



Full wwPDB X-ray Structure Validation Report ⓘ

May 25, 2020 – 06:00 am BST

PDB ID : 4EMY
Title : Crystal structure of aminotransferase from anaerococcus prevotii dsm 20548.
Authors : Chang, C.; Tesar, C.; Bearden, J.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2012-04-12
Resolution : 2.86 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 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 : 2.11
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) : 2.11

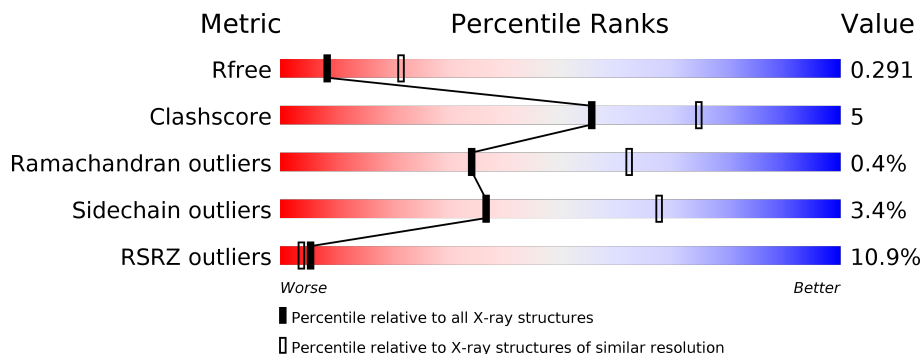
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.86 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	3168 (2.90-2.82)
Clashscore	141614	3438 (2.90-2.82)
Ramachandran outliers	138981	3348 (2.90-2.82)
Sidechain outliers	138945	3351 (2.90-2.82)
RSRZ outliers	127900	3103 (2.90-2.82)

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 ≥ 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	413	
1	B	413	
1	C	413	
1	D	413	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 13055 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 Aminotransferase class I and II.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	409	3249	2080	538	621	4	6	0	0	0
1	B	409	3249	2080	538	621	4	6	0	0	0
1	C	407	3230	2065	536	619	4	6	0	0	0
1	D	407	3235	2073	536	616	4	6	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	EXPRESSION TAG	UNP C7REB0
A	-1	ASN	-	EXPRESSION TAG	UNP C7REB0
A	0	ALA	-	EXPRESSION TAG	UNP C7REB0
B	-2	SER	-	EXPRESSION TAG	UNP C7REB0
B	-1	ASN	-	EXPRESSION TAG	UNP C7REB0
B	0	ALA	-	EXPRESSION TAG	UNP C7REB0
C	-2	SER	-	EXPRESSION TAG	UNP C7REB0
C	-1	ASN	-	EXPRESSION TAG	UNP C7REB0
C	0	ALA	-	EXPRESSION TAG	UNP C7REB0
D	-2	SER	-	EXPRESSION TAG	UNP C7REB0
D	-1	ASN	-	EXPRESSION TAG	UNP C7REB0
D	0	ALA	-	EXPRESSION TAG	UNP C7REB0

- 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	Total 16	8	1	6	1	0	0
2	B	1	Total 16	8	1	6	1	0	0
2	C	1	Total 16	8	1	6	1	0	0
2	D	1	Total 16	8	1	6	1	0	0

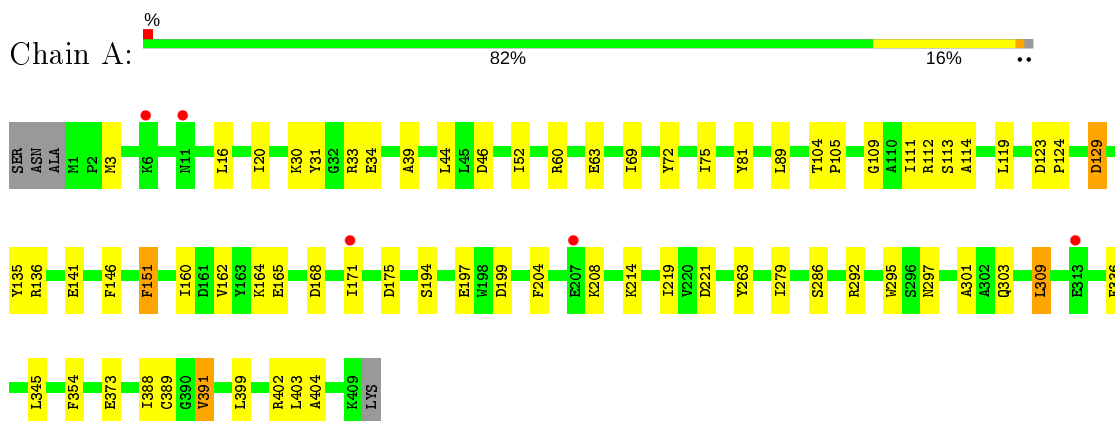
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	7	Total 7	7	0	0
3	B	10	Total 10	10	0	0
3	C	4	Total 4	4	0	0
3	D	7	Total 7	7	0	0

