Full wwPDB X-ray Structure Validation Report ⓘ

Nov 6, 2024 – 03:40 pm GMT

PDB ID	:	8R2P
Title	:	YZwIdeal x16 a scaffold for cryo-EM of small proteins of interest crystallizing in space group 19 (P 21 21 21)
Authors	:	Moche, M.; Friberg, O.; Nygren, P.A.; Nilvebrant, J.
Deposited on	:	2023-11-07
Resolution	:	2.22 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:

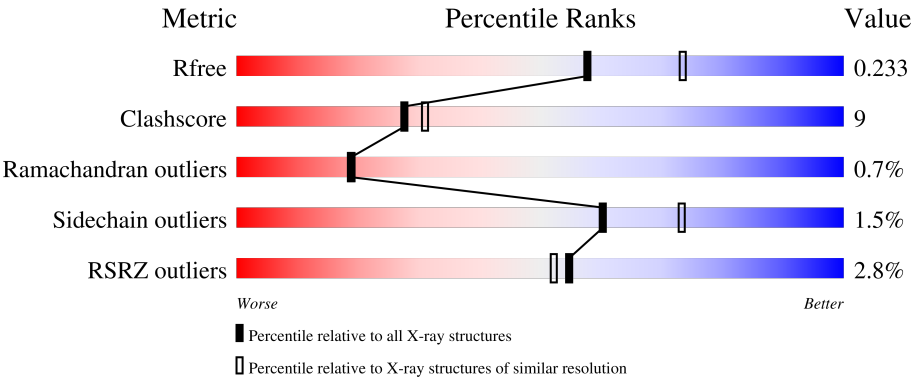
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.22 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	7167 (2.24-2.20)
Clashscore	180529	8096 (2.24-2.20)
Ramachandran outliers	177936	8010 (2.24-2.20)
Sidechain outliers	177891	8011 (2.24-2.20)
RSRZ outliers	164620	7166 (2.24-2.20)

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 <=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	523	% 74% 12% 13%
1	B	523	2% 73% 15% 11%
1	C	523	2% 76% 11% 12%
1	D	523	5% 81% 15%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 16262 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 Putrescine aminotransferase,Immunoglobulin G-binding protein A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	453	Total	C	N	O	S	0	11	0
			3531	2239	612	657	23			
1	B	463	Total	C	N	O	S	0	9	0
			3591	2276	622	670	23			
1	C	461	Total	C	N	O	S	0	14	0
			3628	2296	630	679	23			
1	D	507	Total	C	N	O	S	0	9	0
			3941	2494	685	739	23			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	GLY	-	expression tag	UNP P42588
A	-5	SER	-	expression tag	UNP P42588
A	-4	SER	-	expression tag	UNP P42588
A	-3	HIS	-	expression tag	UNP P42588
A	-2	HIS	-	expression tag	UNP P42588
A	-1	HIS	-	expression tag	UNP P42588
A	0	HIS	-	expression tag	UNP P42588
A	1	HIS	-	expression tag	UNP P42588
A	2	HIS	-	expression tag	UNP P42588
A	3	TYR	-	expression tag	UNP P42588
A	4	TYR	-	expression tag	UNP P42588
A	5	LEU	-	expression tag	UNP P42588
A	6	GLU	-	expression tag	UNP P42588
A	458	GLU	-	linker	UNP P42588
A	459	ALA	-	linker	UNP P42588
A	460	LEU	-	linker	UNP P42588
A	461	GLU	-	linker	UNP P42588
A	462	VAL	-	linker	UNP P42588
A	463	SER	-	linker	UNP P42588
A	464	ALA	-	linker	UNP P42588

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Chain	Residue	Modelled	Actual	Comment	Reference
A	487	ALA	GLY	engineered mutation	UNP P38507
B	-6	GLY	-	expression tag	UNP P42588
B	-5	SER	-	expression tag	UNP P42588
B	-4	SER	-	expression tag	UNP P42588
B	-3	HIS	-	expression tag	UNP P42588
B	-2	HIS	-	expression tag	UNP P42588
B	-1	HIS	-	expression tag	UNP P42588
B	0	HIS	-	expression tag	UNP P42588
B	1	HIS	-	expression tag	UNP P42588
B	2	HIS	-	expression tag	UNP P42588
B	3	TYR	-	expression tag	UNP P42588
B	4	TYR	-	expression tag	UNP P42588
B	5	LEU	-	expression tag	UNP P42588
B	6	GLU	-	expression tag	UNP P42588
B	458	GLU	-	linker	UNP P42588
B	459	ALA	-	linker	UNP P42588
B	460	LEU	-	linker	UNP P42588
B	461	GLU	-	linker	UNP P42588
B	462	VAL	-	linker	UNP P42588
B	463	SER	-	linker	UNP P42588
B	464	ALA	-	linker	UNP P42588
B	487	ALA	GLY	engineered mutation	UNP P38507
C	-6	GLY	-	expression tag	UNP P42588
C	-5	SER	-	expression tag	UNP P42588
C	-4	SER	-	expression tag	UNP P42588
C	-3	HIS	-	expression tag	UNP P42588
C	-2	HIS	-	expression tag	UNP P42588
C	-1	HIS	-	expression tag	UNP P42588
C	0	HIS	-	expression tag	UNP P42588
C	1	HIS	-	expression tag	UNP P42588
C	2	HIS	-	expression tag	UNP P42588
C	3	TYR	-	expression tag	UNP P42588
C	4	TYR	-	expression tag	UNP P42588
C	5	LEU	-	expression tag	UNP P42588
C	6	GLU	-	expression tag	UNP P42588
C	458	GLU	-	linker	UNP P42588
C	459	ALA	-	linker	UNP P42588
C	460	LEU	-	linker	UNP P42588
C	461	GLU	-	linker	UNP P42588
C	462	VAL	-	linker	UNP P42588
C	463	SER	-	linker	UNP P42588
C	464	ALA	-	linker	UNP P42588

