A	-5	HIS	-	expression tag	UNP P74921
A	-4	HIS	-	expression tag	UNP P74921
A	-3	HIS	-	expression tag	UNP P74921
A	-2	HIS	-	expression tag	UNP P74921
A	-1	HIS	-	expression tag	UNP P74921
A	0	HIS	-	expression tag	UNP P74921
A	1	VAL	-	SEE REMARK 999	UNP P74921
B	-11	MSE	-	expression tag	UNP P74921
B	-10	GLY	-	expression tag	UNP P74921
B	-9	SER	-	expression tag	UNP P74921
B	-8	ASP	-	expression tag	UNP P74921
B	-7	LYS	-	expression tag	UNP P74921
B	-6	ILE	-	expression tag	UNP P74921
B	-5	HIS	-	expression tag	UNP P74921
B	-4	HIS	-	expression tag	UNP P74921

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	HIS	-	expression tag	UNP P74921
B	-2	HIS	-	expression tag	UNP P74921
B	-1	HIS	-	expression tag	UNP P74921
B	0	HIS	-	expression tag	UNP P74921
B	1	VAL	-	SEE REMARK 999	UNP P74921
C	-11	MSE	-	expression tag	UNP P74921
C	-10	GLY	-	expression tag	UNP P74921
C	-9	SER	-	expression tag	UNP P74921
C	-8	ASP	-	expression tag	UNP P74921
C	-7	LYS	-	expression tag	UNP P74921
C	-6	ILE	-	expression tag	UNP P74921
C	-5	HIS	-	expression tag	UNP P74921
C	-4	HIS	-	expression tag	UNP P74921
C	-3	HIS	-	expression tag	UNP P74921
C	-2	HIS	-	expression tag	UNP P74921
C	-1	HIS	-	expression tag	UNP P74921
C	0	HIS	-	expression tag	UNP P74921
C	1	VAL	-	SEE REMARK 999	UNP P74921
D	-11	MSE	-	expression tag	UNP P74921
D	-10	GLY	-	expression tag	UNP P74921
D	-9	SER	-	expression tag	UNP P74921
D	-8	ASP	-	expression tag	UNP P74921
D	-7	LYS	-	expression tag	UNP P74921
D	-6	ILE	-	expression tag	UNP P74921
D	-5	HIS	-	expression tag	UNP P74921
D	-4	HIS	-	expression tag	UNP P74921
D	-3	HIS	-	expression tag	UNP P74921
D	-2	HIS	-	expression tag	UNP P74921
D	-1	HIS	-	expression tag	UNP P74921
D	0	HIS	-	expression tag	UNP P74921
D	1	VAL	-	SEE REMARK 999	UNP P74921

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C₈H₁₀NO₆P).

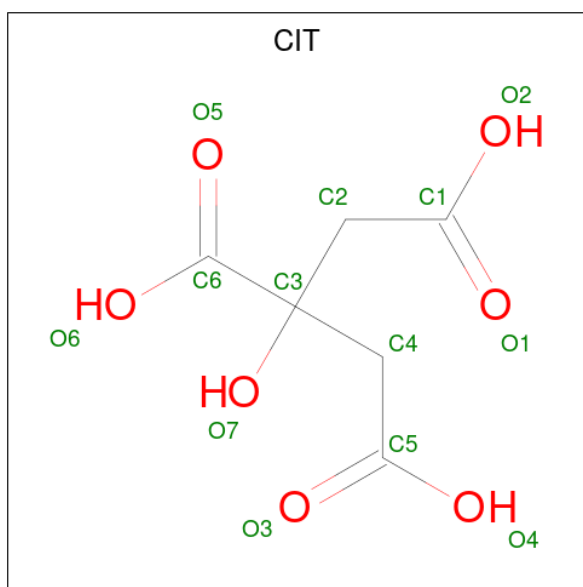


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	16	8	1	6	1	0	0
2	C	1	16	8	1	6	1	0	0

- Molecule 3 is UNKNOWN LIGAND (three-letter code: UNL) (formula:).

