



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 01:49 AM UTC

PDB ID : 1JS1 / pdb_00001js1
Title : Crystal Structure of a new transcarbamylase from the anaerobic bacterium Bacteroides fragilis at 2.0 Å resolution
Authors : Shi, D.; Gallegos, R.; DePonte III, J.; Morizono, H.; Yu, X.; Allewell, N.M.; Malamy, M.; Tuchman, M.
Deposited on : 2001-08-15
Resolution : 2.00 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

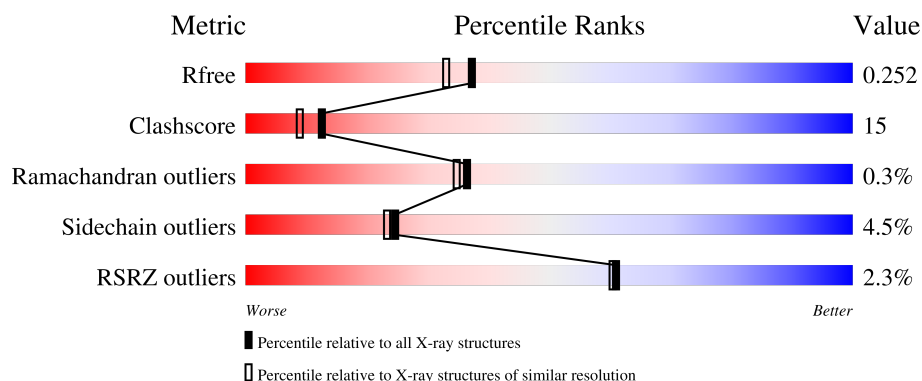
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	X	324	2% 69% 26% 6%
1	Y	324	3% 70% 24% • •
1	Z	324	2% 69% 24% 5% •

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PO4	Z	503	-	-	X	-

2 Entry composition [i](#)

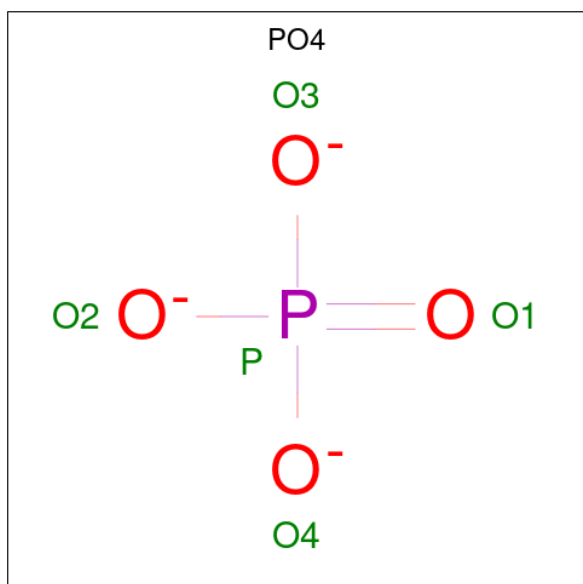
There are 3 unique types of molecules in this entry. The entry contains 8177 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Transcarbamylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	X	324	Total	C	N	O	S	0	0	0
			2620	1668	457	479	16			
1	Y	318	Total	C	N	O	S	0	0	0
			2560	1632	439	473	16			
1	Z	318	Total	C	N	O	S	0	0	0
			2560	1632	439	473	16			

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	X	1	Total	O	P	0	0
			5	4	1		
2	Y	1	Total	O	P	0	0
			5	4	1		
2	Z	1	Total	O	P	0	0
			5	4	1		

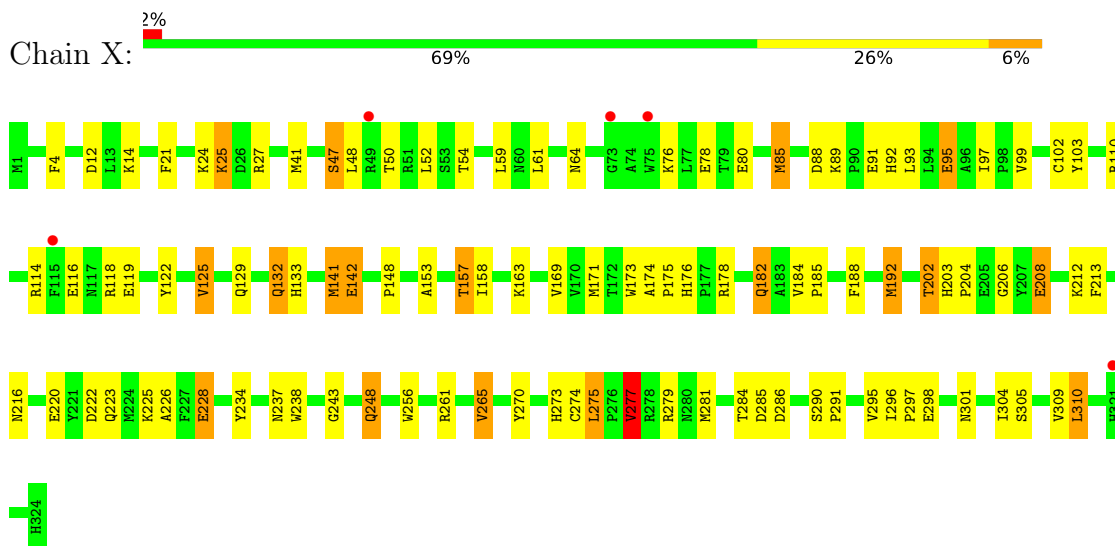
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	X	125	Total 125	O 125	0	0
3	Y	137	Total 137	O 137	0	0
3	Z	160	Total 160	O 160	0	0

