



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 03:06 PM UTC

PDB ID : 4GRX / pdb_00004grx
Title : Structure of an omega-aminotransferase from *Paracoccus denitrificans*
Authors : Rausch, C.; Lerchner, A.; Schiefner, A.; Skerra, A.
Deposited on : 2012-08-27
Resolution : 2.60 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

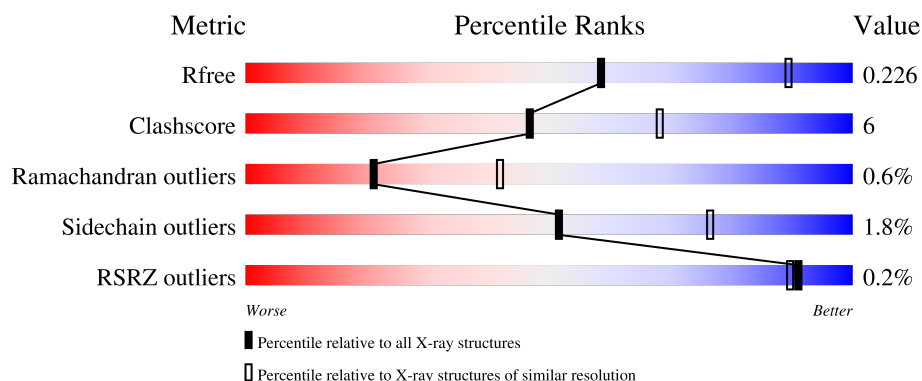
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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}	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	465	 84% 12% ..
1	B	465	 85% 11% ..
1	C	465	 82% 14% ..
1	D	465	 82% 14% ..

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 14277 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.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	449	Total	C	N	O	P	S	0	0	0
			3503	2241	594	645	1	22			
1	B	449	Total	C	N	O	P	S	0	0	0
			3503	2241	594	645	1	22			
1	C	449	Total	C	N	O	P	S	0	0	0
			3503	2241	594	645	1	22			
1	D	449	Total	C	N	O	P	S	0	0	0
			3503	2241	594	645	1	22			

There are 52 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MET	-	expression tag	UNP A1B956
A	-10	ALA	-	expression tag	UNP A1B956
A	-9	SER	-	expression tag	UNP A1B956
A	-8	TRP	-	expression tag	UNP A1B956
A	-7	SER	-	expression tag	UNP A1B956
A	-6	HIS	-	expression tag	UNP A1B956
A	-5	PRO	-	expression tag	UNP A1B956
A	-4	GLN	-	expression tag	UNP A1B956
A	-3	PHE	-	expression tag	UNP A1B956
A	-2	GLU	-	expression tag	UNP A1B956
A	-1	LYS	-	expression tag	UNP A1B956
A	0	GLY	-	expression tag	UNP A1B956
A	1	ALA	-	expression tag	UNP A1B956
B	-11	MET	-	expression tag	UNP A1B956
B	-10	ALA	-	expression tag	UNP A1B956
B	-9	SER	-	expression tag	UNP A1B956
B	-8	TRP	-	expression tag	UNP A1B956
B	-7	SER	-	expression tag	UNP A1B956
B	-6	HIS	-	expression tag	UNP A1B956
B	-5	PRO	-	expression tag	UNP A1B956
B	-4	GLN	-	expression tag	UNP A1B956

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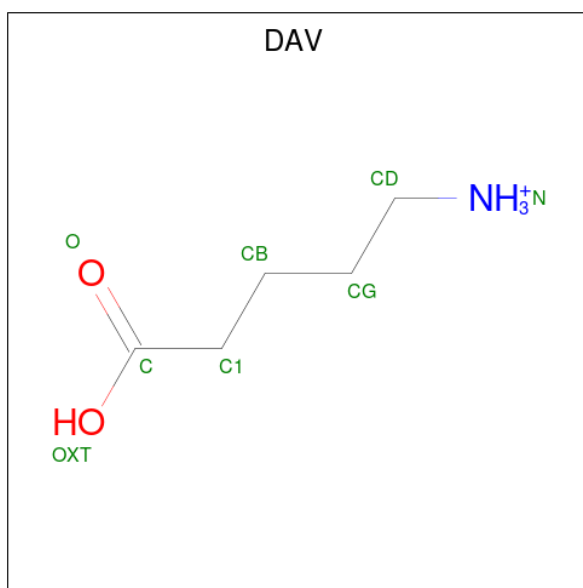
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	PHE	-	expression tag	UNP A1B956
B	-2	GLU	-	expression tag	UNP A1B956
B	-1	LYS	-	expression tag	UNP A1B956
B	0	GLY	-	expression tag	UNP A1B956
B	1	ALA	-	expression tag	UNP A1B956
C	-11	MET	-	expression tag	UNP A1B956
C	-10	ALA	-	expression tag	UNP A1B956
C	-9	SER	-	expression tag	UNP A1B956
C	-8	TRP	-	expression tag	UNP A1B956
C	-7	SER	-	expression tag	UNP A1B956
C	-6	HIS	-	expression tag	UNP A1B956
C	-5	PRO	-	expression tag	UNP A1B956
C	-4	GLN	-	expression tag	UNP A1B956
C	-3	PHE	-	expression tag	UNP A1B956
C	-2	GLU	-	expression tag	UNP A1B956
C	-1	LYS	-	expression tag	UNP A1B956
C	0	GLY	-	expression tag	UNP A1B956
C	1	ALA	-	expression tag	UNP A1B956
D	-11	MET	-	expression tag	UNP A1B956
D	-10	ALA	-	expression tag	UNP A1B956
D	-9	SER	-	expression tag	UNP A1B956
D	-8	TRP	-	expression tag	UNP A1B956
D	-7	SER	-	expression tag	UNP A1B956
D	-6	HIS	-	expression tag	UNP A1B956
D	-5	PRO	-	expression tag	UNP A1B956
D	-4	GLN	-	expression tag	UNP A1B956
D	-3	PHE	-	expression tag	UNP A1B956
D	-2	GLU	-	expression tag	UNP A1B956
D	-1	LYS	-	expression tag	UNP A1B956
D	0	GLY	-	expression tag	UNP A1B956
D	1	ALA	-	expression tag	UNP A1B956