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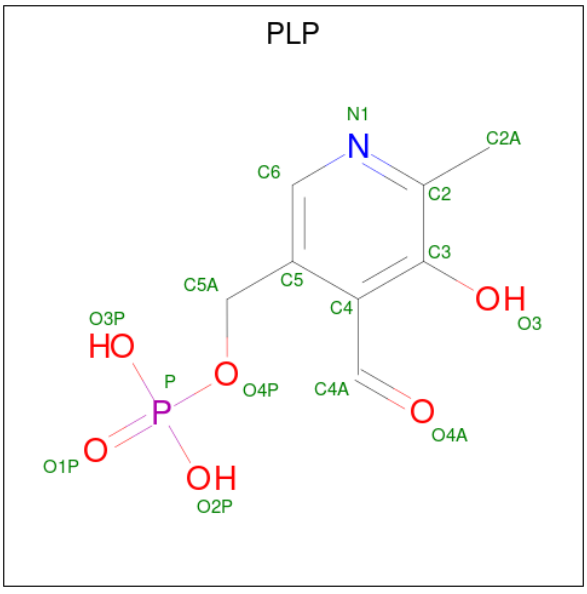
Chain	Residue	Modelled	Actual	Comment	Reference
C	487	ALA	GLY	engineered mutation	UNP P38507
D	-6	GLY	-	expression tag	UNP P42588
D	-5	SER	-	expression tag	UNP P42588
D	-4	SER	-	expression tag	UNP P42588
D	-3	HIS	-	expression tag	UNP P42588
D	-2	HIS	-	expression tag	UNP P42588
D	-1	HIS	-	expression tag	UNP P42588
D	0	HIS	-	expression tag	UNP P42588
D	1	HIS	-	expression tag	UNP P42588
D	2	HIS	-	expression tag	UNP P42588
D	3	TYR	-	expression tag	UNP P42588
D	4	TYR	-	expression tag	UNP P42588
D	5	LEU	-	expression tag	UNP P42588
D	6	GLU	-	expression tag	UNP P42588
D	458	GLU	-	linker	UNP P42588
D	459	ALA	-	linker	UNP P42588
D	460	LEU	-	linker	UNP P42588
D	461	GLU	-	linker	UNP P42588
D	462	VAL	-	linker	UNP P42588
D	463	SER	-	linker	UNP P42588
D	464	ALA	-	linker	UNP P42588
D	487	ALA	GLY	engineered mutation	UNP P38507

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: $C_8H_{10}NO_6P$).



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

- Molecule 3 is water.

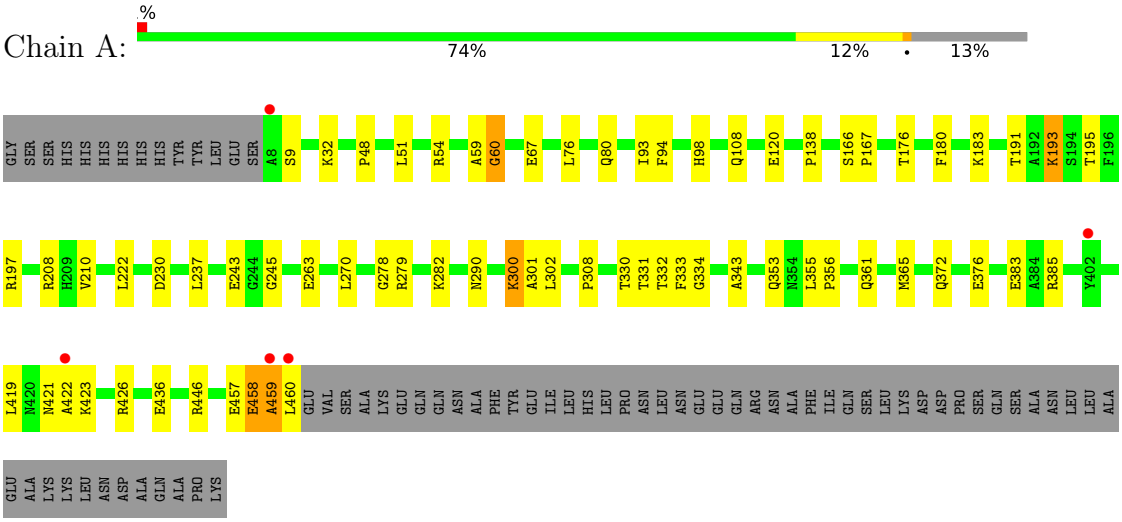
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	346	Total	O	0	0
			346	346		
3	B	406	Total	O	0	0
			406	406		
3	C	348	Total	O	0	0
			348	348		
3	D	407	Total	O	0	0
			407	407		

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.