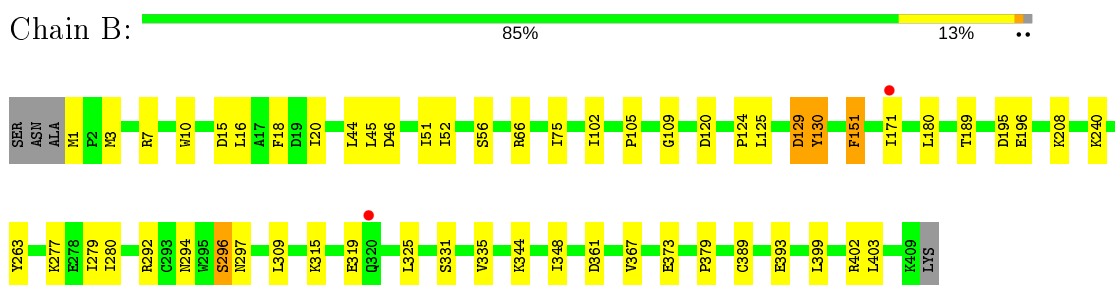
3 Residue-property plots [i](#)

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

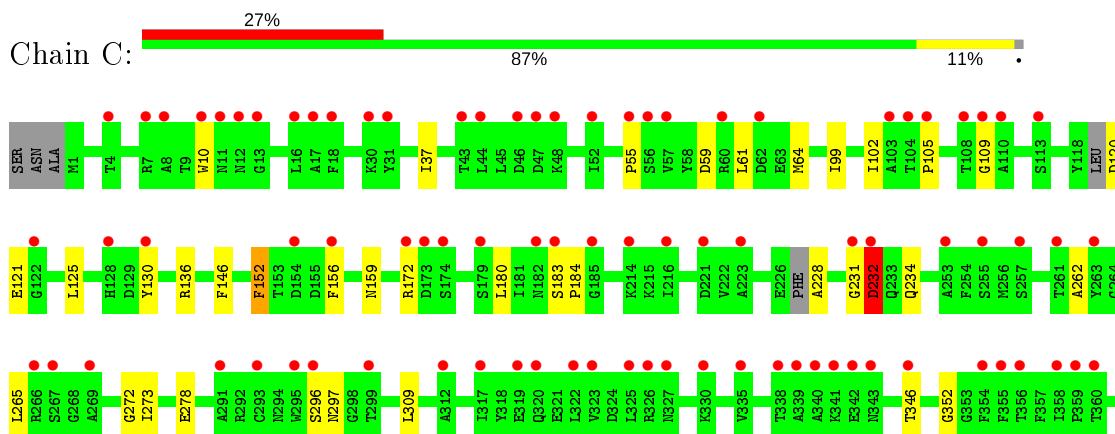
- Molecule 1: Aminotransferase class I and II