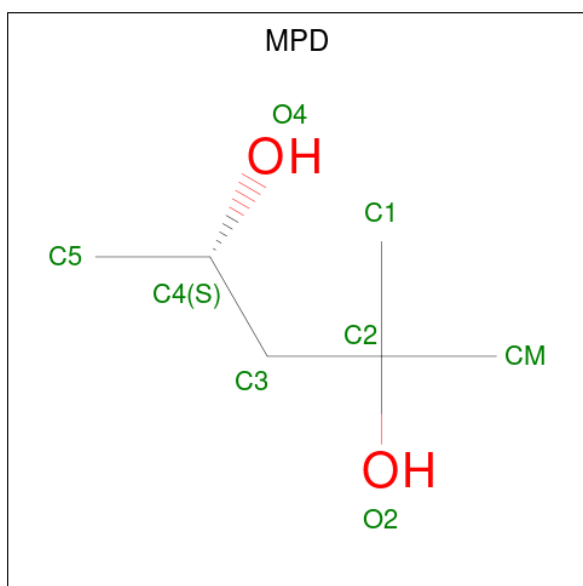
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	O	0	0
			4	4		
3	B	1	Total	O	0	0
			2	2		
3	C	1	Total	O	0	0
			4	4		
3	D	1	Total	O	0	0
			6	6		

- Molecule 4 is CITRIC ACID (three-letter code: CIT) (formula: C₆H₈O₇).



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

- Molecule 5 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 8 6 2	0	0
5	A	1	Total C O 8 6 2	0	0
5	B	1	Total C O 8 6 2	0	0
5	B	1	Total C O 6 5 1	0	0
5	C	1	Total C O 8 6 2	0	0
5	C	1	Total C O 8 6 2	0	0
5	D	1	Total C O 8 6 2	0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	2	Total Cl 2 2	0	0
6	C	1	Total Cl 1 1	0	0
6	D	1	Total Cl 1 1	0	0

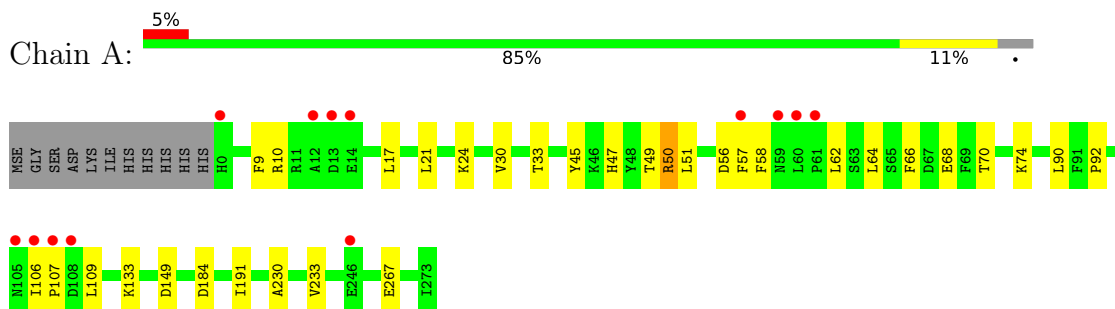
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	150	Total O 150 150	0	0
7	B	139	Total O 139 139	0	0
7	C	178	Total O 178 178	0	0
7	D	154	Total O 154 154	0	0

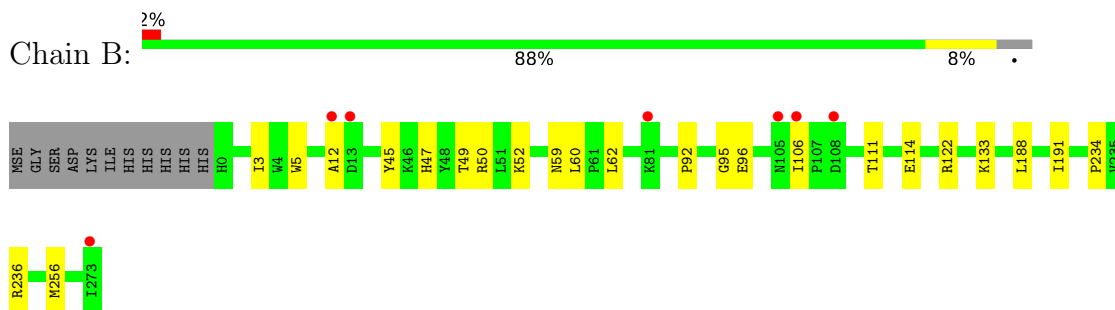
3 Residue-property plots [i](#)

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.