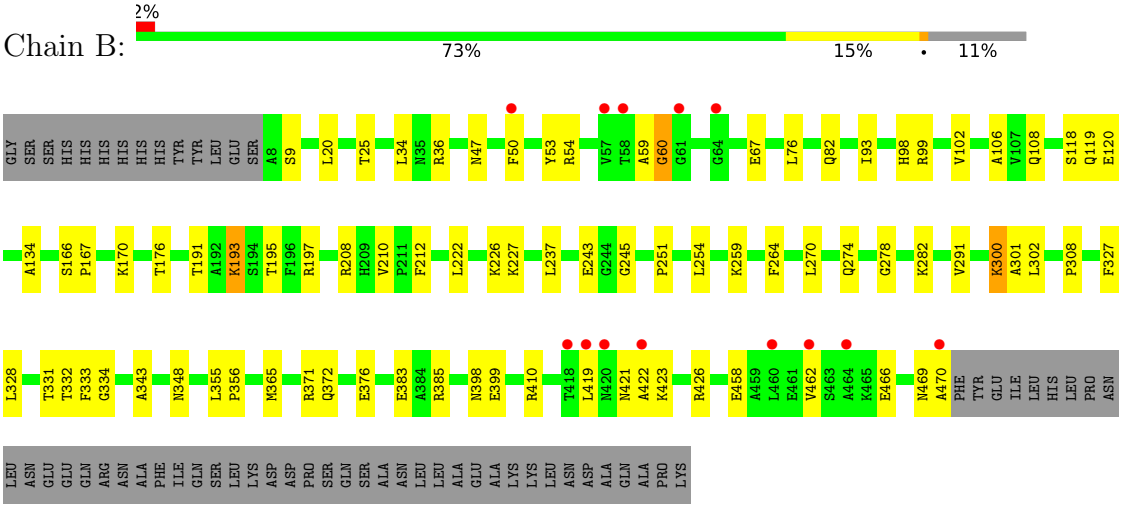
• Molecule 1: Putrescine aminotransferase,Immunoglobulin G-binding protein A

Chain A:



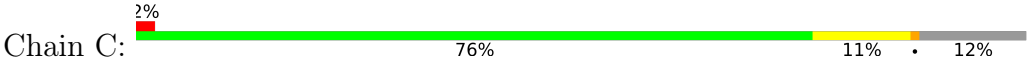
• Molecule 1: Putrescine aminotransferase,Immunoglobulin G-binding protein A

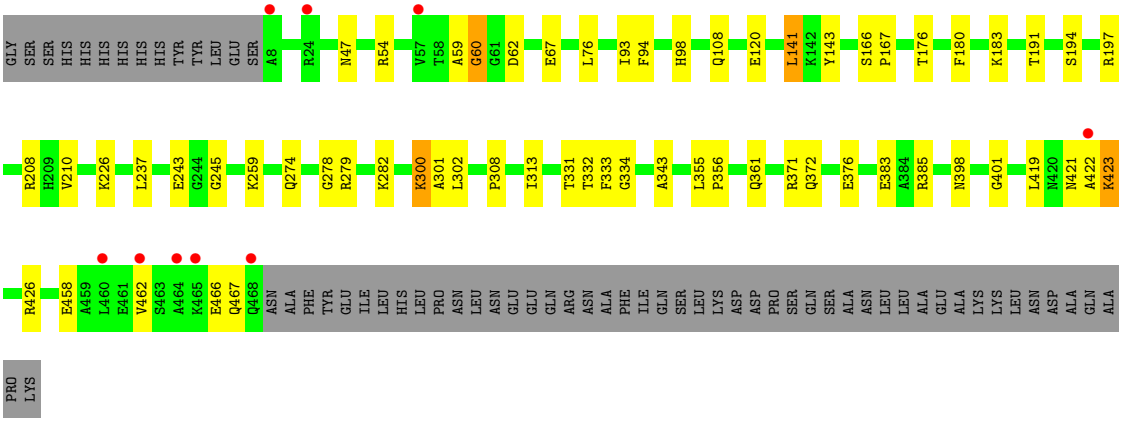
Chain B:



• Molecule 1: Putrescine aminotransferase,Immunoglobulin G-binding protein A

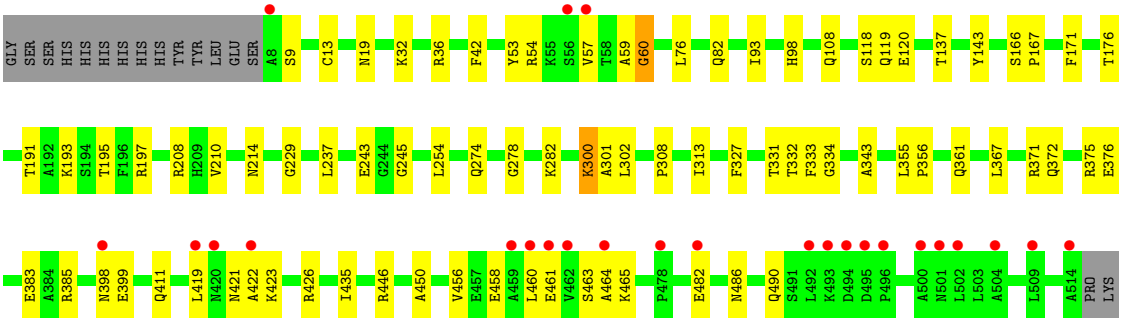
Chain C:





• Molecule 1: Putrescine aminotransferase,Immunoglobulin G-binding protein A

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	73.26Å 196.76Å 208.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.91 – 2.22 48.91 – 2.22	Depositor EDS
% Data completeness (in resolution range)	41.1 (48.91-2.22) 41.2 (48.91-2.22)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.51 (at 2.22Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.186 , 0.230 0.195 , 0.233	Depositor DCC
R_{free} test set	7267 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å^2)	27.5	Xtriage
Anisotropy	0.204	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 41.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.52$, $< L^2 > = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	16262	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 52.06 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.1313e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.66	0/3595	0.81	0/4863
1	B	0.67	0/3655	0.82	0/4942
1	C	0.67	0/3692	0.81	0/4993
1	D	0.68	0/4011	0.82	0/5425
All	All	0.67	0/14953	0.81	0/20223

There are no bond length outliers.

There are no bond angle outliers.

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	3531	0	3553	74	0
1	B	3591	0	3623	81	0
1	C	3628	0	3646	68	0
1	D	3941	0	3957	90	0
2	A	16	0	8	4	0
2	B	16	0	7	2	0
2	C	16	0	7	4	0
2	D	16	0	7	3	0
3	A	346	0	0	22	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	406	0	0	29	0
3	C	348	0	0	17	0
3	D	407	0	0	32	0
All	All	16262	0	14808	263	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 9.