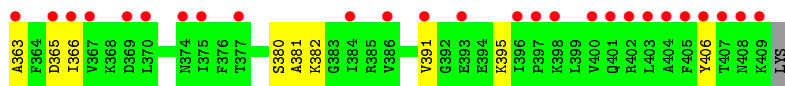


- Molecule 1: Aminotransferase class I and II

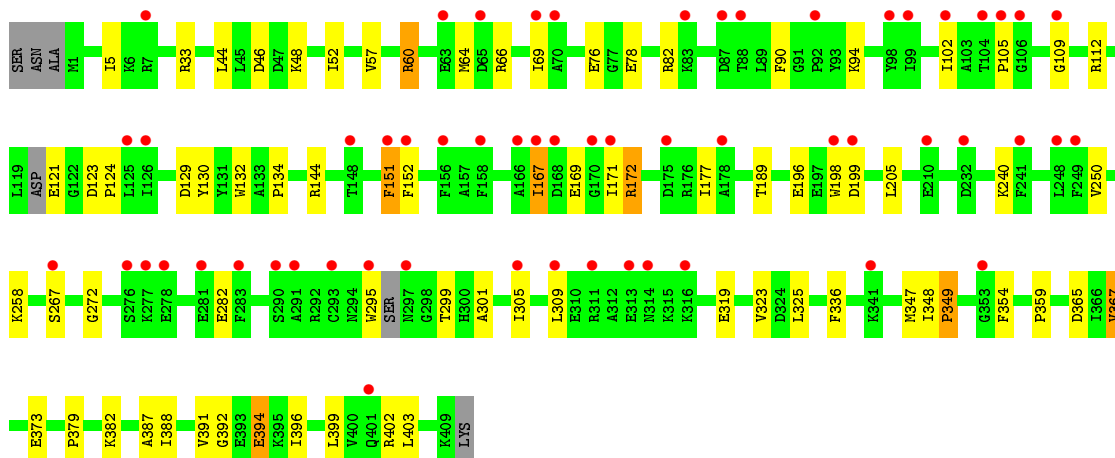
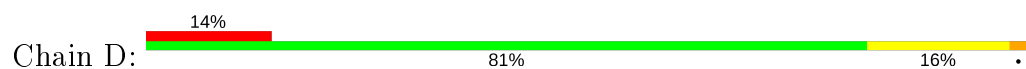


- Molecule 1: Aminotransferase class I and II





- Molecule 1: Aminotransferase class I and II



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	64.30Å 131.18Å 239.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.86 45.10 – 2.86	Depositor EDS
% Data completeness (in resolution range)	99.4 (50.00-2.86) 99.6 (45.10-2.86)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.04 (at 2.86Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.245 , 0.290 0.246 , 0.291	Depositor DCC
R_{free} test set	2420 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	50.4	Xtrriage
Anisotropy	0.960	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 36.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	13055	wwPDB-VP
Average B, all atoms (Å ²)	75.0	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: PLP

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	0.42	0/3315	0.55	0/4470
1	B	0.40	0/3315	0.54	0/4470
1	C	0.41	1/3293 (0.0%)	0.51	0/4437
1	D	0.41	1/3299 (0.0%)	0.51	0/4445
All	All	0.41	2/13222 (0.0%)	0.53	0/17822

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	10	TRP	CD2-CE2	5.11	1.47	1.41
1	D	198	TRP	CD2-CE2	5.05	1.47	1.41

There are no bond angle outliers.