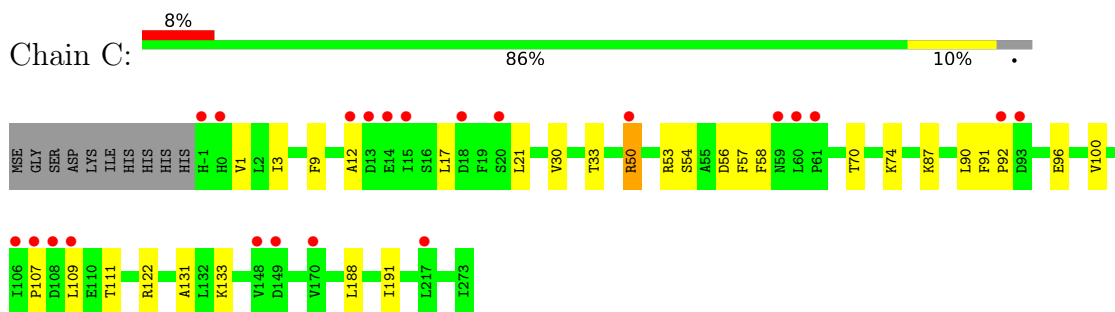
- Molecule 1: Putative branched-chain-amino-acid aminotransferase



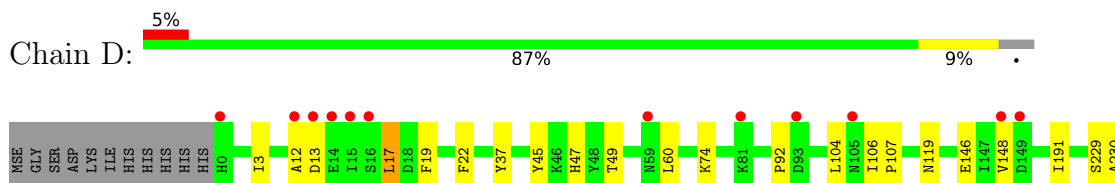
- Molecule 1: Putative branched-chain-amino-acid aminotransferase

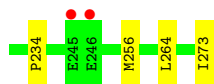


- Molecule 1: Putative branched-chain-amino-acid aminotransferase



- Molecule 1: Putative branched-chain-amino-acid aminotransferase





4 Data and refinement statistics

Property	Value	Source
Space group	I 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	107.71Å 129.76Å 298.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.75 – 2.15 29.75 – 2.15	Depositor EDS
% Data completeness (in resolution range)	98.6 (29.75-2.15) 98.7 (29.75-2.15)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.88 (at 2.16Å)	Xtrriage
Refinement program	REFMAC 5.2.0019, PHENIX	Depositor
R, R_{free}	0.167 , 0.200 0.171 , 0.203	Depositor DCC
R_{free} test set	5612 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	35.9	Xtrriage
Anisotropy	0.222	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 58.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9636	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.05% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MPD, PLP, CIT, UNL, CL

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	0.60	0/2293	0.71	0/3114
1	B	0.60	0/2314	0.74	1/3138 (0.0%)
1	C	0.68	0/2284	0.74	1/3101 (0.0%)
1	D	0.66	0/2251	0.74	2/3057 (0.1%)
All	All	0.64	0/9142	0.73	4/12410 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	122	ARG	NE-CZ-NH1	5.73	123.16	120.30
1	D	148[A]	VAL	CB-CA-C	-5.17	101.57	111.40
1	D	148[B]	VAL	CB-CA-C	-5.17	101.57	111.40
1	C	122	ARG	NE-CZ-NH1	5.08	122.84	120.30

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	2222	0	2229	26	1
1	B	2246	0	2267	16	0
1	C	2216	0	2213	30	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2186	0	2153	18	0
2	A	16	0	8	1	0
2	C	16	0	8	3	0
3	A	4	0	0	6	0
3	B	2	0	0	1	0
3	C	4	0	0	3	0
3	D	6	0	0	7	0
4	A	13	0	5	0	0
4	B	13	0	5	0	0
4	D	13	0	5	0	0
5	A	16	0	28	7	0
5	B	14	0	23	3	0
5	C	16	0	28	4	0
5	D	8	0	14	0	0
6	B	2	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	150	0	0	0	0
7	B	139	0	0	0	0
7	C	178	0	0	0	0
7	D	154	0	0	0	0
All	All	9636	0	8986	113	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 6.