All (263) 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:108[B]:GLN:OE1	1:D:108[B]:GLN:NE2	1.67	1.28
1:A:108[B]:GLN:OE1	1:B:108[B]:GLN:NE2	1.68	1.26
1:C:108[B]:GLN:NE2	1:D:108[B]:GLN:OE1	1.69	1.25
1:A:208[A]:ARG:NH2	3:A:701:HOH:O	1.82	1.10
1:A:108[B]:GLN:NE2	1:B:108[B]:GLN:OE1	1.88	1.07
1:C:208[A]:ARG:NH2	3:C:701:HOH:O	1.94	0.99
1:A:195:THR:O	3:A:702:HOH:O	1.85	0.92
1:C:108[B]:GLN:CD	1:D:108[B]:GLN:HE22	1.74	0.91
1:D:195:THR:O	3:D:701:HOH:O	1.89	0.89
1:C:332[B]:THR:CG2	1:D:93:ILE:HD11	2.03	0.88
1:D:376:GLU:O	3:D:702:HOH:O	1.90	0.88
1:C:67:GLU:OE2	1:D:118:SER:OG	1.91	0.87
1:D:108[A]:GLN:OE1	3:D:703:HOH:O	1.95	0.84
1:B:226:LYS:O	3:B:701:HOH:O	1.95	0.83
1:A:458:GLU:O	1:A:460:LEU:N	2.14	0.81
1:A:108[B]:GLN:CD	1:B:108[B]:GLN:HE22	1.83	0.80
1:C:423:LYS:HA	3:C:830:HOH:O	1.84	0.78
1:D:446[A]:ARG:NH1	3:D:704:HOH:O	1.99	0.77
1:C:108[B]:GLN:CD	1:D:108[B]:GLN:NE2	2.36	0.76
1:C:332[A]:THR:HG21	1:D:300:LYS:CE	2.15	0.75
1:C:108[B]:GLN:OE1	1:D:108[B]:GLN:CD	2.24	0.74
1:D:332[A]:THR:HG22	3:D:801:HOH:O	1.88	0.74
1:C:300:LYS:HE3	1:D:332[A]:THR:HG21	1.68	0.74
1:C:108[B]:GLN:CD	1:D:108[B]:GLN:OE1	2.26	0.73
1:C:332[B]:THR:HG23	1:D:93:ILE:HD11	1.70	0.73
1:A:332[B]:THR:CG2	1:B:93:ILE:HD11	2.18	0.73
1:D:19[A]:ASN:OD1	3:D:705:HOH:O	2.08	0.72
1:D:19[B]:ASN:ND2	3:D:711:HOH:O	2.22	0.72
1:A:353:GLN:OE1	3:A:704:HOH:O	2.08	0.72
1:A:48:PRO:O	3:A:703:HOH:O	2.08	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:212:PHE:O	3:B:702:HOH:O	2.08	0.71
1:C:466:GLU:O	1:C:467:GLN:HG3	1.90	0.70
1:A:332[B]:THR:HG23	1:B:93:ILE:HD11	1.73	0.69
1:B:195:THR:O	3:B:703:HOH:O	2.08	0.69
1:C:332[A]:THR:HG21	1:D:300:LYS:HE3	1.74	0.69
1:C:108[B]:GLN:NE2	1:D:108[B]:GLN:CD	2.46	0.69
1:A:300:LYS:HE3	1:B:332[A]:THR:HG21	1.74	0.69
1:A:376:GLU:O	3:A:705:HOH:O	2.10	0.69
1:D:361:GLN:HB2	3:D:825:HOH:O	1.93	0.68
1:C:141:LEU:O	3:C:702:HOH:O	2.12	0.68
1:A:300:LYS:NZ	2:A:601:PLP:O4A	2.26	0.68
1:A:457:GLU:O	1:A:458:GLU:O	2.13	0.66
1:C:300:LYS:CE	1:D:332[A]:THR:HG21	2.25	0.66
1:D:371[A]:ARG:NH2	3:D:714:HOH:O	2.29	0.66
1:B:82:GLN:HG3	3:B:920:HOH:O	1.95	0.66
1:A:93:ILE:HD11	1:B:332[B]:THR:HG23	1.78	0.65
1:A:279:ARG:NH2	3:A:712:HOH:O	2.28	0.65
1:D:450:ALA:HA	3:D:947:HOH:O	1.95	0.65
1:A:332[A]:THR:HG21	1:B:300:LYS:CE	2.27	0.65
1:D:456:VAL:O	1:D:460:LEU:CD1	2.45	0.65
1:B:376:GLU:O	3:B:704:HOH:O	2.14	0.64
1:A:300:LYS:CE	1:B:332[A]:THR:HG21	2.28	0.64
1:A:263:GLU:OE2	3:A:706:HOH:O	2.14	0.64
1:A:332[A]:THR:HG23	2:B:601:PLP:O3P	1.97	0.64
1:D:399:GLU:N	3:D:710:HOH:O	2.21	0.64
1:D:137:THR:O	3:D:706:HOH:O	2.14	0.64
1:A:282:LYS:O	3:A:707:HOH:O	2.14	0.64
1:A:93:ILE:HD11	1:B:332[B]:THR:CG2	2.28	0.63
1:A:308:PRO:HB3	1:B:333:PHE:HB3	1.79	0.63
1:C:308:PRO:HB3	1:D:333:PHE:HB3	1.80	0.63
1:D:419:LEU:HD23	3:D:1037:HOH:O	1.97	0.63
1:C:371:ARG:NH1	3:C:711:HOH:O	2.28	0.62
1:D:82:GLN:HG3	3:D:920:HOH:O	1.99	0.62
1:B:170:LYS:NZ	3:B:720:HOH:O	2.34	0.61
1:A:208[A]:ARG:HG2	1:D:208[A]:ARG:NE	2.14	0.61
1:A:208[A]:ARG:HG2	1:D:208[A]:ARG:HE	1.67	0.60
1:D:208[B]:ARG:HD3	3:D:848:HOH:O	2.02	0.60
1:B:331:THR:HG23	1:B:334:GLY:H	1.67	0.59
1:D:331:THR:HG23	1:D:334:GLY:H	1.67	0.59
1:D:13:CYS:HB3	3:D:1027:HOH:O	2.02	0.59
1:C:108[B]:GLN:CD	1:D:108[B]:GLN:CD	2.62	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:53:TYR:O	1:D:57:VAL:HG12	2.03	0.58
1:A:422:ALA:O	1:A:423:LYS:HG2	2.04	0.58
1:C:108[A]:GLN:OE1	3:C:703:HOH:O	2.16	0.58
1:B:102:VAL:O	3:B:706:HOH:O	2.17	0.58
1:B:251:PRO:O	3:B:705:HOH:O	2.16	0.57
1:A:243:GLU:OE1	1:A:426:ARG:NH2	2.38	0.57
1:C:243:GLU:OE1	1:C:426:ARG:NH2	2.38	0.57
1:A:331:THR:HG23	1:A:334:GLY:H	1.70	0.57
1:B:134:ALA:O	3:B:707:HOH:O	2.18	0.57
1:C:331:THR:HG23	1:C:334:GLY:H	1.70	0.56
1:C:120:GLU:O	1:D:54:ARG:HD3	2.05	0.56
1:A:193:LYS:HD3	1:A:195:THR:OG1	2.06	0.56
1:B:422:ALA:O	1:B:423:LYS:HG2	2.05	0.56
1:D:482:GLU:OE1	3:D:707:HOH:O	2.18	0.56
1:A:108[B]:GLN:OE1	3:A:708:HOH:O	2.18	0.55
1:D:300:LYS:NZ	2:D:601:PLP:O4A	2.39	0.55
