



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 1, 2017 – 07:59 PM EDT

PDB ID : 1XI9
Title : Alanine aminotransferase from *Pyrococcus furiosus* Pfu-1397077-001
Authors : Zhou, W.; Tempel, W.; Shah, A.; Chen, L.; Liu, Z.-J.; Lee, D.; Lin, D.; Chang, S.-H.; Brereton, P.S.; Izumi, M.; Jenney Jr., F.E.; Lee, H.-S.; Poole II, F.L.; Shah, C.; Sugar, F.J.; Arendall III, W.B.; Richardson, J.S.; Richardson, D.C.; Rose, J.P.; Adams, M.W.W.; Wang, B.-C.; Southeast Collaboratory for Structural Genomics (SECSG)
Deposited on : unknown
Resolution : 2.33 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

<http://wwpdb.org/validation/2016/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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20030345
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20030345

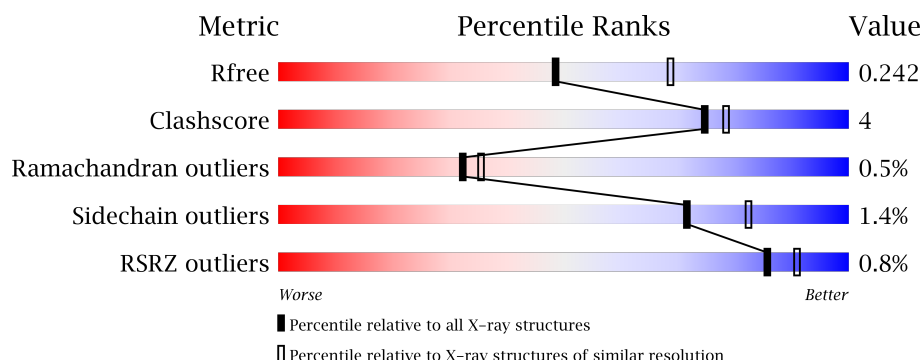
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.33 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}	100719	1570 (2.36-2.32)
Clashscore	112137	1673 (2.36-2.32)
Ramachandran outliers	110173	1654 (2.36-2.32)
Sidechain outliers	110143	1655 (2.36-2.32)
RSRZ outliers	101464	1576 (2.36-2.32)

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. 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	406	
1	B	406	
1	C	406	
1	D	406	

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PLP	D	501	-	-	-	X

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12327 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 transaminase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	388	Total	C	N	O	S	0	0	0
			3062	1974	507	571	10			
1	B	386	Total	C	N	O	S	0	0	0
			3015	1949	497	559	10			
1	C	393	Total	C	N	O	S	0	0	0
			3080	1985	514	571	10			
1	D	386	Total	C	N	O	S	0	0	0
			3005	1941	496	558	10			

There are 36 discrepancies between the modelled and reference sequences:

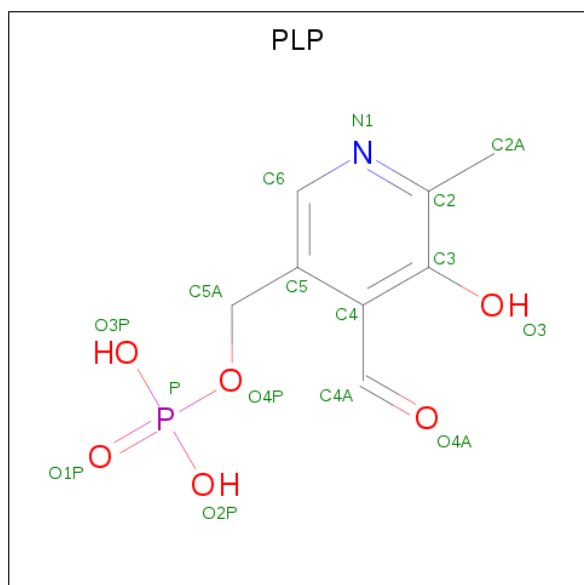
Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	ALA	-	EXPRESSION TAG	UNP Q9P9M8
A	-6	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	-5	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	-4	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	-3	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	-2	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	-1	HIS	-	EXPRESSION TAG	UNP Q9P9M8
A	0	GLY	-	EXPRESSION TAG	UNP Q9P9M8
A	1	SER	-	EXPRESSION TAG	UNP Q9P9M8
B	-7	ALA	-	EXPRESSION TAG	UNP Q9P9M8
B	-6	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	-5	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	-4	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	-3	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	-2	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	-1	HIS	-	EXPRESSION TAG	UNP Q9P9M8
B	0	GLY	-	EXPRESSION TAG	UNP Q9P9M8
B	1	SER	-	EXPRESSION TAG	UNP Q9P9M8
C	-7	ALA	-	EXPRESSION TAG	UNP Q9P9M8
C	-6	HIS	-	EXPRESSION TAG	UNP Q9P9M8
C	-5	HIS	-	EXPRESSION TAG	UNP Q9P9M8