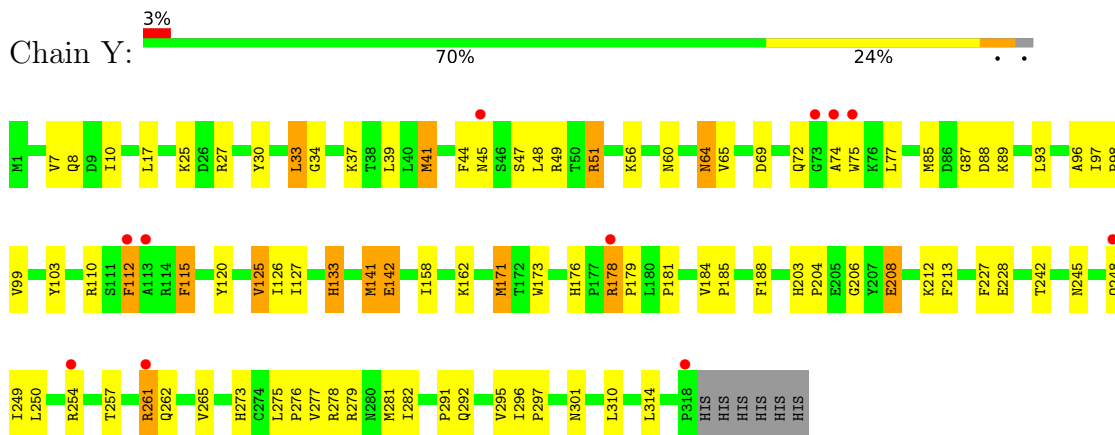
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

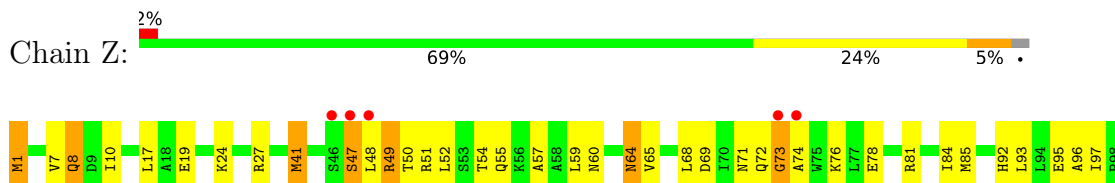
• Molecule 1: Transcarbamylase

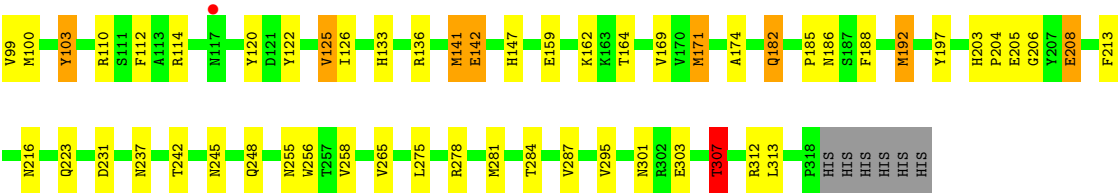


• Molecule 1: Transcarbamylase



• Molecule 1: Transcarbamylase





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	153.41Å 153.41Å 94.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.28 – 2.00 27.28 – 2.00	Depositor EDS
% Data completeness (in resolution range)	96.7 (27.28-2.00) 96.7 (27.28-2.00)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.91 (at 1.99Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.206 , 0.252 0.206 , 0.252	Depositor DCC
R_{free} test set	7481 reflections (10.09%)	wwPDB-VP
Wilson B-factor (Å ²)	29.9	Xtriage
Anisotropy	0.059	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 44.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8177	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.80% 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: PO4

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	X	0.75	3/2685 (0.1%)	1.10	17/3640 (0.5%)
1	Y	0.81	2/2619 (0.1%)	1.13	16/3550 (0.5%)
1	Z	0.94	5/2619 (0.2%)	1.10	18/3550 (0.5%)
All	All	0.83	10/7923 (0.1%)	1.11	51/10740 (0.5%)

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	Z	41	MET	SD-CE	-18.61	1.33	1.79
1	Y	41	MET	SD-CE	-14.20	1.44	1.79
1	Z	171	MET	SD-CE	-13.82	1.45	1.79
1	Y	171	MET	SD-CE	-10.47	1.53	1.79
1	Z	192	MET	SD-CE	-9.54	1.55	1.79
1	X	192	MET	SD-CE	-8.89	1.57	1.79
1	X	141	MET	SD-CE	-7.81	1.60	1.79
1	Z	1	MET	SD-CE	-7.05	1.61	1.79
1	X	85	MET	SD-CE	-6.75	1.62	1.79
1	Z	307	THR	CA-CB	5.13	1.61	1.53