- Molecule 2 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Na 1 1	0	0
2	B	1	Total Na 1 1	0	0
2	C	1	Total Na 1 1	0	0
2	D	1	Total Na 1 1	0	0

- Molecule 3 is DELTA-AMINO VALERIC ACID (CCD ID: DAV) (formula: $C_5H_{12}NO_2$).



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

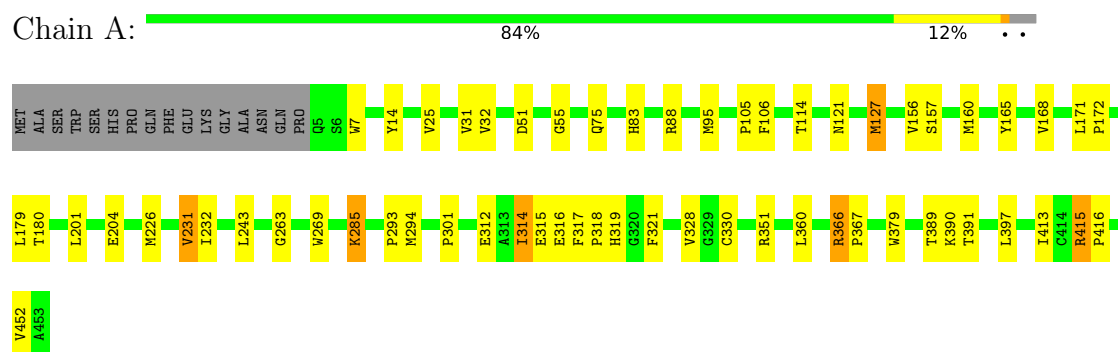
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	74	Total	O	0	0
			74	74		
4	B	59	Total	O	0	0
			59	59		
4	C	64	Total	O	0	0
			64	64		
4	D	48	Total	O	0	0
			48	48		

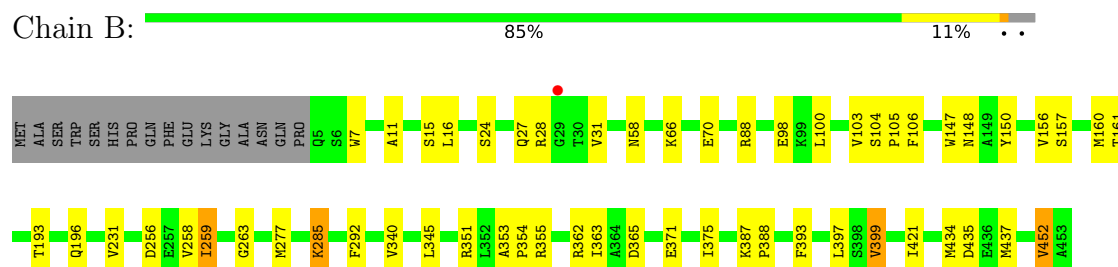
3 Residue-property plots

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.