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-4	HIS	-	EXPRESSION TAG	UNP Q9P9M8
C	-3	HIS	-	EXPRESSION TAG	UNP Q9P9M8
C	-2	HIS	-	EXPRESSION TAG	UNP Q9P9M8
C	-1	HIS	-	EXPRESSION TAG	UNP Q9P9M8
C	0	GLY	-	EXPRESSION TAG	UNP Q9P9M8
C	1	SER	-	EXPRESSION TAG	UNP Q9P9M8
D	-7	ALA	-	EXPRESSION TAG	UNP Q9P9M8
D	-6	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	-5	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	-4	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	-3	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	-2	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	-1	HIS	-	EXPRESSION TAG	UNP Q9P9M8
D	0	GLY	-	EXPRESSION TAG	UNP Q9P9M8
D	1	SER	-	EXPRESSION TAG	UNP Q9P9M8

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: $\text{C}_8\text{H}_{10}\text{NO}_6\text{P}$).

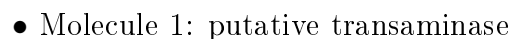
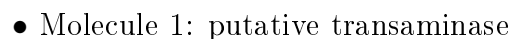


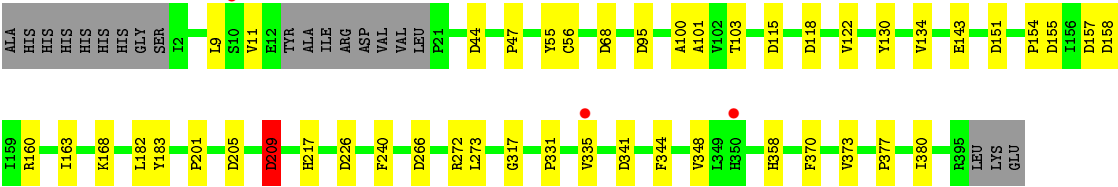
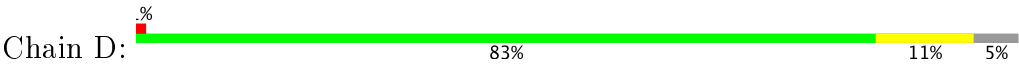
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	B	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	C	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	D	1	Total 15	C 8	N 1	O 5	P 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	28	Total 28	O 28	0	0
3	B	22	Total 22	O 22	0	0
3	C	31	Total 31	O 31	0	0
3	D	24	Total 24	O 24	0	0

- Molecule 1: putative transaminase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	61.80Å 188.09Å 72.58Å 90.00° 89.79° 90.00°	Depositor
Resolution (Å)	42.26 – 2.33 42.14 – 2.33	Depositor EDS
% Data completeness (in resolution range)	100.0 (42.26-2.33) 98.3 (42.14-2.33)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.71 (at 2.34Å)	Xtriage
Refinement program	REFMAC refmac _5.2.0005	Depositor
R, R_{free}	0.202 , 0.245 0.202 , 0.242	Depositor DCC
R_{free} test set	2100 reflections (3.14%)	DCC
Wilson B-factor (Å ²)	29.3	Xtriage
Anisotropy	0.036	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 28.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.137 for h,-k,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	12327	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.30% 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

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	0.60	0/3138	0.84	12/4260 (0.3%)
1	B	0.61	0/3090	0.84	12/4199 (0.3%)
1	C	0.62	0/3157	0.85	11/4286 (0.3%)
1	D	0.63	0/3080	0.85	13/4185 (0.3%)
All	All	0.61	0/12465	0.84	48/16930 (0.3%)

There are no bond length outliers.

