



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:09 PM UTC

PDB ID : 2GCL / pdb_00002gcl
Title : Structure of the Pob3 Middle domain
Authors : VanDemark, A.P.
Deposited on : 2006-03-14
Resolution : 2.21 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

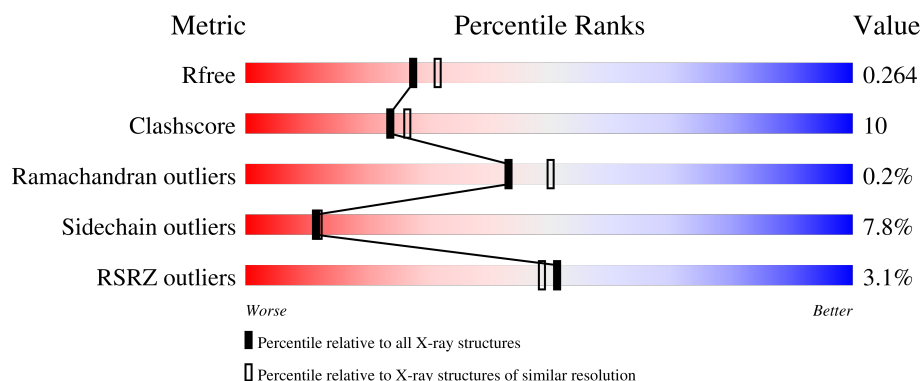
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.21 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	7682 (2.24-2.20)
Clashscore	190562	8402 (2.24-2.20)
Ramachandran outliers	187476	8303 (2.24-2.20)
Sidechain outliers	187428	8304 (2.24-2.20)
RSRZ outliers	180081	7683 (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 $\leq 5\%$. 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	261	
1	B	261	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4050 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 Hypothetical 63.0 kDa protein in DAK1-ORC1 intergenic region.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	230	Total	C	N	O	S	Se	0	0	0
			1895	1211	322	356	2	4			
1	B	231	Total	C	N	O	S	Se	0	0	0
			1908	1217	326	359	2	4			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	218	GLY	-	cloning artifact	UNP Q04636
A	219	HIS	-	cloning artifact	UNP Q04636
A	220	MSE	MET	modified residue	UNP Q04636
A	297	MSE	LEU	engineered mutation	UNP Q04636
A	298	MSE	LEU	engineered mutation	UNP Q04636
A	300	MSE	LEU	engineered mutation	UNP Q04636
A	419	MSE	MET	modified residue	UNP Q04636
B	218	GLY	-	cloning artifact	UNP Q04636
B	219	HIS	-	cloning artifact	UNP Q04636
B	220	MSE	MET	modified residue	UNP Q04636
B	297	MSE	LEU	engineered mutation	UNP Q04636
B	298	MSE	LEU	engineered mutation	UNP Q04636
B	300	MSE	LEU	engineered mutation	UNP Q04636
B	419	MSE	MET	modified residue	UNP Q04636

- Molecule 2 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	4	Total	Cl	0	0
			4	4		

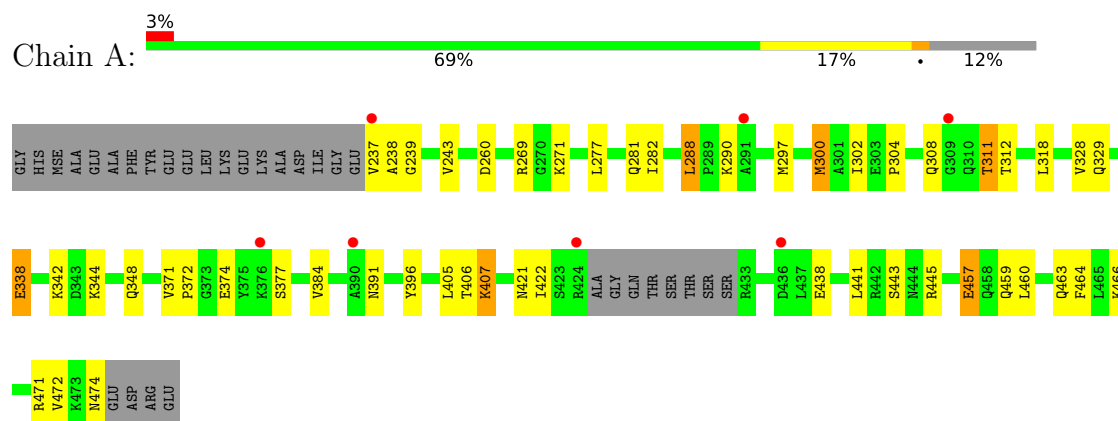
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	137	Total 137	O 137	0	0
3	B	106	Total 106	O 106	0	0