1:C:332[A]:THR:HG21	1:D:300:LYS:HE2	1.87	0.55
1:C:422:ALA:O	1:C:423:LYS:HG2	2.06	0.55
1:C:47:ASN:HB2	3:C:800:HOH:O	2.06	0.55
1:D:243:GLU:OE1	1:D:426:ARG:NH2	2.39	0.55
1:D:375:ARG:HG2	3:D:1005:HOH:O	2.05	0.55
1:D:422:ALA:O	1:D:423:LYS:HG2	2.06	0.55
1:B:243:GLU:OE1	1:B:426:ARG:NH2	2.39	0.55
1:C:282:LYS:HE2	3:C:824:HOH:O	2.07	0.54
1:B:36:ARG:O	3:B:708:HOH:O	2.18	0.54
1:C:398[B]:ASN:H	1:C:398[B]:ASN:ND2	2.04	0.54
1:D:243:GLU:HB3	1:D:419:LEU:HB2	1.90	0.54
1:A:332[A]:THR:HG21	1:B:300:LYS:HE3	1.88	0.54
1:B:331:THR:HG22	3:B:773:HOH:O	2.06	0.54
1:C:243:GLU:HB3	1:C:419:LEU:HB2	1.90	0.53
1:B:9:SER:HB2	3:B:993:HOH:O	2.07	0.53
1:B:243:GLU:HB3	1:B:419:LEU:HB2	1.91	0.53
1:C:332[A]:THR:HG23	2:D:601:PLP:O2P	2.09	0.53
1:A:108[B]:GLN:CD	1:B:108[B]:GLN:NE2	2.52	0.53
1:A:243:GLU:CD	1:A:426:ARG:HH22	2.12	0.53
1:C:76:LEU:HD21	1:C:98:HIS:CE1	2.44	0.53
1:C:243:GLU:CD	1:C:426:ARG:HH22	2.12	0.52
1:A:243:GLU:HB3	1:A:419:LEU:HB2	1.90	0.52
1:D:36:ARG:O	3:D:708:HOH:O	2.19	0.52
1:B:243:GLU:CD	1:B:426:ARG:HH22	2.13	0.52
1:D:243:GLU:CD	1:D:426:ARG:HH22	2.13	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:76:LEU:HD21	1:D:98:HIS:CE1	2.45	0.52
1:D:19[A]:ASN:ND2	3:D:722:HOH:O	2.40	0.52
1:A:76:LEU:HD21	1:A:98:HIS:CE1	2.45	0.52
1:C:333:PHE:HB3	1:D:308:PRO:HB3	1.90	0.52
1:C:274:GLN:NE2	2:C:601:PLP:O3	2.43	0.52
1:D:274:GLN:NE2	2:D:601:PLP:O3	2.43	0.52
1:B:398:ASN:ND2	1:B:422:ALA:HB1	2.25	0.51
1:A:32:LYS:HE2	3:A:890:HOH:O	2.10	0.51
1:D:398:ASN:ND2	1:D:422:ALA:HB1	2.26	0.51
1:A:330:THR:O	3:A:709:HOH:O	2.19	0.51
1:B:108[B]:GLN:HG3	3:B:1028:HOH:O	2.09	0.51
1:A:108[B]:GLN:CD	1:B:108[B]:GLN:OE1	2.47	0.51
1:B:53:TYR:HE1	3:B:1014:HOH:O	1.93	0.51
1:C:59:ALA:HB1	3:C:1022:HOH:O	2.11	0.50
1:C:226:LYS:O	3:C:704:HOH:O	2.19	0.50
1:A:333:PHE:HB3	1:B:308:PRO:HB3	1.93	0.49
1:B:76:LEU:HD21	1:B:98:HIS:CE1	2.46	0.49
1:C:108[B]:GLN:OE1	1:D:108[B]:GLN:OE1	2.28	0.49
1:B:227:LYS:HG2	3:B:1020:HOH:O	2.12	0.49
1:C:398[A]:ASN:ND2	1:C:422:ALA:HB1	2.28	0.49
1:B:245:GLY:HA3	1:B:421:ASN:HD22	1.78	0.49
1:D:9:SER:HA	3:D:924:HOH:O	2.11	0.49
1:D:456:VAL:O	1:D:460:LEU:HD12	2.13	0.49
1:B:291:VAL:HG22	3:B:1003:HOH:O	2.13	0.49
1:C:245:GLY:HA3	1:C:421:ASN:HD22	1.79	0.48
1:B:251:PRO:HG3	3:B:1098:HOH:O	2.13	0.48
1:A:183:LYS:NZ	1:B:327:PHE:O	2.44	0.48
1:B:20[B]:LEU:HD11	1:B:34:LEU:HD22	1.95	0.48
1:D:245:GLY:HA3	1:D:421:ASN:HD22	1.78	0.48
1:C:93:ILE:HD11	1:D:332[B]:THR:HG23	1.96	0.48
1:A:436:GLU:HG2	3:A:1030:HOH:O	2.13	0.48
1:A:245:GLY:HA3	1:A:421:ASN:HD22	1.79	0.47
1:A:54:ARG:HD3	1:B:120:GLU:O	2.14	0.47
1:B:274:GLN:NE2	2:B:601:PLP:O3	2.47	0.47
1:B:278:GLY:HA2	1:B:282:LYS:O	2.14	0.47
1:D:456:VAL:O	1:D:460:LEU:HG	2.14	0.47
1:D:411:GLN:OE1	3:D:709:HOH:O	2.20	0.47
1:A:332[A]:THR:HG21	1:B:300:LYS:HE2	1.96	0.47
1:B:166:SER:N	1:B:167:PRO:CD	2.78	0.47
1:B:410:ARG:HG2	3:B:940:HOH:O	2.14	0.47
1:B:371[A]:ARG:NH1	3:B:744:HOH:O	2.47	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:290[A]:ASN:OD1	3:A:710:HOH:O	2.21	0.46
1:D:229:GLY:HA2	3:D:786:HOH:O	2.15	0.46
2:A:601:PLP:O3P	1:B:332[A]:THR:HG23	2.16	0.46
1:B:254:LEU:HD22	3:B:1013:HOH:O	2.15	0.46
1:C:278:GLY:HA2	1:C:282:LYS:O	2.15	0.46
1:D:435:ILE:HG12	3:D:867:HOH:O	2.16	0.46
1:D:486:ASN:O	1:D:490:GLN:HG2	2.16	0.46
1:D:166:SER:N	1:D:167:PRO:CD	2.79	0.46
1:A:166:SER:N	1:A:167:PRO:CD	2.79	0.46
1:B:399:GLU:HB2	3:B:872:HOH:O	2.16	0.46
1:C:332[B]:THR:HG22	1:D:93:ILE:HD11	1.91	0.46
1:B:108[B]:GLN:OE1	3:B:709:HOH:O	2.20	0.46
1:C:372:GLN:O	1:C:376:GLU:HG3	2.16	0.46
1:D:59:ALA:O	1:D:60:GLY:O	2.34	0.46
1:A:372:GLN:O	1:A:376:GLU:HG3	2.16	0.46
1:D:278:GLY:HA2	1:D:282:LYS:O	2.15	0.46
1:A:278:GLY:HA2	1:A:282:LYS:O	2.15	0.45
1:B:208[B]:ARG:NH2	3:B:749:HOH:O	2.50	0.45
1:C:166:SER:N	1:C:167:PRO:CD	2.79	0.45
1:C:302:LEU:O	1:C:343:ALA:HA	2.16	0.45
1:A:51:LEU:HB2	3:A:703:HOH:O	2.16	0.45
1:D:214:ASN:HB2	3:D:874:HOH:O	2.15	0.45
1:B:176:THR:HA	1:B:210:VAL:O	2.17	0.45
1:A:458:GLU:O	1:A:459:ALA:C	2.55	0.45
1:B:328:LEU:HD12	1:B:328:LEU:HA	1.85	0.45