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	3249	0	3200	46	0
1	B	3249	0	3200	32	0
1	C	3230	0	3178	21	0
1	D	3235	0	3189	40	0
2	A	16	0	7	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	16	0	8	0	0
2	C	16	0	8	0	0
2	D	16	0	8	2	0
3	A	7	0	0	1	0
3	B	10	0	0	1	0
3	C	4	0	0	0	0
3	D	7	0	0	0	0
All	All	13055	0	12798	132	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (132) 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:228:ALA:HA	1:C:352:GLY:HA3	1.46	0.94
1:A:112:ARG:HD2	1:B:294:ASN:HA	1.64	0.78
1:D:394:GLU:CD	1:D:394:GLU:H	1.89	0.75
1:A:111:ILE:HD13	1:A:135:TYR:HE1	1.57	0.70
1:B:105:PRO:HD2	1:B:109:GLY:HA3	1.74	0.69
1:D:33:ARG:HD2	1:D:48:LYS:O	1.94	0.67
1:C:231:GLY:O	1:C:232:ASP:HB3	1.94	0.66
1:A:373:GLU:OE1	1:A:402:ARG:HD3	1.96	0.66
1:A:204:PHE:CZ	1:A:208:LYS:HE2	2.32	0.64
1:A:114:ALA:HB1	1:A:219:ILE:CD1	2.28	0.64
1:C:130:TYR:HE2	1:C:152:PHE:CZ	2.16	0.64
1:D:258:LYS:HE3	2:D:501:PLP:H4A	1.81	0.63
1:A:44:LEU:HG	1:A:354:PHE:CZ	2.34	0.63
1:D:367:VAL:HG11	1:D:379:PRO:HG3	1.81	0.62
1:A:399:LEU:O	1:A:403:LEU:HB2	2.00	0.62
1:D:373:GLU:OE1	1:D:402:ARG:HD3	2.00	0.62
1:A:168:ASP:OD1	1:A:208:LYS:HE3	2.00	0.61
1:A:75:ILE:HD12	1:A:292:ARG:HD3	1.82	0.61
1:A:129:ASP:HB2	1:A:151:PHE:H	1.65	0.61
1:B:373:GLU:OE1	1:B:402:ARG:HD3	2.01	0.61
1:D:46:ASP:HB3	1:D:52:ILE:HD11	1.84	0.60
1:D:121:GLU:O	1:D:144:ARG:HA	2.03	0.59
1:C:37:ILE:HG23	1:C:391:VAL:HG11	1.84	0.59
1:B:125:LEU:HD11	1:B:180:LEU:HB2	1.86	0.57
1:D:66:ARG:HA	1:D:69:ILE:HD12	1.87	0.57
1:B:367:VAL:HG23	3:B:607:HOH:O	2.05	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:399:LEU:O	1:B:403:LEU:HB2	2.05	0.56
1:D:129:ASP:HB2	1:D:151:PHE:H	1.70	0.56
1:B:129:ASP:HB2	1:B:151:PHE:H	1.70	0.55
1:B:46:ASP:HB3	1:B:52:ILE:HD11	1.88	0.55
1:B:195:ASP:O	1:B:240:LYS:HE3	2.06	0.55
1:A:336:PHE:HB2	1:A:388:ILE:HD11	1.90	0.54
1:C:184:PRO:HB2	1:C:228:ALA:CB	2.36	0.54
1:A:279:ILE:HD12	1:B:3:MSE:HG2	1.90	0.54
1:C:105:PRO:HD2	1:C:109:GLY:HA3	1.89	0.54
1:B:44:LEU:HD23	1:B:389:CYS:HB2	1.89	0.53
1:D:347:MSE:HA	1:D:359:PRO:HD2	1.90	0.53
1:C:152:PHE:HA	1:C:159:ASN:HB2	1.91	0.52
1:A:114:ALA:HB1	1:A:219:ILE:HD12	1.91	0.52
1:A:171:ILE:CG2	1:A:171:ILE:O	2.58	0.52
1:A:160:ILE:HG13	1:A:164:LYS:HE3	1.92	0.51
1:A:194:SER:OG	1:A:197:GLU:HG3	2.10	0.51
1:D:52:ILE:HG21	1:D:325:LEU:HD13	1.92	0.51
1:D:105:PRO:HD3	1:D:295:TRP:CE2	2.46	0.51
1:D:392:GLY:O	1:D:396:ILE:HG12	2.10	0.51
1:A:112:ARG:HG3	1:A:113:SER:N	2.26	0.51
1:D:76:GLU:HA	1:D:102:ILE:HG23	1.92	0.51
1:A:16:LEU:O	1:A:20:ILE:HG12	2.11	0.50
1:A:3:MSE:HG2	1:B:279:ILE:HD12	1.94	0.50
1:A:75:ILE:CD1	1:A:292:ARG:HD3	2.41	0.49
1:B:367:VAL:HG11	1:B:379:PRO:HG3	1.94	0.49
1:A:114:ALA:CB	1:A:219:ILE:HD12	2.42	0.49
1:D:199:ASP:OD1	1:D:240:LYS:HE3	2.13	0.49
1:D:171:ILE:O	1:D:171:ILE:HG22	2.13	0.48
1:D:64:MSE:HE1	1:D:305:ILE:HG13	1.95	0.48
1:B:75:ILE:HD12	1:B:292:ARG:HD3	1.95	0.48
1:D:152:PHE:HE2	1:D:189:THR:HG21	1.79	0.48
1:D:399:LEU:O	1:D:403:LEU:HB2	2.12	0.48
1:D:250:VAL:O	1:D:272:GLY:HA2	2.14	0.48
1:B:171:ILE:HD13	1:B:208:LYS:HB3	1.96	0.48
1:D:69:ILE:HG23	1:D:301:ALA:HB2	1.95	0.48
1:A:286:SER:HA	1:B:10:TRP:HD1	1.79	0.47