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	Z	125	VAL	N-CA-C	8.91	118.98	110.42
1	Y	281	MET	N-CA-C	-8.60	101.71	112.72
1	X	281	MET	N-CA-C	-8.17	101.17	112.12
1	Y	133	HIS	N-CA-C	7.40	123.35	113.72
1	X	103	TYR	N-CA-C	7.39	121.14	112.72
1	Z	255	ASN	N-CA-C	-7.34	103.59	112.54
1	X	248	GLN	N-CA-C	7.09	121.06	109.72
1	X	88	ASP	N-CA-C	7.04	118.61	111.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	Y	89	LYS	CA-C-N	7.04	126.65	119.19
1	Y	89	LYS	C-N-CA	7.04	126.65	119.19
1	Y	74	ALA	N-CA-C	-7.00	104.47	113.16
1	Z	27	ARG	N-CA-C	7.00	119.80	111.33
1	X	133	HIS	N-CA-C	6.91	123.72	114.12
1	X	277	VAL	CB-CA-C	-6.78	100.59	110.63
1	Y	96	ALA	N-CA-C	6.71	119.16	111.11
1	Z	133	HIS	N-CA-C	6.67	122.39	113.72
1	Z	64	ASN	N-CA-C	-6.52	100.83	110.48
1	X	48	LEU	N-CA-C	-6.40	104.66	113.18
1	X	125	VAL	N-CA-C	6.39	116.56	110.42
1	Y	48	LEU	N-CA-C	-6.26	104.85	113.18
1	Z	242	THR	N-CA-C	6.26	119.00	110.55
1	Z	73	GLY	N-CA-C	-6.13	106.62	113.79
1	X	64	ASN	N-CA-C	-6.05	100.70	110.32
1	X	27	ARG	N-CA-C	6.01	118.60	111.33
1	X	174	ALA	N-CA-C	-5.97	102.84	108.22
1	X	80	GLU	N-CA-C	5.90	119.14	110.59
1	Z	103	TYR	N-CA-C	5.89	119.22	112.57
1	Z	281	MET	N-CA-C	-5.88	98.27	110.80
1	Y	173	TRP	N-CA-C	-5.88	102.77	110.53
1	Y	141	MET	N-CA-C	-5.88	105.69	112.92
1	X	132	GLN	N-CA-C	5.75	117.55	111.28
1	Y	64	ASN	N-CA-C	-5.68	100.42	109.96
1	X	141	MET	N-CA-C	-5.66	106.18	112.57
1	Y	27	ARG	N-CA-C	5.56	118.06	111.33
1	Z	141	MET	N-CA-C	-5.54	106.40	112.72
1	Y	126	ILE	N-CA-C	5.50	115.70	110.42
1	Z	258	VAL	N-CA-C	5.47	115.45	108.12
1	Z	136	ARG	CA-C-N	-5.42	114.34	119.76
1	Z	136	ARG	C-N-CA	-5.42	114.34	119.76
1	Z	74	ALA	N-CA-C	-5.39	106.38	113.17
1	X	116	GLU	N-CA-C	-5.34	107.77	114.56
1	Z	96	ALA	N-CA-C	5.33	116.78	111.07
1	Y	242	THR	N-CA-C	5.26	117.91	110.50
1	Y	44	PHE	N-CA-C	-5.24	106.28	113.30
1	Z	147	HIS	N-CA-C	-5.22	101.25	108.76
1	X	173	TRP	N-CA-C	-5.21	104.00	110.41
1	Z	84	ILE	N-CA-C	-5.19	100.00	107.37
1	Z	231	ASP	N-CA-C	-5.19	107.50	113.88
1	Y	125	VAL	N-CA-C	5.15	115.77	110.36
1	X	175	PRO	N-CA-C	5.07	119.44	111.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	Y	85	MET	N-CA-C	5.00	117.35	109.39

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	X	2620	0	2574	93	0
1	Y	2560	0	2532	73	0
1	Z	2560	0	2532	80	0
2	X	5	0	0	0	0
2	Y	5	0	0	1	0
2	Z	5	0	0	3	0
3	X	125	0	0	5	0
3	Y	137	0	0	7	0
3	Z	160	0	0	4	0
All	All	8177	0	7638	235	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 15.