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	292	ASP	CB-CG-OD2	8.69	126.12	118.30
1	C	209	ASP	CB-CG-OD2	8.48	125.93	118.30
1	D	115	ASP	CB-CG-OD2	8.01	125.50	118.30
1	B	209	ASP	CB-CG-OD2	8.00	125.50	118.30
1	C	155	ASP	CB-CG-OD2	7.99	125.49	118.30
1	A	165	ASP	CB-CG-OD2	7.34	124.91	118.30
1	D	151	ASP	CB-CG-OD2	6.97	124.57	118.30
1	C	157	ASP	CB-CG-OD2	6.84	124.45	118.30
1	A	155	ASP	CB-CG-OD2	6.78	124.40	118.30
1	C	292	ASP	CB-CG-OD2	6.62	124.26	118.30
1	B	44	ASP	CB-CG-OD2	6.56	124.20	118.30
1	B	155	ASP	CB-CG-OD2	6.55	124.20	118.30
1	A	90	ASP	CB-CG-OD2	6.53	124.17	118.30
1	D	209	ASP	CB-CG-OD2	6.51	124.16	118.30
1	D	155	ASP	CB-CG-OD2	6.50	124.15	118.30
1	C	165	ASP	CB-CG-OD2	6.34	124.01	118.30
1	C	118	ASP	CB-CG-OD2	6.33	124.00	118.30
1	D	95	ASP	CB-CG-OD2	6.29	123.96	118.30
1	B	95	ASP	CB-CG-OD2	6.21	123.89	118.30
1	D	44	ASP	CB-CG-OD2	6.17	123.85	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	118	ASP	CB-CG-OD2	6.16	123.84	118.30
1	A	44	ASP	CB-CG-OD2	6.11	123.80	118.30
1	B	118	ASP	CB-CG-OD2	6.02	123.72	118.30
1	D	158	ASP	CB-CG-OD2	5.97	123.67	118.30
1	D	157	ASP	CB-CG-OD2	5.84	123.56	118.30
1	B	158	ASP	CB-CG-OD2	5.74	123.46	118.30
1	D	226	ASP	CB-CG-OD2	5.66	123.39	118.30
1	C	94	ASP	CB-CG-OD2	5.66	123.39	118.30
1	B	151	ASP	CB-CG-OD2	5.64	123.38	118.30
1	A	115	ASP	CB-CG-OD2	5.58	123.32	118.30
1	B	68	ASP	CB-CG-OD2	5.49	123.25	118.30
1	B	94	ASP	CB-CG-OD2	5.44	123.19	118.30
1	A	184	ASP	CB-CG-OD2	5.44	123.19	118.30
1	C	151	ASP	CB-CG-OD2	5.42	123.18	118.30
1	B	39	ASP	CB-CG-OD2	5.40	123.16	118.30
1	C	226	ASP	CB-CG-OD2	5.39	123.15	118.30
1	A	246	LEU	CA-CB-CG	-5.35	103.00	115.30
1	C	184	ASP	CB-CG-OD2	5.31	123.08	118.30
1	B	115	ASP	CB-CG-OD2	5.30	123.07	118.30
1	D	118	ASP	CB-CG-OD2	5.30	123.07	118.30
1	A	94	ASP	CB-CG-OD2	5.28	123.06	118.30
1	D	68	ASP	CB-CG-OD2	5.25	123.03	118.30
1	A	209	ASP	N-CA-CB	-5.18	101.27	110.60
1	D	205	ASP	CB-CG-OD2	5.13	122.92	118.30
1	B	165	ASP	CB-CG-OD2	5.13	122.92	118.30
1	A	209	ASP	CB-CG-OD1	5.11	122.90	118.30
1	D	266	ASP	CB-CG-OD2	5.09	122.88	118.30
1	C	90	ASP	CB-CG-OD2	5.08	122.87	118.30

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	3062	0	2996	23	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3015	0	2933	26	0
1	C	3080	0	3002	31	0
1	D	3005	0	2913	19	0
2	A	15	0	7	4	0
2	B	15	0	7	2	0
2	C	15	0	7	3	0
2	D	15	0	7	0	0
3	A	28	0	0	0	0
3	B	22	0	0	1	0
3	C	31	0	0	0	0
3	D	24	0	0	0	0
All	All	12327	0	11872	89	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 4.