All (113) 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)
5:A:303:MPD:H11	5:A:303:MPD:H52	1.08	1.06
3:C:301:UNL:O2	3:C:301:UNL:O3	1.77	1.03
5:A:303:MPD:H11	5:A:303:MPD:C5	1.92	0.99
3:D:275:UNL:O1	3:D:275:UNL:O4	1.81	0.98
1:A:33[B]:THR:HG21	3:A:301:UNL:O3	1.66	0.95
5:A:303:MPD:H52	5:A:303:MPD:C1	1.97	0.94
1:D:60:LEU:HD22	1:D:92:PRO:O	1.70	0.92
3:A:301:UNL:O1	3:A:301:UNL:O2	1.88	0.91
5:C:302:MPD:H52	5:C:302:MPD:H12	1.57	0.86
1:B:114[B]:GLU:OE2	1:B:236[B]:ARG:NH1	2.13	0.81
3:C:301:UNL:O3	3:C:301:UNL:O4	2.06	0.73
3:D:275:UNL:O2	3:D:275:UNL:O6	2.08	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:50[B]:ARG:HG3	1:C:53[B]:ARG:HH12	1.53	0.71
1:D:3:ILE:HG23	1:D:12:ALA:HB2	1.74	0.69
1:C:17:LEU:HD12	1:C:21:LEU:HD22	1.74	0.69
1:A:106:ILE:HD11	1:A:230:ALA:HB2	1.76	0.68
1:D:106:ILE:HD11	1:D:230:ALA:HB2	1.78	0.66
3:D:275:UNL:O6	3:D:275:UNL:O5	2.14	0.66
1:C:33[A]:THR:HG22	1:C:87:LYS:HG2	1.78	0.65
3:D:275:UNL:O1	3:D:275:UNL:O2	2.15	0.64
1:A:17:LEU:HD12	1:A:21:LEU:HD22	1.80	0.64
1:C:70:THR:O	1:C:74:LYS:HG3	1.98	0.64
1:C:50[B]:ARG:HG3	1:C:53[B]:ARG:NH1	2.13	0.63
5:C:303:MPD:O4	5:C:303:MPD:H11	1.97	0.63
1:B:47:HIS:CE1	1:B:191[B]:ILE:HD12	2.34	0.63
1:C:50[B]:ARG:CG	1:C:53[B]:ARG:NH1	2.63	0.62
1:C:133:LYS:NZ	2:C:300:PLP:H4A	2.13	0.62
3:A:301:UNL:O3	3:A:301:UNL:O1	2.18	0.61
1:C:50[B]:ARG:CG	1:C:53[B]:ARG:HH12	2.14	0.60
1:C:50[B]:ARG:HD2	1:C:191:ILE:HD11	1.83	0.60
1:D:47:HIS:CE1	1:D:191:ILE:HD12	2.37	0.60
1:C:17:LEU:HD12	1:C:21:LEU:CD2	2.32	0.59
3:A:301:UNL:O3	3:A:301:UNL:O4	2.21	0.59
3:C:301:UNL:O2	3:C:301:UNL:O4	2.20	0.59
1:D:106:ILE:HD12	1:D:107:PRO:HD2	1.83	0.59
1:A:33[B]:THR:CG2	3:A:301:UNL:O3	2.47	0.59
3:D:275:UNL:O6	3:D:275:UNL:O3	2.21	0.58
1:B:45:TYR:O	1:B:49:THR:HG23	2.03	0.58
1:B:5:TRP:CH2	1:B:96:GLU:HG2	2.39	0.57
1:D:104:LEU:HD11	1:D:229:SER:HB2	1.87	0.57
1:D:17:LEU:HD13	1:D:22:PHE:HB2	1.86	0.56
1:D:60:LEU:CD2	1:D:92:PRO:O	2.51	0.56
1:A:184:ASP:O	5:A:303:MPD:H51	2.07	0.55
1:C:30[B]:VAL:HG23	1:C:90:LEU:HB3	1.87	0.55
1:C:56:ASP:C	1:C:58:PHE:H	2.10	0.55
1:C:131:ALA:HA	1:C:188:LEU:HD12	1.88	0.54
1:B:47:HIS:ND1	1:B:191[B]:ILE:HD12	2.22	0.54
1:A:106:ILE:HD11	1:A:230:ALA:CB	2.37	0.54
1:C:133:LYS:HZ3	2:C:300:PLP:H4A	1.71	0.54
1:A:30[B]:VAL:HG23	1:A:90:LEU:HB3	1.91	0.53
1:C:111:THR:O	1:C:111:THR:CG2	2.55	0.53
1:C:17:LEU:HD21	1:D:17:LEU:HD11	1.91	0.53
5:B:278:MPD:O2	5:B:278:MPD:H52	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1:VAL:HG12	1:C:12:ALA:HB2	1.91	0.52
1:A:17:LEU:HD12	1:A:21:LEU:CD2	2.39	0.52