All (235) 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:X:78:GLU:HG2	1:X:85:MET:HE2	1.50	0.93
1:X:202:THR:HG21	1:X:223:GLN:HA	1.51	0.92
1:Z:169:VAL:HG11	1:Z:192:MET:HE2	1.52	0.90
1:X:169:VAL:HG11	1:X:192:MET:CE	2.00	0.90
1:X:169:VAL:HG11	1:X:192:MET:HE3	1.53	0.89
1:Z:73:GLY:HA2	1:Z:76:LYS:HE3	1.54	0.88
1:X:85:MET:HE3	1:Y:279:ARG:HB2	1.57	0.87
1:X:41:MET:HE3	1:X:141:MET:HE1	1.58	0.86
1:X:279:ARG:HB2	1:Z:85:MET:HE3	1.58	0.86
1:X:171:MET:HE1	1:X:185:PRO:HA	1.58	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Z:50:THR:HG22	1:Z:141:MET:HE2	1.59	0.82
1:Z:122:TYR:OH	1:Z:182:GLN:HG3	1.81	0.80
1:Y:273:HIS:ND1	1:Y:277:VAL:HG22	1.97	0.80
1:X:228:GLU:HG3	1:X:265:VAL:HG13	1.63	0.80
1:Y:8:GLN:NE2	3:Y:505:HOH:O	2.16	0.79
1:X:275:LEU:HD11	1:X:295:VAL:HG21	1.64	0.78
1:Y:275:LEU:HD23	1:Y:277:VAL:HG23	1.65	0.77
1:X:275:LEU:HD12	1:X:277:VAL:HG22	1.67	0.75
1:Y:184:VAL:HB	1:Y:185:PRO:HD3	1.69	0.74
1:Y:171:MET:HE1	1:Y:188:PHE:HB3	1.70	0.74
1:Y:87:GLY:O	1:Z:278:ARG:NH2	2.21	0.74
1:Z:120:TYR:CZ	1:Z:125:VAL:HG21	2.23	0.73
1:X:273:HIS:ND1	1:X:277:VAL:HG13	2.04	0.73
1:X:122:TYR:OH	1:X:182:GLN:HG3	1.88	0.73
1:X:275:LEU:CD1	1:X:295:VAL:HG21	2.18	0.72
1:Y:228:GLU:HA	1:Y:265:VAL:O	1.90	0.72
1:X:158:ILE:HD13	1:X:192:MET:HE1	1.71	0.71
1:X:188:PHE:CZ	1:X:192:MET:HE2	2.25	0.71
1:Y:8:GLN:CD	3:Y:505:HOH:O	2.33	0.70
1:X:157:THR:HG21	1:X:298:GLU:HA	1.73	0.69
1:Y:171:MET:HE3	1:Y:188:PHE:CD2	2.27	0.69
1:Z:203:HIS:HD2	1:Z:204:PRO:O	1.75	0.69
1:Z:171:MET:HE1	1:Z:188:PHE:HB3	1.75	0.69
1:X:50:THR:HG22	1:X:141:MET:HE2	1.75	0.69
1:Y:127:ILE:HG12	3:Y:571:HOH:O	1.93	0.69
1:Z:171:MET:HE3	1:Z:188:PHE:CD2	2.28	0.69
1:X:301:ASN:HA	1:X:304:ILE:HD13	1.74	0.68
1:Y:206:GLY:N	1:Y:208:GLU:OE2	2.27	0.68
1:Y:275:LEU:HD23	1:Y:277:VAL:CG2	2.24	0.68
1:X:78:GLU:CG	1:X:85:MET:HE2	2.22	0.68
1:Y:292:GLN:HG3	3:Y:553:HOH:O	1.95	0.66
1:X:203:HIS:HD2	1:X:204:PRO:O	1.79	0.65
1:Z:41:MET:HE1	1:Z:55:GLN:HG2	1.79	0.65
1:Y:275:LEU:HD21	1:Y:295:VAL:CG1	2.27	0.64
1:Z:275:LEU:HD21	1:Z:295:VAL:HG11	1.79	0.64
1:Z:114:ARG:HB2	3:Z:603:HOH:O	1.98	0.64
1:X:304:ILE:HD12	1:X:304:ILE:N	2.12	0.63
1:Z:49:ARG:HG3	2:Z:503:PO4:P	2.39	0.63
1:Z:245:ASN:HA	1:Z:248:GLN:NE2	2.15	0.62
1:X:59:LEU:HD13	1:Z:64:ASN:HB3	1.82	0.61
1:X:118:ARG:NH2	1:X:243:GLY:O	2.33	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Z:120:TYR:CE1	1:Z:125:VAL:HG21	2.35	0.61
1:X:284:THR:HG22	1:X:286:ASP:H	1.64	0.61
1:Y:275:LEU:CD2	1:Y:277:VAL:HG23	2.29	0.61
1:X:95:GLU:HG2	3:X:505:HOH:O	1.99	0.61
1:Z:275:LEU:HD21	1:Z:295:VAL:CG1	2.31	0.61
1:Z:78:GLU:HG2	1:Z:85:MET:HE2	1.82	0.61
1:X:296:ILE:HB	1:X:297:PRO:HD3	1.82	0.61