All (89) 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:A:82:ARG:NH2	1:A:209:ASP:OD2	2.07	0.88
1:B:237:LYS:HZ1	2:B:501:PLP:C4A	1.95	0.80
1:B:237:LYS:NZ	2:B:501:PLP:C4A	2.47	0.78
1:A:56:CYS:HG	1:B:56:CYS:HG	1.31	0.76
1:A:7:ARG:HD2	1:A:136:PHE:O	1.90	0.72
1:A:267:ARG:HD3	1:B:11:VAL:O	1.94	0.66
1:D:377:PRO:HD2	1:D:380:ILE:HD12	1.79	0.64
1:C:211:MET:HE1	1:C:327:PHE:HD2	1.63	0.64
1:B:156:ILE:HG23	1:B:194:ILE:HD11	1.80	0.63
1:C:56:CYS:HG	1:D:56:CYS:HG	1.42	0.62
1:C:7:ARG:HD3	1:C:136:PHE:CE1	2.34	0.61
1:C:86:LYS:HE3	1:C:209:ASP:OD1	2.00	0.61
1:C:237:LYS:NZ	2:C:501:PLP:C4A	2.64	0.60
1:C:209:ASP:OD2	1:C:233:ASN:ND2	2.35	0.59
1:C:294:LEU:HD11	1:C:298:MET:HE3	1.83	0.59
1:A:237:LYS:NZ	2:A:501:PLP:C4A	2.66	0.58
1:C:207:ILE:HD11	1:C:236:SER:HB2	1.85	0.57
1:B:373:VAL:HG12	1:B:375:LEU:H	1.69	0.57
1:C:237:LYS:HZ1	2:C:501:PLP:C4A	2.18	0.56
1:B:47:PRO:HD3	1:B:240:PHE:O	2.07	0.54
1:A:184:ASP:OD1	1:A:187:THR:HG23	2.07	0.53
1:C:211:MET:HE1	1:C:327:PHE:CD2	2.43	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:132:GLY:HA3	1:B:271:ILE:CD1	2.39	0.52
1:D:160:ARG:O	1:D:163:ILE:HG22	2.12	0.50
1:A:126:SER:O	1:A:362:PHE:HD2	1.95	0.49
1:A:331:PRO:HD2	1:A:370:PHE:O	2.12	0.49
1:C:272:ARG:HA	1:D:103:THR:HG21	1.94	0.49
1:C:47:PRO:HD3	1:C:240:PHE:O	2.14	0.48
1:C:341:ASP:OD1	1:C:358:HIS:HB2	2.14	0.48
1:C:352:ALA:O	1:C:387:ARG:HD2	2.14	0.48
1:A:237:LYS:HZ3	2:A:501:PLP:C4A	2.27	0.47
1:A:209:ASP:HB3	1:A:210:LEU:H	1.41	0.47
1:D:100:ALA:O	1:D:101:ALA:HB3	2.13	0.47
1:B:100:ALA:O	1:B:101:ALA:HB3	2.14	0.47
1:B:377:PRO:HD2	1:B:380:ILE:HD12	1.96	0.47
1:A:209:ASP:HB3	1:A:238:VAL:HG21	1.96	0.47
1:A:185:LYS:O	1:A:189:GLU:HB2	2.15	0.47
1:C:102:VAL:HG11	2:C:501:PLP:H6	1.97	0.47
1:B:235:LEU:HD11	1:B:283:ALA:HB2	1.96	0.46
1:A:336:GLY:HA3	1:A:338:TRP:CZ3	2.51	0.46
1:C:211:MET:HE3	1:C:211:MET:HB3	1.61	0.46
1:D:47:PRO:HD3	1:D:240:PHE:O	2.16	0.46
1:A:237:LYS:HZ1	2:A:501:PLP:C4A	2.28	0.46
1:C:100:ALA:O	1:C:101:ALA:HB3	2.15	0.46
1:D:344:PHE:O	1:D:348:VAL:HG23	2.15	0.46
1:B:373:VAL:HG11	1:B:375:LEU:HD12	1.98	0.46
1:C:208:TYR:CE1	1:C:237:LYS:HG3	2.51	0.46