1:C:183:LYS:NZ	1:D:327:PHE:O	2.47	0.45
1:C:458:GLU:O	1:C:462:VAL:HG23	2.16	0.45
1:A:176:THR:HA	1:A:210:VAL:O	2.17	0.45
1:A:270:LEU:HD23	1:A:270:LEU:HA	1.81	0.45
1:C:54:ARG:HD3	1:D:120:GLU:O	2.17	0.45
1:D:254:LEU:HD22	3:D:978:HOH:O	2.17	0.45
1:A:308:PRO:HB3	1:B:333:PHE:CB	2.47	0.44
1:A:446:ARG:HD2	3:A:766:HOH:O	2.17	0.44
1:A:9:SER:HB2	3:A:923:HOH:O	2.17	0.44
1:A:208[B]:ARG:HE	1:D:208[B]:ARG:HG2	1.82	0.44
1:B:372:GLN:O	1:B:376:GLU:HG3	2.17	0.44
1:D:9:SER:HB2	3:D:991:HOH:O	2.17	0.44
1:C:176:THR:HA	1:C:210:VAL:O	2.16	0.44
1:C:180:PHE:O	2:C:601:PLP:H2A3	2.17	0.44
1:D:302:LEU:O	1:D:343:ALA:HA	2.18	0.44
1:B:348:ASN:OD1	3:B:710:HOH:O	2.21	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:372:GLN:O	1:D:376:GLU:HG3	2.18	0.44
1:C:94:PHE:HA	3:C:836:HOH:O	2.17	0.44
1:C:237:LEU:HA	3:C:770:HOH:O	2.17	0.44
1:C:183:LYS:HD3	3:C:820:HOH:O	2.18	0.44
1:C:308:PRO:HB3	1:D:333:PHE:CB	2.47	0.43
1:D:176:THR:HA	1:D:210:VAL:O	2.18	0.43
1:B:302:LEU:O	1:B:343:ALA:HA	2.18	0.43
1:C:355:LEU:N	1:C:356:PRO:CD	2.82	0.43
1:C:401:GLY:HA3	3:C:830:HOH:O	2.18	0.43
1:D:355:LEU:N	1:D:356:PRO:CD	2.81	0.43
1:A:120:GLU:O	1:B:54:ARG:HD3	2.19	0.43
1:B:25:THR:HG22	3:B:787:HOH:O	2.18	0.43
1:B:106:ALA:HA	3:B:779:HOH:O	2.18	0.43
1:B:458:GLU:O	1:B:462:VAL:HG23	2.18	0.43
1:A:302:LEU:O	1:A:343:ALA:HA	2.18	0.43
1:B:365[B]:MET:SD	1:B:365[B]:MET:C	2.97	0.43
1:B:419:LEU:HD23	3:B:992:HOH:O	2.17	0.43
1:B:191:THR:O	1:B:197:ARG:HD2	2.19	0.43
1:D:54:ARG:NE	3:D:725:HOH:O	2.43	0.43
1:D:367:LEU:HB2	3:D:869:HOH:O	2.18	0.42
1:A:300:LYS:HZ1	2:A:601:PLP:C4A	2.28	0.42
1:B:355:LEU:N	1:B:356:PRO:CD	2.82	0.42
1:C:194:SER:HB3	3:C:877:HOH:O	2.19	0.42
1:A:355:LEU:N	1:A:356:PRO:CD	2.82	0.42
1:C:59:ALA:O	1:C:60:GLY:O	2.37	0.42
1:A:60:GLY:HA2	3:A:740:HOH:O	2.20	0.42
1:A:180:PHE:O	2:A:601:PLP:H2A3	2.19	0.42
1:A:191:THR:O	1:A:197:ARG:HD2	2.20	0.42
1:B:59:ALA:O	1:B:60:GLY:O	2.37	0.42
1:D:166:SER:HB2	1:D:171:PHE:CE2	2.55	0.42
1:D:191:THR:O	1:D:197:ARG:HD2	2.20	0.42
1:C:361[C]:GLN:NE2	3:C:752:HOH:O	2.53	0.42
1:B:193:LYS:HD2	3:B:1009:HOH:O	2.19	0.42
1:D:331:THR:CG2	1:D:334:GLY:HA3	2.50	0.42
1:A:108[B]:GLN:NE2	1:B:108[B]:GLN:CD	2.68	0.41
1:D:118:SER:O	1:D:119:GLN:HB2	2.20	0.41
1:C:300:LYS:HZ1	2:C:601:PLP:C4A	2.33	0.41
1:B:99:ARG:NH2	3:B:751:HOH:O	2.50	0.41
1:B:118:SER:O	1:B:119:GLN:HB2	2.20	0.41
1:B:270:LEU:HA	1:B:270:LEU:HD23	1.79	0.41
1:C:143:TYR:O	1:C:313:ILE:HA	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:279:ARG:NH2	3:C:754:HOH:O	2.54	0.41
1:D:214:ASN:HA	3:D:933:HOH:O	2.19	0.41
1:A:93:ILE:O	1:A:301:ALA:HA	2.21	0.41
1:A:361:GLN:HB2	3:A:803:HOH:O	2.20	0.41
1:B:93:ILE:O	1:B:301:ALA:HA	2.20	0.41
1:B:469:ASN:O	1:B:470:ALA:C	2.59	0.41
1:D:237:LEU:HD23	1:D:237:LEU:N	2.36	0.41
1:A:94:PHE:HA	3:A:867:HOH:O	2.19	0.41
1:B:47:ASN:HB3	1:B:50:PHE:HD2	1.86	0.41
1:C:361[C]:GLN:CD	3:C:752:HOH:O	2.58	0.41
1:A:80:GLN:NE2	3:A:764:HOH:O	2.53	0.41
1:C:191:THR:O	1:C:197:ARG:HD2	2.21	0.41
1:A:59:ALA:O	1:A:60:GLY:O	2.38	0.41
1:A:108[B]:GLN:HE22	1:B:108[B]:GLN:CD	2.21	0.41
1:B:222:LEU:HD23	1:B:264:PHE:CD2	2.56	0.41
1:C:93:ILE:O	1:C:301:ALA:HA	2.20	0.41
1:D:32:LYS:HG2	3:D:946:HOH:O	2.20	0.41
1:A:230:ASP:HA	3:A:942:HOH:O	2.21	0.41
1:B:331:THR:CG2	1:B:334:GLY:HA3	2.51	0.41
1:C:237:LEU:HD23	1:C:237:LEU:N	2.36	0.41
1:A:237:LEU:HD23	1:A:237:LEU:N	2.36	0.40
1:D:93:ILE:O	1:D:301:ALA:HA	2.21	0.40
1:D:371[B]:ARG:NH1	3:D:749:HOH:O	2.53	0.40
1:A:365[B]:MET:C	1:A:365[B]:MET:SD	3.00	0.40
1:B:237:LEU:N	1:B:237:LEU:HD23	2.36	0.40
2:C:601:PLP:O1P	1:D:332[A]:THR:OG1	2.38	0.40
1:D:143:TYR:O	1:D:313:ILE:HA	2.21	0.40
1:A:138:PRO:HB3	3:A:876:HOH:O	2.20	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	462/523 (88%)	436 (94%)	22 (5%)	4 (1%)	14 13
1	B	470/523 (90%)	443 (94%)	25 (5%)	2 (0%)	30 33
1	C	474/523 (91%)	445 (94%)	27 (6%)	2 (0%)	30 33
1	D	514/523 (98%)	482 (94%)	26 (5%)	6 (1%)	11 8
All	All	1920/2092 (92%)	1806 (94%)	100 (5%)	14 (1%)	19 19