1:Y:296:ILE:N	1:Y:296:ILE:HD12	2.16	0.60
1:X:24:LYS:NZ	1:X:301:ASN:HD21	1.99	0.60
1:X:273:HIS:CE1	1:X:277:VAL:HG13	2.37	0.60
1:X:24:LYS:HG2	1:X:304:ILE:HG12	1.84	0.59
1:X:91:GLU:HG3	3:Y:509:HOH:O	2.01	0.59
1:X:273:HIS:CG	1:X:277:VAL:HG13	2.37	0.59
1:Z:24:LYS:NZ	1:Z:301:ASN:HD21	2.01	0.59
1:Y:178:ARG:HH11	1:Y:178:ARG:CB	2.16	0.59
1:Z:17:LEU:HD13	1:Z:159:GLU:HG3	1.85	0.59
1:X:158:ILE:CD1	1:X:192:MET:HE1	2.33	0.58
1:Y:275:LEU:HD21	1:Y:295:VAL:HG13	1.85	0.58
1:Y:171:MET:CE	1:Y:188:PHE:HB3	2.33	0.58
1:Y:254:ARG:HB2	1:Y:254:ARG:CZ	2.33	0.58
1:X:202:THR:HG22	1:X:220:GLU:O	2.04	0.57
1:X:114:ARG:HG3	3:X:520:HOH:O	2.04	0.57
1:Y:64:ASN:HB3	1:Z:59:LEU:HD13	1.87	0.57
1:Y:112:PHE:N	1:Y:112:PHE:CD2	2.70	0.57
1:X:47:SER:HB2	1:X:110:ARG:HH12	1.70	0.57
1:Z:192:MET:CE	1:Z:197:TYR:HD1	2.18	0.56
1:X:12:ASP:OD2	1:X:14:LYS:HB3	2.05	0.56
1:Y:41:MET:HE3	1:Y:65:VAL:CG1	2.36	0.55
1:X:212:LYS:HE3	1:X:213:PHE:CZ	2.41	0.55
1:Y:254:ARG:HB2	1:Y:254:ARG:NH1	2.21	0.55
1:Z:93:LEU:CD1	1:Z:97:ILE:HD12	2.36	0.55
1:Y:39:LEU:HD23	1:Y:41:MET:HE2	1.88	0.55
1:X:286:ASP:OD1	1:Z:81:ARG:NH2	2.36	0.55
1:Y:37:LYS:HG2	1:Y:314:LEU:CD2	2.37	0.55
1:X:93:LEU:CD1	1:X:97:ILE:HD12	2.37	0.54
1:Y:203:HIS:HD2	1:Y:204:PRO:O	1.91	0.54
1:Z:8:GLN:H	1:Z:8:GLN:NE2	2.05	0.54
1:X:274:CYS:O	1:X:275:LEU:HB2	2.06	0.54
1:X:284:THR:HG22	1:X:285:ASP:N	2.22	0.54
1:X:304:ILE:HD12	1:X:304:ILE:H	1.73	0.53
1:Y:51:ARG:HH22	1:Y:69:ASP:CG	2.16	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Z:47:SER:HB2	1:Z:110:ARG:HH12	1.72	0.53
1:Z:85:MET:HE1	1:Z:92:HIS:HB2	1.90	0.53
1:X:122:TYR:OH	1:X:182:GLN:CG	2.56	0.53
1:Z:51:ARG:O	1:Z:55:GLN:HG3	2.07	0.53
1:X:275:LEU:CD1	1:X:295:VAL:CG2	2.85	0.53
1:Z:284:THR:HG22	1:Z:287:VAL:HG23	1.91	0.53
1:X:184:VAL:HB	1:X:185:PRO:HD3	1.89	0.53
1:Y:296:ILE:HB	1:Y:297:PRO:HD3	1.90	0.53
1:X:279:ARG:HB2	1:Z:85:MET:CE	2.35	0.52
1:Z:48:LEU:N	2:Z:503:PO4:O1	2.40	0.52
1:Z:78:GLU:CG	1:Z:85:MET:HE2	2.40	0.52
1:Z:51:ARG:NH2	1:Z:69:ASP:OD2	2.40	0.52
1:Y:39:LEU:CD2	1:Y:41:MET:HE2	2.39	0.52
1:Y:51:ARG:NH2	1:Y:69:ASP:OD2	2.42	0.52
1:X:261:ARG:NH2	3:X:589:HOH:O	2.42	0.52
1:Z:303:GLU:O	1:Z:307:THR:HG23	2.10	0.52
1:X:21:PHE:O	1:X:25:LYS:HD3	2.09	0.52
1:Z:208:GLU:CD	1:Z:208:GLU:H	2.17	0.52
1:Z:19:GLU:OE2	1:Z:312:ARG:NE	2.39	0.52
1:X:169:VAL:HG11	1:X:192:MET:HE2	1.91	0.51
1:Z:68:LEU:HD12	1:Z:100:MET:HE1	1.92	0.51
1:X:153:ALA:O	1:X:157:THR:HG23	2.10	0.51
1:X:206:GLY:N	1:X:208:GLU:OE2	2.44	0.51
1:Z:125:VAL:HG23	1:Z:126:ILE:N	2.25	0.51
1:X:171:MET:HE3	1:X:234:TYR:CD2	2.45	0.51
1:Z:171:MET:HE1	1:Z:185:PRO:HA	1.92	0.51
1:Y:291:PRO:HG2	1:Y:292:GLN:NE2	2.26	0.51