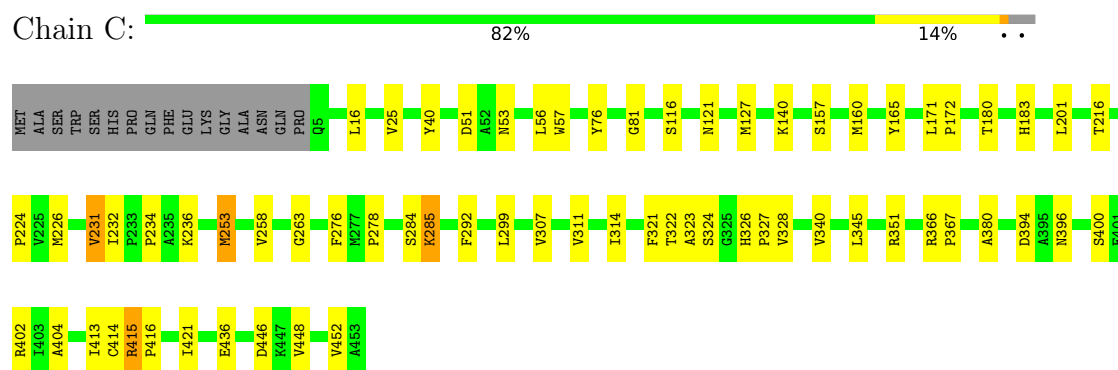
• Molecule 1: Aminotransferase



• Molecule 1: Aminotransferase



• Molecule 1: Aminotransferase



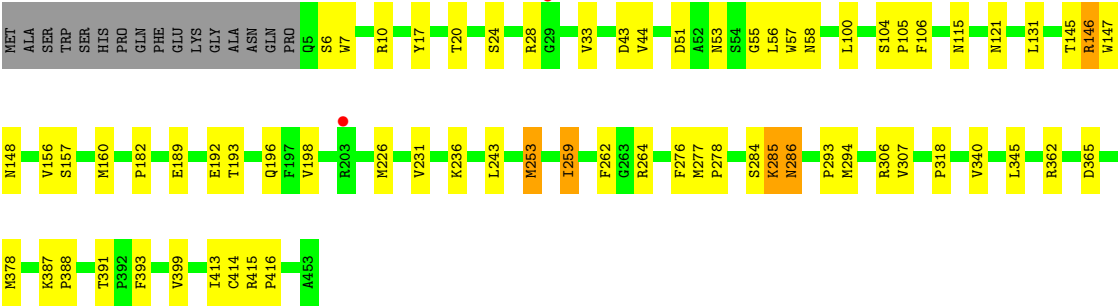
• Molecule 1: Aminotransferase

Chain D:

82%

14%

••



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	66.79Å 103.63Å 145.43Å 90.00° 98.88° 90.00°	Depositor
Resolution (Å)	19.83 – 2.60 19.83 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.5 (19.83-2.60) 99.5 (19.83-2.60)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.11 (at 2.59Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.178 , 0.227 0.177 , 0.226	Depositor DCC
R_{free} test set	3063 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	35.9	Xtriage
Anisotropy	0.052	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 33.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	14277	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.40% 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: NA, LLP, DAV

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	0.72	0/3569	0.92	3/4839 (0.1%)
1	B	0.71	0/3569	0.90	2/4839 (0.0%)
1	C	0.71	0/3569	0.90	1/4839 (0.0%)
1	D	0.68	0/3569	0.89	1/4839 (0.0%)
All	All	0.71	0/14276	0.90	7/19356 (0.0%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	263	GLY	N-CA-C	7.54	121.64	113.58
1	B	263	GLY	N-CA-C	7.22	122.24	113.79
1	B	259	ILE	CB-CA-C	-5.33	105.23	111.94
1	D	259	ILE	CB-CA-C	-5.15	105.73	111.80
1	A	366	ARG	CA-C-N	5.02	125.04	119.32
1	A	366	ARG	C-N-CA	5.02	125.04	119.32
1	A	263	GLY	N-CA-C	5.01	125.06	113.18

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	3503	0	3421	43	0
1	B	3503	0	3421	39	0
1	C	3503	0	3421	43	0
1	D	3503	0	3421	46	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	8	0	2	1	0
3	C	8	0	2	1	0
4	A	74	0	0	1	0
4	B	59	0	0	0	0
4	C	64	0	0	1	0
4	D	48	0	0	2	0
All	All	14277	0	13688	159	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 6.