1:D:154:PRO:HD3	1:D:183:TYR:CE2	2.51	0.46
1:D:341:ASP:OD1	1:D:358:HIS:HB2	2.16	0.46
1:C:327:PHE:HA	1:C:374:PHE:CZ	2.51	0.45
1:D:130:TYR:O	1:D:134:VAL:HG23	2.16	0.45
1:C:3:ARG:O	1:D:168:LYS:HE3	2.16	0.45
1:C:267:ARG:HD2	1:D:11:VAL:O	2.17	0.45
1:A:70:GLU:HG2	1:A:97:ARG:NE	2.32	0.44
1:C:185:LYS:O	1:C:189:GLU:HB2	2.16	0.44
1:D:317:GLY:HA2	1:D:335:VAL:HG22	1.99	0.44
1:B:152:TRP:CD1	1:B:179:THR:HB	2.53	0.43
1:D:122:VAL:O	1:D:143:GLU:HA	2.18	0.43
1:B:119:GLU:HG2	1:B:140:LYS:HB3	2.00	0.43
1:B:375:LEU:N	1:B:376:PRO:CD	2.82	0.43
1:D:331:PRO:HD2	1:D:370:PHE:O	2.19	0.43
1:B:102:VAL:CG2	1:B:207:ILE:HD13	2.49	0.43
1:C:122:VAL:O	1:C:143:GLU:HA	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:308:ILE:HD12	1:B:381:LEU:HD22	2.00	0.42
1:A:118:ASP:HB3	1:A:168:LYS:HG2	2.01	0.42
1:B:50:HIS:HE1	3:B:520:HOH:O	2.03	0.42
1:A:174:ASN:HA	1:A:175:PRO:C	2.40	0.42
1:B:122:VAL:O	1:B:143:GLU:HA	2.19	0.42
1:C:366:GLY:O	1:C:369:HIS:HB2	2.20	0.42
1:B:152:TRP:HB2	1:B:181:ALA:HB2	2.02	0.41
1:A:170:ILE:HD12	1:A:195:ALA:HB2	2.03	0.41
1:B:174:ASN:HA	1:B:175:PRO:C	2.41	0.41
1:A:327:PHE:HA	1:A:374:PHE:CZ	2.56	0.41
1:B:231:VAL:O	1:B:249:MET:HA	2.20	0.41
1:A:132:GLY:HA3	1:B:271:ILE:HD11	2.03	0.41
1:A:168:LYS:HD3	1:A:168:LYS:HA	1.95	0.41
1:C:130:TYR:O	1:C:134:VAL:HG23	2.21	0.41
1:C:336:GLY:HA3	1:C:338:TRP:CZ3	2.56	0.41
1:C:70:GLU:HG2	1:C:97:ARG:NE	2.36	0.41
1:D:182:LEU:HD11	1:D:217:HIS:HA	2.03	0.41
1:B:233:ASN:HB3	1:B:248:TYR:CZ	2.56	0.41
1:C:124:GLY:HA2	1:C:125:PRO:C	2.41	0.41
1:D:168:LYS:O	1:D:201:PRO:HD2	2.21	0.40
1:B:124:GLY:HA2	1:B:125:PRO:C	2.41	0.40
1:C:18:VAL:O	1:C:21:PRO:HD2	2.21	0.40
1:A:205:ASP:OD2	2:A:501:PLP:N1	2.54	0.40
1:B:298:MET:HE1	1:B:301:LEU:HD12	2.04	0.40
1:C:267:ARG:NH2	1:D:9:LEU:HA	2.36	0.40
1:C:267:ARG:HH21	1:D:9:LEU:HA	1.87	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	384/406 (95%)	368 (96%)	14 (4%)	2 (0%)	32	35
1	B	382/406 (94%)	373 (98%)	7 (2%)	2 (0%)	32	35
1	C	391/406 (96%)	377 (96%)	12 (3%)	2 (0%)	32	35
1	D	382/406 (94%)	372 (97%)	8 (2%)	2 (0%)	32	35
All	All	1539/1624 (95%)	1490 (97%)	41 (3%)	8 (0%)	32	35