1:X:153:ALA:O	1:X:157:THR:CG2	2.58	0.51
1:Y:275:LEU:HD21	1:Y:295:VAL:HG11	1.93	0.51
1:Z:284:THR:CG2	1:Z:287:VAL:HG23	2.41	0.51
1:Y:56:LYS:NZ	1:Y:60:ASN:HD21	2.09	0.50
1:Y:212:LYS:HE3	1:Y:213:PHE:CZ	2.47	0.50
1:X:95:GLU:CG	3:X:505:HOH:O	2.57	0.50
1:Y:171:MET:HE1	1:Y:185:PRO:HA	1.93	0.50
1:X:275:LEU:HD13	1:X:295:VAL:CG2	2.42	0.50
1:Z:47:SER:CB	1:Z:110:ARG:HH12	2.25	0.50
1:Y:227:PHE:CD2	1:Y:262:GLN:HB3	2.47	0.50
1:Z:112:PHE:HE1	1:Z:114:ARG:HD3	1.77	0.50
1:Y:75:TRP:CZ2	1:Y:77:LEU:HD11	2.47	0.50
1:X:85:MET:CE	1:Y:279:ARG:HB2	2.38	0.49
1:X:203:HIS:CE1	1:X:208:GLU:HA	2.46	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:X:228:GLU:HA	1:X:265:VAL:HG13	1.94	0.49
1:Z:71:ASN:HB2	3:Z:562:HOH:O	2.11	0.49
1:X:169:VAL:CG1	1:X:192:MET:HE3	2.32	0.49
1:Y:49:ARG:NH2	1:Y:276:PRO:HB3	2.27	0.49
1:Y:72:GLN:HG3	1:Y:72:GLN:O	2.11	0.49
1:X:24:LYS:CG	1:X:304:ILE:HG12	2.42	0.49
1:X:228:GLU:HA	1:X:265:VAL:CG1	2.43	0.49
1:Z:182:GLN:HG2	3:Z:599:HOH:O	2.13	0.49
1:X:24:LYS:HZ2	1:X:301:ASN:HD21	1.59	0.49
1:Y:41:MET:HE3	1:Y:65:VAL:HG13	1.93	0.49
1:Y:133:HIS:HE1	3:Y:518:HOH:O	1.96	0.48
1:X:290:SER:HB2	1:X:291:PRO:HD2	1.95	0.48
1:X:202:THR:CG2	1:X:220:GLU:O	2.61	0.48
1:Z:169:VAL:HG21	1:Z:192:MET:CE	2.43	0.48
1:Z:174:ALA:O	1:Z:237:ASN:HB2	2.13	0.48
1:Z:49:ARG:HG3	2:Z:503:PO4:O4	2.14	0.48
1:X:85:MET:HE1	1:X:92:HIS:HB2	1.95	0.48
1:Z:120:TYR:OH	1:Z:125:VAL:HG21	2.14	0.48
1:X:222:ASP:HB3	1:X:225:LYS:HB2	1.96	0.47
1:X:125:VAL:O	1:X:129:GLN:HG3	2.14	0.47
1:X:275:LEU:CD1	1:X:277:VAL:HG22	2.40	0.47
1:Z:51:ARG:HH22	1:Z:69:ASP:CG	2.23	0.47
1:Y:99:VAL:HG11	1:Z:49:ARG:HH12	1.79	0.47
1:Y:110:ARG:HB2	1:Y:141:MET:HE3	1.97	0.46
1:Y:176:HIS:CD2	1:Y:278:ARG:HD2	2.50	0.46
1:Z:112:PHE:CE1	1:Z:114:ARG:HD3	2.50	0.46
1:X:275:LEU:HD13	1:X:295:VAL:HG21	1.97	0.46
1:Y:93:LEU:HD12	1:Y:97:ILE:HG12	1.96	0.46
1:X:206:GLY:CA	1:X:208:GLU:OE2	2.63	0.46
1:X:163:LYS:HE3	1:X:270:TYR:OH	2.16	0.46
1:Y:49:ARG:NH1	2:Y:502:PO4:O1	2.49	0.46
1:Y:261:ARG:H	1:Y:261:ARG:NE	2.13	0.46
1:Z:19:GLU:OE2	1:Z:312:ARG:NH2	2.47	0.46
1:Z:51:ARG:HG2	1:Z:55:GLN:HE21	1.81	0.45
1:Z:68:LEU:CD1	1:Z:100:MET:HE1	2.46	0.45
1:X:52:LEU:HG	1:Z:103:TYR:CD1	2.52	0.45
1:Y:115:PHE:CZ	1:Y:181:PRO:HA	2.52	0.45
1:Y:178:ARG:HB2	1:Y:179:PRO:HD2	1.98	0.45
1:Z:57:ALA:CB	1:Z:307:THR:HG22	2.46	0.45
1:X:99:VAL:O	1:X:102:CYS:HB2	2.17	0.45
1:X:176:HIS:HE1	1:X:178:ARG:HD3	1.82	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Y:34:GLY:O	1:Y:37:LYS:HB2	2.17	0.45
1:Z:54:THR:OG1	1:Z:141:MET:HE3	2.16	0.45
1:X:212:LYS:HE3	1:X:213:PHE:CE1	2.52	0.45
1:Z:192:MET:HE3	1:Z:197:TYR:HD1	1.81	0.45
1:Z:303:GLU:O	1:Z:307:THR:CG2	2.65	0.45