1:A:69:ILE:HG23	1:A:301:ALA:HB2	1.96	0.47
1:B:1:MSE:HE2	1:B:1:MSE:H1	1.79	0.47
1:B:292:ARG:HD2	1:B:292:ARG:HA	1.71	0.47
1:A:292:ARG:HD2	1:A:292:ARG:HA	1.61	0.47
1:C:125:LEU:HD11	1:C:180:LEU:HB2	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:152:PHE:CE2	1:D:189:THR:HG21	2.49	0.47
1:D:60:ARG:O	1:D:64:MSE:HB2	2.15	0.47
1:B:1:MSE:N	1:B:1:MSE:HE2	2.31	0.47
1:D:121:GLU:C	1:D:123:ASP:H	2.18	0.47
1:B:16:LEU:O	1:B:20:ILE:HG12	2.15	0.46
1:C:61:LEU:HA	1:C:64:MSE:HE3	1.98	0.46
1:B:335:VAL:HG21	1:B:393:GLU:HG2	1.98	0.46
1:D:130:TYR:CE2	1:D:382:LYS:HB3	2.51	0.45
1:D:57:VAL:HG13	1:D:305:ILE:HG21	1.99	0.45
1:A:60:ARG:HG3	1:A:309:LEU:CD1	2.46	0.45
1:B:315:LYS:O	1:B:319:GLU:HG2	2.15	0.45
1:D:44:LEU:HG	1:D:354:PHE:CZ	2.51	0.45
1:A:105:PRO:HD2	1:A:109:GLY:HA3	1.99	0.45
1:B:56:SER:O	1:B:309:LEU:HD21	2.16	0.45
1:D:319:GLU:O	1:D:323:VAL:HG23	2.16	0.45
1:A:105:PRO:HD3	1:A:295:TRP:CE2	2.52	0.45
1:A:39:ALA:HB2	1:A:391:VAL:HG11	1.98	0.45
1:C:380:SER:C	1:C:382:LYS:H	2.20	0.44
1:A:175:ASP:HA	1:A:214:LYS:HD3	1.99	0.44
1:A:119:LEU:HD22	1:A:123:ASP:HB3	1.99	0.44
1:A:81:TYR:CD1	1:A:303:GLN:HA	2.52	0.44
1:A:111:ILE:HD13	1:A:135:TYR:CE1	2.46	0.44
1:A:72:TYR:CZ	1:B:263:TYR:HB3	2.52	0.44
1:B:44:LEU:HD13	1:B:325:LEU:HD11	2.00	0.44
1:A:221:ASP:OD2	2:A:501:PLP:N1	2.51	0.44
1:A:72:TYR:CE1	1:B:263:TYR:HB3	2.53	0.44
1:B:130:TYR:N	1:B:130:TYR:CD2	2.86	0.43
1:C:231:GLY:H	1:C:234:GLN:HE22	1.67	0.43
1:D:132:TRP:CE2	1:D:134:PRO:HG2	2.53	0.43
1:A:345:LEU:HD13	1:A:404:ALA:HA	2.00	0.43
1:B:189:THR:HB	1:B:348:ILE:HG21	1.99	0.43
1:A:136:ARG:HG3	1:A:146:PHE:CD2	2.54	0.43
1:B:15:ASP:HB3	1:B:18:PHE:HB3	2.00	0.43
1:A:104:THR:HB	1:A:109:GLY:HA3	1.99	0.43
1:A:162:VAL:HA	1:A:165:GLU:HG2	2.00	0.43
1:C:136:ARG:HG3	1:C:146:PHE:CD2	2.54	0.43
1:C:37:ILE:HG12	1:C:395:LYS:HD3	2.00	0.43
1:D:167:ILE:HD12	1:D:205:LEU:HD21	2.00	0.43
1:B:277:LYS:O	1:B:280:ILE:HG22	2.19	0.43
1:D:258:LYS:CE	2:D:501:PLP:H4A	2.48	0.43
1:C:366:ILE:HG23	1:C:406:TYR:HB2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:90:PHE:HB3	1:D:94:LYS:HA	2.00	0.42
1:D:78:GLU:O	1:D:82:ARG:HG3	2.18	0.42
1:A:30:LYS:HD2	1:A:31:TYR:CZ	2.54	0.42
1:C:120:ASP:HB2	1:D:5:ILE:HG21	2.00	0.42
1:B:7:ARG:O	1:B:10:TRP:CZ2	2.72	0.42
1:D:169:GLU:HA	1:D:172:ARG:HD3	2.02	0.42
1:D:336:PHE:HB2	1:D:388:ILE:HD11	2.01	0.42
1:C:55:PRO:O	1:C:59:ASP:HB2	2.20	0.42
1:A:60:ARG:HG3	1:A:309:LEU:HD13	2.02	0.41
1:C:363:ALA:C	1:C:365:ASP:H	2.23	0.41
1:D:348:ILE:HA	1:D:349:PRO:HD2	1.92	0.41
1:A:60:ARG:NH1	1:A:63:GLU:OE1	2.53	0.41
1:B:45:LEU:HD23	1:B:51:ILE:HA	2.01	0.41
1:C:99:ILE:HA	1:C:272:GLY:O	2.20	0.41
1:C:120:ASP:OD1	1:C:121:GLU:N	2.53	0.41
1:C:152:PHE:CE2	1:C:156:PHE:CD1	3.09	0.41
1:D:105:PRO:HD2	1:D:109:GLY:HA3	2.02	0.41
1:A:44:LEU:HD23	1:A:389:CYS:HB2	2.03	0.41
1:A:112:ARG:NH1	3:A:606:HOH:O	2.53	0.41
1:A:123:ASP:HA	1:A:124:PRO:HD3	1.93	0.41
1:D:391:VAL:HG23	1:D:396:ILE:CD1	2.51	0.41
1:C:262:ALA:HB1	1:C:265:LEU:HD12	2.03	0.41
1:A:46:ASP:HB3	1:A:52:ILE:HD11	2.03	0.40
1:D:124:PRO:HG2	1:D:177:ILE:HG22	2.04	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	407/413 (98%)	386 (95%)	20 (5%)	1 (0%)	47 75