1:C:100:VAL:HG21	1:D:19:PHE:HZ	1.75	0.52
1:C:133:LYS:NZ	2:C:300:PLP:C4A	2.73	0.52
1:B:114[B]:GLU:CD	1:B:236[B]:ARG:NH1	2.63	0.51
1:A:64:LEU:HD22	1:A:68:GLU:CB	2.41	0.51
5:A:303:MPD:H53	5:A:303:MPD:HM2	1.92	0.51
3:B:276:UNL:O1	3:B:276:UNL:O2	2.29	0.50
5:C:303:MPD:O4	5:C:303:MPD:C1	2.60	0.50
1:B:50:ARG:NH1	1:B:191[A]:ILE:HD13	2.27	0.49
1:A:66:PHE:O	1:A:70:THR:HG23	2.13	0.49
1:C:30[B]:VAL:CG2	1:C:90:LEU:HD23	2.44	0.48
1:C:50[B]:ARG:HG2	1:C:53[B]:ARG:NH1	2.29	0.48
1:A:133:LYS:NZ	2:A:300:PLP:H4A	2.28	0.47
1:A:106:ILE:HD12	1:A:107:PRO:HD2	1.96	0.47
1:A:30[A]:VAL:HG12	1:A:51:LEU:HD12	1.97	0.47
1:A:109:LEU:HD13	1:A:233:VAL:HG13	1.97	0.47
1:A:47:HIS:CE1	1:A:191:ILE:HD12	2.50	0.47
5:C:302:MPD:H12	5:C:302:MPD:C5	2.37	0.46
1:B:59:ASN:HA	5:B:278:MPD:H13	1.97	0.46
1:B:114[B]:GLU:OE2	1:B:236[B]:ARG:CZ	2.63	0.46
1:C:30[B]:VAL:HG21	1:C:90:LEU:HD23	1.99	0.45
1:A:64:LEU:HD22	1:A:68:GLU:HB2	1.99	0.45
1:B:133:LYS:HG2	1:B:188:LEU:HD22	1.98	0.45
1:A:50[B]:ARG:HD2	1:A:191:ILE:HD11	1.99	0.45
1:A:64:LEU:HD22	1:A:68:GLU:HB3	1.99	0.44
1:D:45:TYR:O	1:D:49:THR:HG23	2.17	0.44
1:C:30[A]:VAL:HG13	1:C:54:SER:HB3	2.00	0.44
1:C:111:THR:O	1:C:111:THR:HG22	2.17	0.44
1:A:107:PRO:HG2	1:A:109:LEU:HD21	2.00	0.44
1:A:30[B]:VAL:CG2	1:A:90:LEU:HB3	2.47	0.44
1:C:30[B]:VAL:CG2	1:C:90:LEU:HB3	2.47	0.44
5:A:303:MPD:C5	5:A:303:MPD:C1	2.67	0.44
1:B:106:ILE:O	1:B:106:ILE:HG23	2.17	0.43
1:D:229:SER:OG	3:D:275:UNL:O4	2.33	0.43
1:C:91:PHE:HA	1:C:92:PRO:HD3	1.93	0.43
1:D:37:TYR:CG	1:D:264:LEU:HD21	2.54	0.42
1:C:56:ASP:C	1:C:58:PHE:N	2.72	0.42
1:C:107:PRO:HG2	1:C:109:LEU:HD21	2.00	0.42
1:A:56:ASP:C	1:A:58:PHE:H	2.22	0.42
1:D:17:LEU:CD1	1:D:22:PHE:HB2	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:LYS:HB2	1:B:62[A]:LEU:HD11	2.02	0.42
1:B:234:PRO:HG3	1:B:256:MSE:SE	2.70	0.42
1:A:24:LYS:HG3	1:A:92:PRO:HG2	2.01	0.41
1:A:9:PHE:C	1:A:10:ARG:HG3	2.41	0.41
1:A:45:TYR:O	1:A:49:THR:HG23	2.20	0.41
1:A:70:THR:O	1:A:74:LYS:HG3	2.19	0.41
3:D:275:UNL:O4	3:D:275:UNL:O6	2.39	0.41
1:D:119:ASN:HB2	1:D:146:GLU:OE2	2.20	0.41
3:A:301:UNL:O2	3:A:301:UNL:O4	2.38	0.41
1:B:3:ILE:HG23	1:B:12:ALA:HB2	2.03	0.41
5:A:304:MPD:HM3	5:A:304:MPD:H4	1.94	0.41
1:D:74:LYS:NZ	1:D:273:ILE:O	2.54	0.41
1:A:149:ASP:HB3	1:C:9:PHE:CD2	2.56	0.41
1:B:60:LEU:HD22	1:B:92:PRO:HA	2.02	0.40
1:D:3:ILE:CG2	1:D:12:ALA:HB2	2.48	0.40
5:B:278:MPD:O2	5:B:278:MPD:C5	2.69	0.40
1:B:60:LEU:HD11	1:B:95:GLY:HA2	2.02	0.40
1:C:133:LYS:HG3	1:C:188:LEU:HD11	2.04	0.40
1:D:234:PRO:HG3	1:D:256:MSE:SE	2.72	0.40