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	209	ASP
1	B	209	ASP
1	C	209	ASP
1	D	209	ASP
1	C	18	VAL
1	B	273	LEU
1	D	273	LEU
1	A	273	LEU

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	318/348 (91%)	316 (99%)	2 (1%)	89	94
1	B	308/348 (88%)	304 (99%)	4 (1%)	73	84
1	C	315/348 (90%)	308 (98%)	7 (2%)	57	70
1	D	305/348 (88%)	301 (99%)	4 (1%)	73	84
All	All	1246/1392 (90%)	1229 (99%)	17 (1%)	71	82

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	55	TYR
1	A	272	ARG
1	B	55	TYR

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Mol	Chain	Res	Type
1	B	209	ASP
1	B	214	GLU
1	B	272	ARG
1	C	3	ARG
1	C	7	ARG
1	C	55	TYR
1	C	84	LYS
1	C	89	VAL
1	C	272	ARG
1	C	335	VAL
1	D	55	TYR
1	D	209	ASP
1	D	272	ARG
1	D	373	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	50	HIS
1	B	324	GLN
1	C	107	GLN
1	D	324	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

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	A	501	-	15,15,16	1.09	1 (6%)	20,22,23	1.30	3 (15%)
2	PLP	B	501	-	15,15,16	1.04	2 (13%)	20,22,23	1.61	4 (20%)
2	PLP	C	501	-	15,15,16	1.04	1 (6%)	20,22,23	1.05	1 (5%)
2	PLP	D	501	-	15,15,16	1.69	5 (33%)	20,22,23	1.36	4 (20%)

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	A	501	-	-	0/6/6/8	0/1/1/1
2	PLP	B	501	-	-	0/6/6/8	0/1/1/1
2	PLP	C	501	-	-	0/6/6/8	0/1/1/1
2	PLP	D	501	-	-	0/6/6/8	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	PLP	C6-N1	2.17	1.39	1.34
2	D	501	PLP	C5-C4	2.29	1.43	1.40
2	C	501	PLP	C2-N1	2.31	1.38	1.33
2	B	501	PLP	C2-N1	2.33	1.38	1.33
2	A	501	PLP	C2-N1	2.39	1.38	1.33
2	D	501	PLP	C6-N1	2.53	1.39	1.34
2	D	501	PLP	C6-C5	2.60	1.43	1.37
2	D	501	PLP	C2-N1	3.08	1.40	1.33
2	D	501	PLP	C3-C2	3.20	1.43	1.40

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	PLP	C4A-C4-C5	-4.75	116.06	120.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	PLP	C4A-C4-C3	-3.47	114.56	120.54
2	D	501	PLP	O4P-C5A-C5	-2.95	103.38	109.32
2	C	501	PLP	C5A-C5-C6	-2.56	114.93	119.33
2	D	501	PLP	C5A-C5-C6	-2.27	115.42	119.33
2	D	501	PLP	C5-C6-N1	-2.12	120.29	123.87
2	B	501	PLP	C5-C6-N1	-2.07	120.37	123.87
2	A	501	PLP	O4P-C5A-C5	-2.05	105.19	109.32
2	A	501	PLP	C4A-C4-C5	2.04	122.92	120.86
2	B	501	PLP	C6-C5-C4	2.31	120.11	118.18
2	A	501	PLP	O3P-P-O4P	2.97	114.63	106.73
2	D	501	PLP	O3P-P-O4P	3.15	115.11	106.73

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	PLP	4	0
2	B	501	PLP	2	0
2	C	501	PLP	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [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	A	388/406 (95%)	-0.25	2 (0%) 90 95	16, 27, 40, 56	0
1	B	386/406 (95%)	-0.12	5 (1%) 77 84	17, 27, 40, 52	0
1	C	393/406 (96%)	-0.19	3 (0%) 86 91	16, 26, 40, 53	0
1	D	386/406 (95%)	-0.17	3 (0%) 86 91	17, 27, 42, 48	0
All	All	1553/1624 (95%)	-0.18	13 (0%) 86 91	16, 27, 41, 56	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	335	VAL	3.5
1	B	335	VAL	3.5
1	D	335	VAL	3.3
1	D	350	HIS	2.7
1	C	335	VAL	2.7
1	D	10	SER	2.5
1	C	350	HIS	2.3
1	B	256	ASN	2.2
1	B	350	HIS	2.2
1	B	351	ASN	2.1
1	A	337	PRO	2.1
1	C	196	GLY	2.1
1	B	337	PRO	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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 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	LLDF	B-factors(\AA^2)	Q<0.9
2	PLP	D	501	15/16	0.95	0.19	2.76	29,42,44,45	0
2	PLP	A	501	15/16	0.96	0.14	0.50	28,32,33,34	0
2	PLP	C	501	15/16	0.97	0.15	0.23	34,39,41,42	0
2	PLP	B	501	15/16	0.98	0.15	-0.19	25,32,34,35	0

6.5 Other polymers [i](#)

There are no such residues in this entry.