All (159) 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:B:157:SER:HA	1:B:160:MET:HE3	1.47	0.96
1:A:127:MET:HE2	1:B:16:LEU:HD21	1.57	0.85
1:D:253:MET:HE2	1:D:276:PHE:HE2	1.40	0.83
1:A:157:SER:HA	1:A:160:MET:HE3	1.60	0.81
1:B:147:TRP:O	1:B:148:ASN:HB2	1.77	0.81
1:D:253:MET:HE2	1:D:276:PHE:CE2	2.16	0.81
1:D:157:SER:HA	1:D:160:MET:HE3	1.61	0.79
1:C:400:SER:HB2	1:C:416:PRO:HB2	1.67	0.76
1:D:157:SER:HA	1:D:160:MET:CE	2.16	0.73
1:A:51:ASP:HA	1:A:413:ILE:HB	1.71	0.72
1:B:193:THR:HG22	1:B:196:GLN:HG3	1.72	0.72
1:D:7:TRP:CD1	1:D:44:VAL:HG21	2.25	0.72
1:A:285:LLP:H4'1	3:A:502:DAV:N	2.05	0.71
1:B:156:VAL:HG12	1:B:160:MET:HE2	1.72	0.71
1:A:156:VAL:HG12	1:A:160:MET:HE2	1.76	0.67
1:D:121:ASN:HB3	1:D:160:MET:HE1	1.78	0.64
1:B:362:ARG:O	1:B:365:ASP:HB2	1.97	0.64
1:C:285:LLP:H4'1	3:C:502:DAV:N	2.12	0.64
1:B:58:ASN:HB3	1:B:285:LLP:HG3	1.79	0.64
1:D:286:ASN:HB2	4:D:610:HOH:O	1.98	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:17:TYR:HB3	1:D:20:THR:HB	1.80	0.63
1:A:452:VAL:HG12	1:A:452:VAL:O	2.00	0.62
1:C:351:ARG:NE	1:C:351:ARG:HA	2.13	0.62
1:C:415:ARG:NH1	1:C:416:PRO:HD2	2.14	0.62
1:A:294:MET:HE1	1:A:330:CYS:SG	2.40	0.62
1:D:105:PRO:HB2	1:D:277:MET:HE1	1.81	0.61
1:C:121:ASN:HB3	1:C:160:MET:HE1	1.82	0.61
1:A:180:THR:HB	1:A:201:LEU:CD2	2.29	0.61
1:D:277:MET:HE3	1:D:278:PRO:HD2	1.81	0.61
1:A:317:PHE:CE2	1:A:319:HIS:HB3	2.37	0.60
1:A:452:VAL:O	1:A:452:VAL:CG1	2.49	0.59
1:A:127:MET:CE	1:B:16:LEU:HD21	2.31	0.59
1:A:415:ARG:HD3	1:A:415:ARG:C	2.27	0.59
1:A:366:ARG:HD3	4:A:613:HOH:O	2.02	0.58
1:B:193:THR:HG23	1:B:196:GLN:H	1.68	0.58
1:B:193:THR:HG22	1:B:196:GLN:CG	2.32	0.58
1:D:51:ASP:HA	1:D:413:ILE:HB	1.86	0.58
1:A:397:LEU:HD13	1:A:452:VAL:HG13	1.86	0.57
1:B:24:SER:HA	1:B:27:GLN:HB3	1.87	0.56
1:C:366:ARG:NH1	1:C:446:ASP:OD1	2.38	0.55
1:A:83:HIS:CE1	1:A:88:ARG:HH12	2.25	0.55
1:A:7:TRP:HB3	1:A:32:VAL:HG21	1.89	0.55
1:C:157:SER:HA	1:C:160:MET:HE3	1.88	0.55
1:D:362:ARG:O	1:D:365:ASP:HB2	2.07	0.55
1:C:404:ALA:HB2	1:C:416:PRO:CD	2.37	0.55
1:C:448:VAL:O	1:C:452:VAL:HG22	2.07	0.54
1:A:180:THR:HB	1:A:201:LEU:HD22	1.88	0.54
1:A:114:THR:HG22	1:A:321:PHE:CE2	2.43	0.54
1:B:105:PRO:HB2	1:B:277:MET:HE1	1.90	0.54
1:D:100:LEU:O	1:D:104:SER:HB3	2.09	0.53
1:A:171:LEU:HB3	1:A:172:PRO:HA	1.90	0.53
1:C:180:THR:HB	1:C:201:LEU:HD22	1.90	0.53
1:D:393:PHE:HB2	1:D:399:VAL:HG21	1.90	0.53
1:C:51:ASP:HA	1:C:413:ILE:HB	1.90	0.53
1:B:259:ILE:HG12	1:B:285:LLP:O3	2.09	0.52