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	458	GLU
1	A	459	ALA
1	B	60	GLY
1	C	60	GLY
1	D	60	GLY
1	D	458	GLU
1	D	461	GLU
1	D	463	SER
1	A	60	GLY
1	B	300	LYS
1	C	300	LYS
1	D	464	ALA
1	A	300	LYS
1	D	300	LYS

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	371/421 (88%)	366 (99%)	5 (1%)	65 77
1	B	377/421 (90%)	371 (98%)	6 (2%)	58 71
1	C	382/421 (91%)	376 (98%)	6 (2%)	58 71
1	D	414/421 (98%)	409 (99%)	5 (1%)	67 79
All	All	1544/1684 (92%)	1522 (99%)	22 (1%)	60 75

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	67	GLU
1	A	193	LYS
1	A	222	LEU
1	A	383	GLU
1	A	385	ARG
1	B	67	GLU
1	B	193	LYS
1	B	259	LYS
1	B	383	GLU
1	B	385	ARG
1	B	466	GLU
1	C	62	ASP
1	C	141	LEU
1	C	259	LYS
1	C	383	GLU
1	C	385	ARG
1	C	423	LYS
1	D	42	PHE
1	D	193	LYS
1	D	383	GLU
1	D	385	ARG
1	D	465	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	241	GLN
1	B	241	GLN
1	C	82	GLN
1	C	241	GLN
1	D	241	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 (i)