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:A:267:GLU:OE1	1:A:267:GLU:OE1[7_555]	2.09	0.11

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	279/285 (98%)	266 (95%)	12 (4%)	1 (0%)	34 29

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	280/285 (98%)	270 (96%)	10 (4%)	0	100	100
1	C	279/285 (98%)	267 (96%)	11 (4%)	1 (0%)	34	29
1	D	275/285 (96%)	262 (95%)	13 (5%)	0	100	100
All	All	1113/1140 (98%)	1065 (96%)	46 (4%)	2 (0%)	47	46

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	57	PHE
1	A	57	PHE

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	245/252 (97%)	242 (99%)	3 (1%)	71	76
1	B	248/252 (98%)	247 (100%)	1 (0%)	91	93
1	C	241/252 (96%)	237 (98%)	4 (2%)	60	65
1	D	237/252 (94%)	235 (99%)	2 (1%)	81	86
All	All	971/1008 (96%)	961 (99%)	10 (1%)	81	81

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50[A]	ARG
1	A	50[B]	ARG
1	A	62	LEU
1	B	111	THR
1	C	3	ILE
1	C	50[A]	ARG
1	C	50[B]	ARG
1	C	96	GLU
1	D	13	ASP

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Mol	Chain	Res	Type
1	D	17	LEU