1:C:415:ARG:HH11	1:C:416:PRO:HD2	1.74	0.52
1:C:258:VAL:HG13	1:C:284:SER:HB3	1.91	0.52
1:C:366:ARG:HB2	1:C:367:PRO:HD2	1.91	0.52
1:C:402:ARG:NH1	4:C:655:HOH:O	2.41	0.52
1:C:321:PHE:HB2	1:C:324:SER:HB3	1.92	0.52
1:C:292:PHE:CZ	1:D:293:PRO:HD3	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:157:SER:CA	1:B:160:MET:HE3	2.32	0.51
1:C:400:SER:HB2	1:C:416:PRO:CB	2.37	0.51
1:D:156:VAL:HG12	1:D:160:MET:HE2	1.93	0.51
1:A:165:TYR:O	1:A:168:VAL:HG22	2.12	0.50
1:D:264:ARG:HG2	1:D:378:MET:HG3	1.94	0.50
1:C:351:ARG:HA	1:C:351:ARG:HE	1.75	0.49
1:C:127:MET:HE1	1:C:299:LEU:HD11	1.94	0.49
1:D:57:TRP:HE1	1:D:415:ARG:NH1	2.11	0.49
1:C:322:THR:HA	1:D:56:LEU:HD23	1.94	0.48
1:D:193:THR:HG23	1:D:196:GLN:H	1.78	0.48
1:D:393:PHE:CB	1:D:399:VAL:HG21	2.44	0.48
1:A:316:GLU:O	1:A:318:PRO:HD3	2.13	0.48
1:D:182:PRO:HD2	1:D:226:MET:HE3	1.94	0.47
1:A:83:HIS:HE2	1:A:88:ARG:HH12	1.62	0.47
1:B:156:VAL:CG1	1:B:160:MET:HE2	2.43	0.47
1:B:393:PHE:HB2	1:B:399:VAL:HG11	1.95	0.47
1:C:171:LEU:HB3	1:C:172:PRO:HA	1.96	0.47
1:D:243:LEU:HD11	1:D:253:MET:HG2	1.95	0.47
1:A:114:THR:HG22	1:A:321:PHE:HE2	1.78	0.47
1:C:40:TYR:OH	1:C:436:GLU:OE1	2.28	0.47
1:A:75:GLN:HG2	1:A:328:VAL:HA	1.97	0.47
1:C:76:TYR:CE2	1:C:328:VAL:HG11	2.50	0.47
1:A:293:PRO:HD3	1:B:292:PHE:CZ	2.49	0.47
1:C:224:PRO:O	1:C:234:PRO:HD3	2.15	0.47
1:C:307:VAL:O	1:C:311:VAL:HG23	2.15	0.47
1:B:353:ALA:N	1:B:354:PRO:HD2	2.30	0.47
1:A:88:ARG:HG2	1:B:31:VAL:HB	1.97	0.47
1:B:27:GLN:HG3	1:B:28:ARG:HG3	1.96	0.47
1:B:387:LYS:HB3	1:B:388:PRO:HD3	1.96	0.47
1:C:81:GLY:HA2	1:C:327:PRO:HG2	1.96	0.47
1:B:397:LEU:HD22	1:B:452:VAL:HG22	1.96	0.46
1:D:131:LEU:HD11	1:D:306:ARG:HB3	1.96	0.46
1:D:157:SER:HA	1:D:160:MET:HE2	1.98	0.46
1:D:58:ASN:HB3	1:D:285:LLP:HG3	1.99	0.45
1:D:147:TRP:O	1:D:148:ASN:HB2	2.16	0.45
1:B:11:ALA:O	1:B:15:SER:HB2	2.17	0.45
1:B:256:ASP:OD1	1:B:285:LLP:H2'2	2.17	0.45
1:D:189:GLU:O	1:D:192:GLU:HB3	2.17	0.45
1:D:387:LYS:HB3	1:D:388:PRO:HD3	1.97	0.45
1:D:57:TRP:CD2	1:D:259:ILE:HD12	2.52	0.45
1:D:106:PHE:CE1	1:D:277:MET:HE2	2.53	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:83:HIS:CE1	1:A:88:ARG:NH1	2.86	0.44
1:A:106:PHE:HB3	1:A:301:PRO:HD3	1.98	0.44
1:B:340:VAL:HA	1:B:345:LEU:HB2	1.99	0.44
1:D:253:MET:CE	1:D:276:PHE:HE2	2.22	0.44
1:A:314:ILE:O	1:A:315:GLU:HB2	2.16	0.44
1:A:179:LEU:HB3	1:A:204:GLU:OE1	2.18	0.44
1:B:258:VAL:HG12	1:B:285:LLP:HD3	1.99	0.44