1:X:78:GLU:HA	1:X:89:LYS:HD3	1.99	0.45
1:X:202:THR:HA	1:X:220:GLU:O	2.17	0.45
1:Z:284:THR:HG23	1:Z:287:VAL:H	1.82	0.45
1:Z:171:MET:CE	1:Z:188:PHE:HB3	2.45	0.44
1:Y:103:TYR:CD1	1:Z:52:LEU:HG	2.52	0.44
1:X:202:THR:HG23	1:X:226:ALA:HB2	1.99	0.44
1:X:141:MET:O	1:X:142:GLU:CB	2.64	0.44
1:X:202:THR:HB	1:X:256:TRP:HZ3	1.81	0.44
1:X:185:PRO:HG2	1:X:238:TRP:HB3	1.99	0.44
1:Y:262:GLN:O	1:Y:265:VAL:HG22	2.18	0.44
1:Z:7:VAL:O	1:Z:10:ILE:HG22	2.18	0.44
1:Y:120:TYR:CE1	1:Y:125:VAL:HG21	2.52	0.43
1:Z:8:GLN:NE2	3:Z:529:HOH:O	2.51	0.43
1:X:54:THR:HG21	1:X:141:MET:HE3	2.00	0.43
1:X:203:HIS:HE1	3:X:593:HOH:O	2.01	0.43
1:Z:141:MET:O	1:Z:142:GLU:CB	2.66	0.43
1:Y:245:ASN:CG	1:Y:250:LEU:HD21	2.43	0.43
1:X:76:LYS:HB2	1:X:89:LYS:HA	2.00	0.43
1:X:237:ASN:CG	1:X:238:TRP:N	2.77	0.43
1:Y:273:HIS:CG	1:Y:277:VAL:HG22	2.53	0.43
1:Z:47:SER:O	1:Z:48:LEU:HD23	2.19	0.43
1:Z:223:GLN:HB2	1:Z:256:TRP:CZ3	2.54	0.43
1:Z:47:SER:OG	1:Z:48:LEU:N	2.49	0.43
1:Z:162:LYS:HD2	1:Z:164:THR:O	2.18	0.43
1:Z:206:GLY:CA	1:Z:208:GLU:OE2	2.66	0.43
1:Z:192:MET:HE1	1:Z:197:TYR:CD1	2.53	0.43
1:Z:57:ALA:O	1:Z:60:ASN:HB2	2.19	0.42
1:X:305:SER:O	1:X:309:VAL:HG23	2.20	0.42
1:Z:284:THR:HG22	1:Z:287:VAL:CG2	2.48	0.42
1:Y:37:LYS:HG2	1:Y:314:LEU:HD22	2.00	0.42
1:Y:245:ASN:HA	1:Y:248:GLN:OE1	2.20	0.42
1:X:171:MET:HE3	1:X:234:TYR:HD2	1.82	0.42
1:Y:97:ILE:HB	1:Y:98:PRO:HD3	2.02	0.42
1:X:41:MET:HE3	1:X:141:MET:CE	2.39	0.42
1:Y:112:PHE:N	1:Y:112:PHE:HD2	2.17	0.42
1:Y:178:ARG:C	1:Y:249:ILE:HD11	2.44	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Y:254:ARG:HG3	1:Y:257:THR:OG1	2.19	0.42
1:X:284:THR:CG2	1:X:285:ASP:N	2.82	0.41
1:Y:301:ASN:HD22	1:Y:301:ASN:HA	1.74	0.41
1:Z:41:MET:CE	1:Z:65:VAL:HG13	2.51	0.41
1:Y:7:VAL:O	1:Y:10:ILE:HG22	2.20	0.41
1:Y:141:MET:O	1:Y:142:GLU:CB	2.67	0.41
1:X:110:ARG:C	1:X:110:ARG:HD3	2.46	0.41
1:Z:54:THR:CB	1:Z:141:MET:HE3	2.51	0.41
1:X:61:LEU:CD1	1:X:310:LEU:HB3	2.51	0.41
1:Y:273:HIS:CD2	1:Y:282:ILE:HG21	2.55	0.41
1:Z:186:ASN:HB3	1:Z:213:PHE:CG	2.56	0.41
1:X:4:PHE:CE2	1:X:148:PRO:HB2	2.56	0.41
1:Y:261:ARG:H	1:Y:261:ARG:HE	1.69	0.40
1:Y:158:ILE:O	1:Y:162:LYS:HB3	2.22	0.40
1:Y:273:HIS:CE1	1:Y:277:VAL:HG22	2.53	0.40
1:Z:1:MET:CE	1:Z:313:LEU:HG	2.51	0.40
1:Z:72:GLN:HG2	1:Z:114:ARG:HH12	1.86	0.40
1:Y:7:VAL:HG12	3:Y:505:HOH:O	2.21	0.40
1:Y:30:TYR:O	1:Y:33:LEU:HB2	2.22	0.40
1:Z:95:GLU:O	1:Z:99:VAL:HG23	2.21	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	X	322/324 (99%)	309 (96%)	12 (4%)	1 (0%)	36	35
1	Y	316/324 (98%)	307 (97%)	8 (2%)	1 (0%)	36	35
1	Z	316/324 (98%)	304 (96%)	11 (4%)	1 (0%)	36	35
All	All	954/972 (98%)	920 (96%)	31 (3%)	3 (0%)	36	35