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

Mol	Chain	Res	Type
1	B	27	GLN
1	C	159	ASN
1	D	27	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 20 ligands modelled in this entry, 4 are unknown and 4 are monoatomic - leaving 12 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	$\# Z > 2$
5	MPD	B	278	-	7,7,7	0.46	0	9,10,10	0.83	0
4	CIT	D	276	-	12,12,12	1.01	0	17,17,17	1.58	4 (23%)
5	MPD	B	279	-	5,5,7	0.36	0	4,7,10	0.48	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	CIT	B	277	-	12,12,12	1.42	1 (8%)	17,17,17	1.91	3 (17%)
2	PLP	C	300	-	16,16,16	1.68	4 (25%)	20,23,23	1.15	2 (10%)
5	MPD	D	277	-	7,7,7	0.30	0	9,10,10	0.93	0
5	MPD	C	303	-	7,7,7	0.30	0	9,10,10	0.49	0
2	PLP	A	300	-	16,16,16	1.27	1 (6%)	20,23,23	1.04	1 (5%)
5	MPD	C	302	-	7,7,7	0.34	0	9,10,10	0.45	0
4	CIT	A	302	-	12,12,12	1.11	1 (8%)	17,17,17	1.56	2 (11%)
5	MPD	A	303	-	7,7,7	0.32	0	9,10,10	0.76	0
5	MPD	A	304	-	7,7,7	0.48	0	9,10,10	0.29	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
5	MPD	B	278	-	-	1/5/5/5	-
4	CIT	D	276	-	-	2/16/16/16	-
5	MPD	B	279	-	-	1/3/3/5	-
4	CIT	B	277	-	-	0/16/16/16	-
2	PLP	C	300	-	-	2/8/8/8	0/1/1/1
5	MPD	D	277	-	-	3/5/5/5	-
5	MPD	C	303	-	-	0/5/5/5	-
2	PLP	A	300	-	-	2/8/8/8	0/1/1/1
5	MPD	C	302	-	-	1/5/5/5	-
4	CIT	A	302	-	-	0/16/16/16	-
5	MPD	A	303	-	-	3/5/5/5	-
5	MPD	A	304	-	-	1/5/5/5	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	300	PLP	C2-N1	3.11	1.39	1.33
2	C	300	PLP	C3-C2	3.08	1.44	1.40
2	A	300	PLP	C2-N1	3.02	1.39	1.33
4	B	277	CIT	C3-C6	3.00	1.56	1.53
2	C	300	PLP	C6-N1	2.62	1.40	1.34
2	C	300	PLP	C4-C4A	2.60	1.52	1.46
4	A	302	CIT	O2-C1	-2.25	1.23	1.30

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	277	CIT	O6-C6-C3	6.07	123.59	113.05
4	A	302	CIT	O6-C6-C3	4.32	120.56	113.05
4	D	276	CIT	O6-C6-C3	3.95	119.92	113.05
4	B	277	CIT	O6-C6-O5	-2.79	114.94	123.82
4	D	276	CIT	O1-C1-C2	-2.55	115.50	122.94
4	A	302	CIT	O2-C1-O1	-2.26	117.67	123.30
2	A	300	PLP	O4A-C4A-C4	-2.24	120.04	124.91
2	C	300	PLP	O3-C3-C2	2.14	122.16	117.49
4	D	276	CIT	C4-C3-C2	-2.14	103.58	109.16
2	C	300	PLP	O4A-C4A-C4	-2.10	120.34	124.91
4	B	277	CIT	O7-C3-C6	2.03	111.71	108.86
4	D	276	CIT	O6-C6-O5	-2.01	117.44	123.82

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	300	PLP	C3-C4-C4A-O4A
2	A	300	PLP	C5-C4-C4A-O4A
2	C	300	PLP	C3-C4-C4A-O4A
2	C	300	PLP	C5-C4-C4A-O4A
5	A	303	MPD	C2-C3-C4-O4
5	A	303	MPD	C2-C3-C4-C5
5	D	277	MPD	O2-C2-C3-C4
5	D	277	MPD	CM-C2-C3-C4
5	D	277	MPD	C2-C3-C4-C5
5	A	304	MPD	C2-C3-C4-C5
5	B	279	MPD	O2-C2-C3-C4
5	A	303	MPD	O2-C2-C3-C4
5	B	278	MPD	C2-C3-C4-C5
5	C	302	MPD	C2-C3-C4-C5
4	D	276	CIT	O1-C1-C2-C3
4	D	276	CIT	O2-C1-C2-C3

There are no ring outliers.