There are no oligosaccharides 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	601	-	16,16,16	0.64	0	20,23,23	0.81	0
2	PLP	B	601	-	16,16,16	0.61	0	20,23,23	0.69	0
2	PLP	A	601	-	16,16,16	0.53	0	20,23,23	1.05	1 (5%)
2	PLP	C	601	-	16,16,16	0.61	0	20,23,23	0.94	1 (5%)

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	601	-	-	1/8/8/8	0/1/1/1
2	PLP	B	601	-	-	2/8/8/8	0/1/1/1
2	PLP	A	601	-	-	1/8/8/8	0/1/1/1
2	PLP	C	601	-	-	2/8/8/8	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	601	PLP	O4P-C5A-C5	2.90	114.88	109.35
2	C	601	PLP	O4P-C5A-C5	2.26	113.66	109.35

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	601	PLP	C3-C4-C4A-O4A
2	B	601	PLP	C3-C4-C4A-O4A
2	A	601	PLP	C3-C4-C4A-O4A
2	D	601	PLP	C3-C4-C4A-O4A
2	C	601	PLP	C5-C4-C4A-O4A
2	B	601	PLP	C5-C4-C4A-O4A

There are no ring outliers.

4 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	601	PLP	3	0
2	B	601	PLP	2	0
2	A	601	PLP	4	0
2	C	601	PLP	4	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, 95^{th} 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	453/523 (86%)	-0.28	5 (1%)	77	76	8, 26, 68, 122	11 (2%)
1	B	463/523 (88%)	-0.26	13 (2%)	55	52	10, 27, 71, 131	9 (1%)
1	C	461/523 (88%)	-0.28	9 (1%)	64	61	8, 26, 71, 126	14 (3%)
1	D	507/523 (96%)	-0.09	25 (4%)	36	33	10, 29, 118, 144	9 (1%)
All	All	1884/2092 (90%)	-0.22	52 (2%)	55	52	8, 27, 84, 144	43 (2%)

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	462	VAL	6.6
1	D	459	ALA	5.7
1	D	460	LEU	4.1
1	C	468	GLN	4.1
1	B	419	LEU	4.0
1	C	460	LEU	3.8
1	A	460	LEU	3.8
1	B	470	ALA	3.7
1	C	422	ALA	3.7
1	B	64	GLY	3.6
1	C	462	VAL	3.5
1	D	496	PRO	3.4
1	D	492	LEU	3.4
1	A	422	ALA	3.3
1	B	420	ASN	3.2
1	D	8	ALA	3.2
1	D	509	LEU	3.2
1	D	464	ALA	3.2
1	A	459	ALA	3.1
1	D	422	ALA	3.1
1	D	500	ALA	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	422	ALA	2.9
1	B	57	VAL	2.8
1	D	514	ALA	2.7
1	C	24[A]	ARG	2.7
1	D	502	LEU	2.6
1	B	61	GLY	2.6
1	D	494	ASP	2.6
1	B	460	LEU	2.6
1	D	495	ASP	2.5
1	C	464	ALA	2.5
1	D	482	GLU	2.5
1	D	57	VAL	2.5
1	D	493	LYS	2.5
1	B	462	VAL	2.4
1	D	501	ASN	2.4
1	C	465	LYS	2.4
1	B	50	PHE	2.3
1	B	58	THR	2.3
1	D	478	PRO	2.3
1	D	56	SER	2.3
1	D	461	GLU	2.2
1	C	57	VAL	2.2
1	D	420	ASN	2.2
1	A	8	ALA	2.2
1	A	402	TYR	2.1
1	C	8	ALA	2.1
1	D	504	ALA	2.1
1	D	398	ASN	2.1
1	B	464	ALA	2.1
1	D	419	LEU	2.1
1	B	418	THR	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

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, 95^{th} 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	D	601	16/16	0.94	0.13	27,36,41,41	16
2	PLP	C	601	16/16	0.95	0.11	22,25,29,29	16
2	PLP	B	601	16/16	0.95	0.11	25,31,33,33	16
2	PLP	A	601	16/16	0.96	0.09	24,31,32,33	16

6.5 Other polymers

There are no such residues in this entry.