1:C:16:LEU:HD11	1:D:307:VAL:HG11	2.00	0.43
1:B:434:MET:O	1:B:437:MET:HB3	2.18	0.43
1:C:56:LEU:O	1:C:57:TRP:HB2	2.17	0.43
1:D:24:SER:O	1:D:28:ARG:HB3	2.18	0.43
1:C:183:HIS:HB2	1:C:232:ILE:HG21	2.00	0.43
1:D:6:SER:O	1:D:10:ARG:HG3	2.19	0.43
1:D:253:MET:CE	1:D:276:PHE:CE2	2.96	0.43
1:A:95:MET:HE3	1:B:7:TRP:HH2	1.84	0.43
1:A:180:THR:OG1	1:A:204:GLU:OE2	2.27	0.42
1:A:366:ARG:HB2	1:A:367:PRO:HD2	2.00	0.42
1:B:106:PHE:CE1	1:B:277:MET:HE3	2.54	0.42
1:C:323:ALA:O	1:C:326:HIS:HB2	2.20	0.42
1:B:355:ARG:HH21	1:B:435:ASP:CG	2.28	0.42
1:C:253:MET:HE2	1:C:276:PHE:HE2	1.83	0.42
1:D:33:VAL:HA	1:D:43:ASP:HA	2.01	0.42
1:A:415:ARG:HD3	1:A:416:PRO:N	2.34	0.42
1:C:394:ASP:HB3	1:C:396:ASN:OD1	2.19	0.42
1:C:415:ARG:HA	1:C:416:PRO:HD3	1.81	0.42
1:B:150:TYR:HA	1:B:161:THR:HG23	2.00	0.42
1:C:140:LYS:HA	1:C:216:THR:HA	2.02	0.42
1:C:226:MET:O	1:C:231:VAL:HA	2.19	0.42
1:D:182:PRO:HD2	1:D:226:MET:CE	2.50	0.42
1:D:106:PHE:CD1	1:D:277:MET:HE2	2.55	0.42
1:A:157:SER:CA	1:A:160:MET:HE3	2.40	0.41
1:D:146:ARG:NH2	4:D:621:HOH:O	2.52	0.41
1:D:198:VAL:HG21	1:D:236:LYS:O	2.19	0.41
1:C:116:SER:HB3	1:D:115:ASN:ND2	2.35	0.41
1:D:145:THR:HG21	1:D:160:MET:HB3	2.02	0.41
1:D:193:THR:CG2	1:D:196:GLN:H	2.33	0.41
1:D:340:VAL:HA	1:D:345:LEU:HB2	2.02	0.41
1:A:121:ASN:HB3	1:A:160:MET:HE1	2.01	0.41
1:A:389:THR:O	1:A:390:LYS:HB2	2.19	0.41
1:B:363:ILE:C	1:B:365:ASP:H	2.29	0.41
1:B:100:LEU:O	1:B:104:SER:HB3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:340:VAL:HA	1:C:345:LEU:HB2	2.03	0.41
1:A:31:VAL:HB	1:B:88:ARG:HG2	2.03	0.41
1:A:360:LEU:HD11	1:A:379:TRP:HB3	2.03	0.41
1:B:256:ASP:OD2	1:B:285:LLP:H2'3	2.21	0.41
1:C:253:MET:HE2	1:C:276:PHE:CE2	2.56	0.41
1:C:253:MET:CE	1:C:278:PRO:HB3	2.49	0.41
1:C:380:ALA:HA	1:C:421:ILE:O	2.19	0.41
1:A:226:MET:O	1:A:231:VAL:HA	2.20	0.41
1:B:66:LYS:O	1:B:70:GLU:HG2	2.21	0.41
1:B:193:THR:CG2	1:B:196:GLN:H	2.32	0.41
1:C:165:TYR:CD2	1:D:318:PRO:HB2	2.56	0.41
1:C:414:CYS:O	1:C:416:PRO:HD3	2.21	0.41
1:A:226:MET:HB2	1:A:232:ILE:HB	2.02	0.40
1:B:193:THR:CG2	1:B:196:GLN:HG3	2.47	0.40
1:A:105:PRO:HD3	1:A:269:TRP:CD1	2.56	0.40
1:A:14:TYR:CE1	1:B:98:GLU:HG3	2.56	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	446/465 (96%)	425 (95%)	19 (4%)	2 (0%)	30	51
1	B	446/465 (96%)	417 (94%)	26 (6%)	3 (1%)	18	38
1	C	446/465 (96%)	424 (95%)	21 (5%)	1 (0%)	43	66
1	D	446/465 (96%)	418 (94%)	23 (5%)	5 (1%)	11	25
All	All	1784/1860 (96%)	1684 (94%)	89 (5%)	11 (1%)	21	42