7 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	278	MPD	3	0
2	C	300	PLP	3	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	303	MPD	2	0
2	A	300	PLP	1	0
5	C	302	MPD	2	0
5	A	303	MPD	6	0
5	A	304	MPD	1	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, 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	272/285 (95%)	-0.09	13 (4%) 30 39	25, 34, 70, 84	0
1	B	272/285 (95%)	-0.30	7 (2%) 56 64	25, 37, 59, 78	0
1	C	273/285 (95%)	-0.04	22 (8%) 12 16	25, 34, 71, 85	0
1	D	272/285 (95%)	-0.07	14 (5%) 28 36	24, 37, 60, 78	0
All	All	1089/1140 (95%)	-0.13	56 (5%) 28 36	24, 35, 67, 85	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	12	ALA	5.5
1	D	15	ILE	5.5
1	A	106	ILE	5.3
1	C	15	ILE	5.2
1	C	13	ASP	5.1
1	C	12	ALA	4.6
1	A	105	ASN	4.3
1	C	108	ASP	4.3
1	C	60	LEU	4.3
1	A	108	ASP	4.0
1	A	0	HIS	3.9
1	C	14	GLU	3.6
1	C	93	ASP	3.6
1	B	106	ILE	3.6
1	B	13	ASP	3.3
1	D	13	ASP	3.3
1	A	59	ASN	3.2
1	C	61	PRO	3.2
1	A	60	LEU	3.2
1	C	59	ASN	3.1
1	C	92	PRO	3.1

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Mol	Chain	Res	Type	RSRZ
1	D	16	SER	3.0
1	D	246	GLU	3.0
1	C	0	HIS	3.0
1	D	245	GLU	3.0
1	D	105	ASN	2.9
1	A	13	ASP	2.8
1	C	107	PRO	2.8
1	A	61	PRO	2.7
1	B	12	ALA	2.7
1	D	81	LYS	2.6
1	B	105	ASN	2.5
1	D	149[A]	ASP	2.5
1	C	106	ILE	2.4
1	C	149	ASP	2.4
1	A	14	GLU	2.4
1	B	81	LYS	2.4
1	C	109	LEU	2.4
1	C	50[A]	ARG	2.4
1	C	148	VAL	2.3
1	D	59	ASN	2.3
1	C	18	ASP	2.3
1	C	170	VAL	2.3
1	B	108	ASP	2.2
1	A	107	PRO	2.2
1	A	57	PHE	2.2
1	A	246	GLU	2.2
1	C	217	LEU	2.2
1	D	14	GLU	2.2
1	C	20	SER	2.2
1	D	93	ASP	2.2
1	D	0	HIS	2.1
1	D	148[A]	VAL	2.1
1	D	12	ALA	2.1
1	B	273	ILE	2.0
1	C	-1	HIS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	UNL	B	276	2/-	0.89	0.38	34,34,34,63	0
5	MPD	A	304	8/8	0.89	0.23	54,72,76,77	0
5	MPD	D	277	8/8	0.89	0.21	38,55,79,82	0
6	CL	B	275	1/1	0.90	0.07	70,70,70,70	0
5	MPD	C	302	8/8	0.91	0.27	61,68,68,72	0
6	CL	C	274	1/1	0.91	0.14	84,84,84,84	0
4	CIT	B	277	13/13	0.93	0.18	30,53,61,64	0
5	MPD	C	303	8/8	0.94	0.14	39,50,57,61	0
3	UNL	A	301	4/-	0.94	0.22	31,53,61,70	0
3	UNL	D	275	6/-	0.95	0.20	36,52,66,71	0
3	UNL	C	301	4/-	0.95	0.18	33,44,62,71	0
5	MPD	A	303	8/8	0.95	0.15	49,53,59,61	0
5	MPD	B	279	6/8	0.96	0.08	37,48,55,56	0
4	CIT	D	276	13/13	0.96	0.17	31,48,59,59	0
6	CL	D	274	1/1	0.96	0.14	48,48,48,48	0
5	MPD	B	278	8/8	0.97	0.12	48,54,61,65	0
6	CL	B	274	1/1	0.97	0.16	57,57,57,57	0
2	PLP	C	300	16/16	0.97	0.12	34,42,53,65	0
4	CIT	A	302	13/13	0.97	0.12	33,36,42,45	0
2	PLP	A	300	16/16	0.97	0.10	35,42,53,64	0

6.5 Other polymers [i](#)

There are no such residues in this entry.