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	407/413 (98%)	391 (96%)	14 (3%)	2 (0%)	29	57
1	C	401/413 (97%)	370 (92%)	29 (7%)	2 (0%)	29	57
1	D	401/413 (97%)	375 (94%)	24 (6%)	2 (0%)	29	57
All	All	1616/1652 (98%)	1522 (94%)	87 (5%)	7 (0%)	34	62

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	33	ARG
1	C	381	ALA
1	B	296	SER
1	D	172	ARG
1	D	387	ALA
1	C	232	ASP
1	B	124	PRO

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	344/341 (101%)	334 (97%)	10 (3%)	42	72
1	B	344/341 (101%)	332 (96%)	12 (4%)	36	67
1	C	342/341 (100%)	331 (97%)	11 (3%)	39	69
1	D	342/341 (100%)	329 (96%)	13 (4%)	33	64
All	All	1372/1364 (101%)	1326 (97%)	46 (3%)	37	67

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	34	GLU
1	A	89	LEU
1	A	129	ASP
1	A	141	GLU

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Mol	Chain	Res	Type
1	A	151	PHE
1	A	199	ASP
1	A	263	TYR
1	A	297	ASN
1	A	309	LEU
1	A	391	VAL
1	B	66	ARG
1	B	102	ILE
1	B	120	ASP
1	B	129	ASP
1	B	130	TYR
1	B	151	PHE
1	B	196	GLU
1	B	296	SER
1	B	297	ASN
1	B	331	SER
1	B	344	LYS
1	B	361	ASP
1	C	102	ILE
1	C	152	PHE
1	C	172	ARG
1	C	183	SER
1	C	232	ASP
1	C	273	ILE
1	C	278	GLU
1	C	296	SER
1	C	297	ASN
1	C	309	LEU
1	C	346	THR
1	D	60	ARG
1	D	112	ARG
1	D	151	PHE
1	D	167	ILE
1	D	196	GLU
1	D	267	SER
1	D	282	GLU
1	D	299	THR
1	D	309	LEU
1	D	349	PRO
1	D	365	ASP
1	D	367	VAL
1	D	394	GLU

Some 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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PLP	D	501	-	16,16,16	1.22	2 (12%)	20,23,23	1.38	3 (15%)
2	PLP	C	501	-	16,16,16	1.24	2 (12%)	20,23,23	1.25	3 (15%)
2	PLP	B	501	-	16,16,16	1.27	1 (6%)	20,23,23	1.44	3 (15%)
2	PLP	A	501	-	16,16,16	1.28	1 (6%)	20,23,23	1.27	3 (15%)

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	PLP	D	501	-	-	2/8/8/8	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PLP	C	501	-	-	2/8/8/8	0/1/1/1
2	PLP	B	501	-	-	4/8/8/8	0/1/1/1
2	PLP	A	501	-	-	5/8/8/8	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	PLP	C2-N1	2.96	1.39	1.33
2	C	501	PLP	C2-N1	2.88	1.39	1.33
2	B	501	PLP	C2-N1	2.80	1.39	1.33
2	A	501	PLP	C2-N1	2.68	1.38	1.33
2	D	501	PLP	C6-N1	2.24	1.39	1.34
2	C	501	PLP	C6-N1	2.23	1.39	1.34