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	284	SER
1	B	371	GLU
1	D	231	VAL
1	D	55	GLY
1	D	262	PHE
1	B	231	VAL
1	B	375	ILE
1	A	55	GLY
1	C	231	VAL
1	A	231	VAL
1	D	416	PRO

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	360/373 (96%)	352 (98%)	8 (2%)	45 72
1	B	360/373 (96%)	355 (99%)	5 (1%)	59 81
1	C	360/373 (96%)	354 (98%)	6 (2%)	53 78
1	D	360/373 (96%)	353 (98%)	7 (2%)	50 75
All	All	1440/1492 (96%)	1414 (98%)	26 (2%)	51 76

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	VAL
1	A	127	MET
1	A	243	LEU
1	A	312	GLU
1	A	314	ILE
1	A	351	ARG
1	A	391	THR
1	A	415	ARG
1	B	103	VAL
1	B	351	ARG
1	B	399	VAL

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Mol	Chain	Res	Type
1	B	421	ILE
1	B	452	VAL
1	C	25	VAL
1	C	53	ASN
1	C	236	LYS
1	C	253	MET
1	C	314	ILE
1	C	415	ARG
1	D	53	ASN
1	D	146	ARG
1	D	253	MET
1	D	286	ASN
1	D	294	MET
1	D	391	THR
1	D	414	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	53	ASN
1	A	75	GLN
1	A	115	ASN
1	A	267	ASN
1	A	326	HIS
1	A	342	ASN
1	B	53	ASN
1	B	92	GLN
1	B	108	ASN
1	C	26	HIS
1	C	267	ASN
1	C	348	ASN
1	D	26	HIS
1	D	92	GLN
1	D	115	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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
1	LLP	B	285	1	23,24,25	2.96	6 (26%)	25,32,34	1.97	6 (24%)
1	LLP	C	285	1	23,24,25	2.86	6 (26%)	25,32,34	1.93	9 (36%)
1	LLP	D	285	1	23,24,25	3.14	6 (26%)	25,32,34	1.63	5 (20%)
1	LLP	A	285	1	23,24,25	2.63	5 (21%)	25,32,34	1.95	10 (40%)

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
1	LLP	B	285	1	-	9/16/17/19	0/1/1/1
1	LLP	C	285	1	-	6/16/17/19	0/1/1/1
1	LLP	D	285	1	-	9/16/17/19	0/1/1/1
1	LLP	A	285	1	-	4/16/17/19	0/1/1/1

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	285	LLP	C3-C2	9.09	1.50	1.41
1	B	285	LLP	C3-C2	8.38	1.49	1.41
1	C	285	LLP	C3-C2	8.24	1.49	1.41
1	A	285	LLP	C3-C2	7.47	1.48	1.41
1	D	285	LLP	C4-C5	7.36	1.52	1.42
1	B	285	LLP	C4-C5	6.80	1.51	1.42
1	C	285	LLP	C4-C5	6.43	1.50	1.42
1	D	285	LLP	C4'-NZ	6.21	1.47	1.27
1	A	285	LLP	C4-C5	6.17	1.50	1.42
1	B	285	LLP	C4'-NZ	6.14	1.47	1.27

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	285	LLP	C4'-NZ	6.00	1.47	1.27
1	A	285	LLP	C4'-NZ	5.91	1.47	1.27
1	D	285	LLP	C4-C3	5.26	1.49	1.41
1	B	285	LLP	C4-C3	4.76	1.48	1.41
1	C	285	LLP	C4-C3	4.37	1.48	1.41
1	A	285	LLP	C4-C3	3.67	1.47	1.41
1	B	285	LLP	C4-C4'	3.38	1.53	1.46
1	D	285	LLP	C4-C4'	3.29	1.53	1.46
1	C	285	LLP	C4-C4'	2.66	1.52	1.46
1	A	285	LLP	C4-C4'	2.35	1.51	1.46
1	B	285	LLP	C6-C5	2.30	1.42	1.37
1	D	285	LLP	C6-C5	2.08	1.41	1.37
1	C	285	LLP	C2-N1	2.03	1.37	1.33

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	285	LLP	C3-C4-C5	-5.40	113.94	118.28
1	C	285	LLP	C4-C4'-NZ	-4.31	104.16	124.04
1	A	285	LLP	C4-C4'-NZ	-4.26	104.39	124.04
1	A	285	LLP	C5-C4-C4'	3.75	127.25	121.47
1	B	285	LLP	C4-C4'-NZ	-3.50	107.90	124.04
1	D	285	LLP	C3-C4-C5	-3.41	115.54	118.28
1	B	285	LLP	C2'-C2-C3	-3.31	116.92	120.80
1	C	285	LLP	CE-NZ-C4'	3.17	128.86	118.72
1	D	285	LLP	C4-C4'-NZ	-3.09	109.77	124.04
1	A	285	LLP	OP4-C5'-C5	3.06	115.10	109.36
1	D	285	LLP	C5-C4-C4'	2.98	126.07	121.47
1	C	285	LLP	C5-C4-C4'	2.88	125.91	121.47
1	B	285	LLP	OP3-P-OP2	2.84	118.47	107.80
1	C	285	LLP	C4-C3-C2	-2.76	118.59	120.14
1	C	285	LLP	C2'-C2-C3	-2.70	117.64	120.80
1	C	285	LLP	C3-C4-C5	-2.64	116.16	118.28
1	C	285	LLP	OP3-P-OP4	-2.60	99.89	106.67
1	A	285	LLP	C4-C3-C2	-2.58	118.69	120.14
1	B	285	LLP	OP2-P-OP4	-2.58	99.95	106.67
1	D	285	LLP	OP3-P-OP2	2.51	117.22	107.80
1	D	285	LLP	C4-C3-C2	-2.50	118.74	120.14
1	A	285	LLP	C3-C4-C5	-2.45	116.31	118.28
1	A	285	LLP	CE-NZ-C4'	2.43	126.51	118.72
1	A	285	LLP	OP3-P-OP4	-2.40	100.42	106.67
1	C	285	LLP	OP4-C5'-C5	2.37	113.79	109.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	285	LLP	CE-NZ-C4'	2.34	126.22	118.72
1	C	285	LLP	C2'-C2-N1	2.27	121.92	117.64
1	A	285	LLP	C3-C4-C4'	-2.22	116.40	120.40
1	A	285	LLP	O3-C3-C2	2.18	122.11	117.58
1	A	285	LLP	OP3-P-OP2	2.11	115.70	107.80