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	X	142	GLU
1	Y	142	GLU
1	Z	142	GLU

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	X	283/283 (100%)	267 (94%)	16 (6%)	18	15
1	Y	277/283 (98%)	264 (95%)	13 (5%)	23	22
1	Z	277/283 (98%)	268 (97%)	9 (3%)	34	35
All	All	837/849 (99%)	799 (96%)	38 (4%)	24	23

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	X	25	LYS
1	X	47	SER
1	X	95	GLU
1	X	119	GLU
1	X	132	GLN
1	X	157	THR
1	X	182	GLN
1	X	202	THR
1	X	208	GLU
1	X	216	ASN
1	X	228	GLU
1	X	248	GLN
1	X	265	VAL
1	X	275	LEU
1	X	277	VAL
1	X	310	LEU
1	Y	17	LEU
1	Y	25	LYS

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Mol	Chain	Res	Type
1	Y	33	LEU
1	Y	45	ASN
1	Y	47	SER
1	Y	51	ARG
1	Y	88	ASP
1	Y	112	PHE
1	Y	115	PHE
1	Y	178	ARG
1	Y	208	GLU
1	Y	261	ARG
1	Y	310	LEU
1	Z	8	GLN
1	Z	47	SER
1	Z	49	ARG
1	Z	182	GLN
1	Z	205	GLU
1	Z	208	GLU
1	Z	216	ASN
1	Z	265	VAL
1	Z	307	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (35) such sidechains are listed below:

Mol	Chain	Res	Type
1	X	55	GLN
1	X	64	ASN
1	X	71	ASN
1	X	72	GLN
1	X	203	HIS
1	X	248	GLN
1	X	267	ASN
1	X	280	ASN
1	X	301	ASN
1	X	320	HIS
1	X	324	HIS
1	Y	8	GLN
1	Y	45	ASN
1	Y	55	GLN
1	Y	60	ASN
1	Y	64	ASN
1	Y	72	GLN
1	Y	133	HIS

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Mol	Chain	Res	Type
1	Y	203	HIS
1	Y	237	ASN
1	Y	268	ASN
1	Y	301	ASN
1	Z	8	GLN
1	Z	55	GLN
1	Z	60	ASN
1	Z	64	ASN
1	Z	203	HIS
1	Z	216	ASN
1	Z	237	ASN
1	Z	245	ASN
1	Z	248	GLN
1	Z	267	ASN
1	Z	268	ASN
1	Z	292	GLN
1	Z	301	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

3 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	PO4	Y	502	-	4,4,4	1.50	0	6,6,6	0.46	0
2	PO4	X	501	-	4,4,4	1.59	1 (25%)	6,6,6	0.43	0
2	PO4	Z	503	-	4,4,4	1.26	0	6,6,6	0.53	0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	X	501	PO4	P-O4	-2.02	1.48	1.54

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	Y	502	PO4	1	0
2	Z	503	PO4	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

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	X	324/324 (100%)	0.09	5 (1%) 72 71	20, 31, 53, 73	0
1	Y	318/324 (98%)	0.16	11 (3%) 47 46	20, 31, 49, 72	0
1	Z	318/324 (98%)	-0.08	6 (1%) 66 66	18, 28, 45, 67	0
All	All	960/972 (98%)	0.06	22 (2%) 61 60	18, 30, 50, 73	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	Y	112	PHE	3.2
1	Y	75	TRP	3.0
1	Z	74	ALA	2.8
1	Z	73	GLY	2.7
1	Y	74	ALA	2.7
1	Z	46	SER	2.6
1	Y	73	GLY	2.5
1	X	115	PHE	2.4
1	Z	47	SER	2.4
1	Y	254	ARG	2.4
1	X	73	GLY	2.4
1	Y	45	ASN	2.3
1	Z	48	LEU	2.3
1	X	49	ARG	2.3
1	Y	178	ARG	2.2
1	Y	113	ALA	2.1
1	Y	248	GLN	2.1
1	Y	261	ARG	2.1
1	X	321	HIS	2.1
1	Y	318	PRO	2.1
1	X	75	TRP	2.1
1	Z	117	ASN	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 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($\text{\AA}^2$)	Q<0.9
2	PO4	Z	503	5/5	0.62	0.18	64,64,66,67	0
2	PO4	Y	502	5/5	0.76	0.13	69,70,70,71	0
2	PO4	X	501	5/5	0.82	0.12	59,59,60,60	0

6.5 Other polymers [i](#)

There are no such residues in this entry.