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	PLP	C3-C4-C5	2.95	120.52	118.26
2	B	501	PLP	C5-C6-N1	-2.73	119.27	123.82
2	D	501	PLP	C5-C6-N1	-2.69	119.34	123.82
2	A	501	PLP	C3-C4-C4A	-2.61	116.20	119.90
2	C	501	PLP	C3-C4-C5	2.57	120.23	118.26
2	B	501	PLP	O4A-C4A-C4	-2.52	119.43	124.91
2	C	501	PLP	C5-C6-N1	-2.32	119.95	123.82
2	A	501	PLP	C5-C6-N1	-2.29	120.01	123.82
2	C	501	PLP	O4A-C4A-C4	-2.24	120.03	124.91
2	B	501	PLP	C3-C4-C5	2.23	119.97	118.26
2	D	501	PLP	O4A-C4A-C4	-2.05	120.45	124.91
2	A	501	PLP	O4P-C5A-C5	2.03	113.22	109.35

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	501	PLP	C3-C4-C4A-O4A
2	D	501	PLP	C5-C4-C4A-O4A
2	C	501	PLP	C3-C4-C4A-O4A
2	C	501	PLP	C5-C4-C4A-O4A
2	B	501	PLP	C3-C4-C4A-O4A
2	B	501	PLP	C5-C4-C4A-O4A

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Mol	Chain	Res	Type	Atoms
2	B	501	PLP	C5A-O4P-P-O3P
2	A	501	PLP	C3-C4-C4A-O4A
2	A	501	PLP	C5-C4-C4A-O4A
2	A	501	PLP	C5A-O4P-P-O1P
2	A	501	PLP	C5A-O4P-P-O2P
2	B	501	PLP	C5A-O4P-P-O2P
2	A	501	PLP	C5A-O4P-P-O3P

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	PLP	2	0
2	A	501	PLP	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	403/413 (97%)	-0.10	5 (1%) 79 78	34, 48, 64, 86	0
1	B	403/413 (97%)	-0.07	2 (0%) 91 90	33, 46, 70, 96	0
1	C	401/413 (97%)	1.41	111 (27%) 0 0	61, 108, 144, 233	0
1	D	401/413 (97%)	0.84	57 (14%) 2 2	50, 95, 129, 220	0
All	All	1608/1652 (97%)	0.52	175 (10%) 5 4	33, 67, 136, 233	0

All (175) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	384	ILE	8.4
1	C	363	ALA	7.8
1	C	11	ASN	7.1
1	C	408	ASN	7.0
1	C	400	VAL	6.8
1	C	12	ASN	6.7
1	D	171	ILE	6.7
1	D	278	GLU	5.6
1	C	403	LEU	5.5
1	C	341	LYS	5.2
1	C	47	ASP	5.2
1	D	305	ILE	5.2
1	C	367	VAL	5.0
1	C	174	SER	4.9
1	C	10	TRP	4.7
1	C	398	LYS	4.7
1	C	405	PHE	4.6
1	C	358	ILE	4.5
1	D	98	TYR	4.5
1	C	342	GLU	4.5
1	C	404	ALA	4.5

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Mol	Chain	Res	Type	RSRZ
1	C	231	GLY	4.3
1	D	70	ALA	4.3
1	D	297	ASN	4.3
1	C	377	THR	4.3
1	C	391	VAL	4.3
1	C	365	ASP	4.2
1	C	319	GLU	4.2
1	C	323	VAL	4.1
1	D	99	ILE	4.0
1	C	108	THR	3.9
1	C	110	ALA	3.9
1	C	339	ALA	3.8
1	C	52	ILE	3.8
1	D	281	GLU	3.8
1	C	109	GLY	3.7
1	C	335	VAL	3.7
1	C	185	GLY	3.6
1	C	370	LEU	3.6
1	D	311	ARG	3.6
1	C	375	ILE	3.6
1	C	374	ASN	3.6
1	C	62	ASP	3.6
1	D	87	ASP	3.6
1	D	170	GLY	3.6
1	C	182	ASN	3.6
1	C	104	THR	3.5
1	C	396	ILE	3.5
1	C	354	PHE	3.5
1	C	338	THR	3.5
1	C	156	PHE	3.5
1	C	56	SER	3.4
1	C	366	ILE	3.4
1	C	407	THR	3.4
1	D	314	ASN	3.4
1	D	65	ASP	3.4
1	C	386	VAL	3.4
1	C	255	SER	3.3
1	A	11	ASN	3.3
1	D	167	ILE	3.3
1	C	57	VAL	3.3
1	C	356	THR	3.3
1	C	253	ALA	3.2