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	285	LLP	C3-C4-C4'-NZ
1	A	285	LLP	O-C-CA-CB
1	B	285	LLP	C5'-OP4-P-OP1
1	B	285	LLP	C5'-OP4-P-OP2
1	B	285	LLP	C5'-OP4-P-OP3
1	B	285	LLP	C-CA-CB-CG
1	C	285	LLP	C-CA-CB-CG
1	C	285	LLP	O-C-CA-CB
1	D	285	LLP	C4-C4'-NZ-CE
1	D	285	LLP	C5'-OP4-P-OP1
1	D	285	LLP	C5'-OP4-P-OP3
1	D	285	LLP	C-CA-CB-CG
1	D	285	LLP	O-C-CA-CB
1	B	285	LLP	C4-C4'-NZ-CE
1	A	285	LLP	C4-C4'-NZ-CE
1	C	285	LLP	C4-C4'-NZ-CE
1	B	285	LLP	CG-CD-CE-NZ
1	C	285	LLP	C3-C4-C4'-NZ
1	B	285	LLP	C3-C4-C4'-NZ
1	D	285	LLP	C3-C4-C4'-NZ
1	D	285	LLP	C5'-OP4-P-OP2
1	B	285	LLP	C5-C4-C4'-NZ
1	D	285	LLP	C5-C4-C4'-NZ
1	A	285	LLP	C-CA-CB-CG
1	C	285	LLP	CG-CD-CE-NZ
1	C	285	LLP	CD-CE-NZ-C4'
1	D	285	LLP	CD-CE-NZ-C4'
1	B	285	LLP	N-CA-CB-CG

There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	285	LLP	5	0
1	C	285	LLP	1	0
1	D	285	LLP	1	0
1	A	285	LLP	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	$\# Z > 2$
3	DAV	A	502	-	7,7,7	1.08	1 (14%)	7,7,7	1.21	1 (14%)
3	DAV	C	502	-	7,7,7	0.83	0	7,7,7	1.41	2 (28%)

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
3	DAV	A	502	-	-	2/5/5/5	-
3	DAV	C	502	-	-	5/5/5/5	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502	DAV	C1-C	2.12	1.55	1.50

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	A	502	DAV	O-C-C1	-2.13	116.33	123.09
3	C	502	DAV	CB-C1-C	-2.12	108.99	114.51
3	C	502	DAV	O-C-C1	-2.06	116.56	123.09

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	502	DAV	C-C1-CB-CG
3	C	502	DAV	C1-CB-CG-CD
3	C	502	DAV	N-CD-CG-CB
3	A	502	DAV	O-C-C1-CB
3	A	502	DAV	OXT-C-C1-CB
3	C	502	DAV	O-C-C1-CB
3	C	502	DAV	OXT-C-C1-CB

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	502	DAV	1	0
3	C	502	DAV	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 [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	448/465 (96%)	-0.71	0 100 100	15, 32, 56, 82	1 (0%)
1	B	448/465 (96%)	-0.59	1 (0%) 91 90	16, 33, 67, 85	2 (0%)
1	C	448/465 (96%)	-0.67	0 100 100	20, 34, 55, 75	3 (0%)
1	D	448/465 (96%)	-0.49	2 (0%) 88 86	21, 39, 71, 88	3 (0%)
All	All	1792/1860 (96%)	-0.61	3 (0%) 91 90	15, 34, 67, 88	9 (0%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	29	GLY	3.0
1	D	203	ARG	2.9
1	B	29	GLY	2.5

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	LLP	D	285	24/25	0.89	0.13	39,50,54,56	0
1	LLP	B	285	24/25	0.90	0.13	34,48,52,56	0
1	LLP	C	285	24/25	0.95	0.08	33,38,41,42	0
1	LLP	A	285	24/25	0.96	0.06	31,32,33,34	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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	DAV	A	502	8/8	0.80	0.16	34,45,60,63	0
2	NA	C	501	1/1	0.85	0.07	48,48,48,48	0
3	DAV	C	502	8/8	0.87	0.13	54,57,63,66	0
2	NA	D	501	1/1	0.94	0.05	26,26,26,26	0
2	NA	B	501	1/1	0.95	0.03	29,29,29,29	0
2	NA	A	501	1/1	0.97	0.03	28,28,28,28	0

6.5 Other polymers [i](#)

There are no such residues in this entry.