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Mol	Chain	Res	Type	RSRZ
1	C	173	ASP	3.2
1	D	316	LYS	3.2
1	D	109	GLY	3.2
1	A	171	ILE	3.2
1	C	48	LYS	3.2
1	D	290	SER	3.2
1	D	341	LYS	3.1
1	D	293	CYS	3.1
1	B	171	ILE	3.1
1	C	44	LEU	3.1
1	C	369	ASP	3.1
1	C	326	ARG	3.1
1	C	320	GLN	3.1
1	D	232	ASP	3.1
1	C	401	GLN	3.1
1	D	277	LYS	3.1
1	C	8	ALA	3.0
1	C	397	PRO	3.0
1	C	17	ALA	3.0
1	C	267	SER	3.0
1	C	406	TYR	2.9
1	C	261	THR	2.9
1	C	293	CYS	2.9
1	C	346	THR	2.9
1	D	295	TRP	2.9
1	D	158	PHE	2.9
1	D	276	SER	2.8
1	C	291	ALA	2.8
1	C	340	ALA	2.8
1	D	210	GLU	2.8
1	C	46	ASP	2.8
1	C	183	SER	2.8
1	C	30	LYS	2.8
1	D	309	LEU	2.8
1	C	343	ASN	2.7
1	C	122	GLY	2.7
1	D	152	PHE	2.7
1	D	198	TRP	2.7
1	C	31	TYR	2.7
1	C	214	LYS	2.6
1	C	130	TYR	2.6
1	C	295	TRP	2.6

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Mol	Chain	Res	Type	RSRZ
1	C	359	PRO	2.6
1	C	330	LYS	2.6
1	C	402	ARG	2.6
1	C	172	ARG	2.6
1	D	105	PRO	2.6
1	C	223	ALA	2.6
1	C	296	SER	2.5
1	B	320	GLN	2.5
1	D	401	GLN	2.5
1	D	313	GLU	2.5
1	D	63	GLU	2.4
1	C	221	ASP	2.4
1	D	83	LYS	2.4
1	D	106	GLY	2.4
1	D	199	ASP	2.4
1	C	16	LEU	2.4
1	A	207	GLU	2.4
1	C	409	LYS	2.4
1	C	105	PRO	2.4
1	D	178	ALA	2.4
1	C	7	ARG	2.4
1	D	151	PHE	2.4
1	D	102	ILE	2.4
1	A	313	GLU	2.4
1	C	266	ARG	2.3
1	C	269	ALA	2.3
1	C	355	PHE	2.3
1	C	154	ASP	2.3
1	C	322	LEU	2.3
1	C	317	ILE	2.3
1	D	156	PHE	2.3
1	C	327	ASN	2.3
1	D	175	ASP	2.3
1	C	103	ALA	2.3
1	D	88	THR	2.3
1	D	166	ALA	2.3
1	D	291	ALA	2.3
1	C	43	THR	2.2
1	C	360	THR	2.2
1	C	4	THR	2.2
1	C	113	SER	2.2
1	C	128	HIS	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	267	SER	2.2
1	C	55	PRO	2.2
1	D	248	LEU	2.2
1	C	312	ALA	2.2
1	D	241	PHE	2.2
1	C	299	THR	2.2
1	C	60	ARG	2.2
1	D	69	ILE	2.2
1	D	104	THR	2.2
1	D	283	PHE	2.1
1	D	126	ILE	2.1
1	C	18	PHE	2.1
1	C	263	TYR	2.1
1	C	325	LEU	2.1
1	D	353	GLY	2.1
1	D	7	ARG	2.1
1	C	232	ASP	2.1
1	C	216	ILE	2.1
1	D	92	PRO	2.1
1	D	249	PHE	2.1
1	C	257	SER	2.1
1	C	13	GLY	2.1
1	D	168	ASP	2.0
1	D	148	THR	2.0
1	C	393	GLU	2.0
1	A	6	LYS	2.0
1	D	125	LEU	2.0
1	C	179	SER	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 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. 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
2	PLP	C	501	16/16	0.84	0.35	59,68,74,79	0
2	PLP	D	501	16/16	0.91	0.17	38,46,57,57	0
2	PLP	A	501	16/16	0.96	0.18	23,28,33,42	0
2	PLP	B	501	16/16	0.97	0.20	30,37,43,50	0

6.5 Other polymers [i](#)

There are no such residues in this entry.