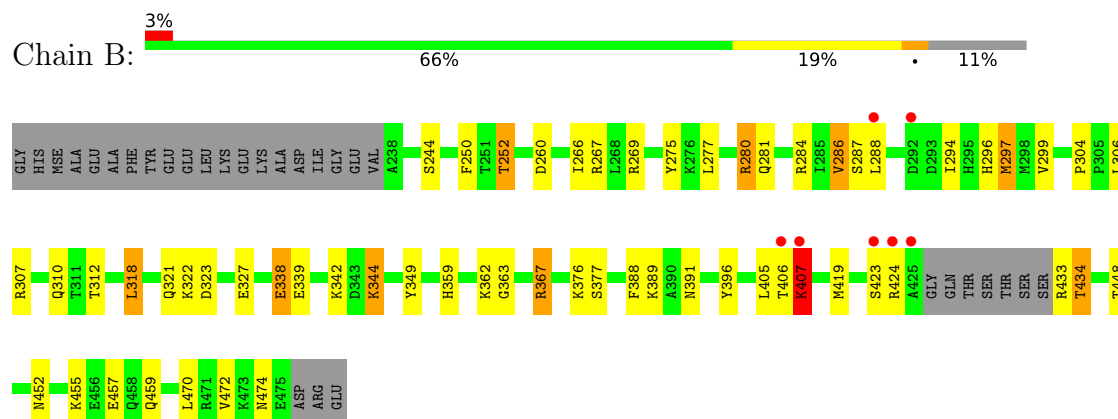
3 Residue-property plots [i](#)

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: Hypothetical 63.0 kDa protein in DAK1-ORC1 intergenic region



- Molecule 1: Hypothetical 63.0 kDa protein in DAK1-ORC1 intergenic region



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	57.11Å 57.77Å 156.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.21 30.00 – 2.21	Depositor EDS
% Data completeness (in resolution range)	98.8 (30.00-2.21) 98.7 (30.00-2.21)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.207 , 0.264 0.210 , 0.264	Depositor DCC
R_{free} test set	1337 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	32.2	Xtriage
Anisotropy	0.297	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	0.034 for k,h,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4050	wwPDB-VP
Average B, all atoms (Å ²)	41.0	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 26.50 % 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 2.6069e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: CL

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	0.74	1/1929 (0.1%)	0.86	0/2595
1	B	0.65	0/1942	0.86	1/2611 (0.0%)
All	All	0.70	1/3871 (0.0%)	0.86	1/5206 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	300	MSE	SE-CE	-5.03	1.80	1.95

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	294	ILE	N-CA-C	-5.11	107.77	111.90

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	407	LYS	Peptide

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	1895	0	1888	29	0
1	B	1908	0	1901	48	0
2	A	4	0	0	0	0
3	A	137	0	0	4	0
3	B	106	0	0	7	0
All	All	4050	0	3789	77	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 10.

All (77) 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:286:VAL:HG23	1:B:288:LEU:HD13	1.49	0.93
1:B:287:SER:O	1:B:288:LEU:HD12	1.76	0.85
1:B:287:SER:C	1:B:288:LEU:HD12	2.03	0.83
1:B:318:LEU:N	1:B:318:LEU:HD23	1.97	0.80
1:B:349:TYR:OH	1:B:359:HIS:HD2	1.70	0.74
1:B:275:TYR:HE1	1:B:307:ARG:O	1.76	0.68
1:B:391:ASN:HB3	1:B:407:LYS:HB2	1.79	0.64
1:B:288:LEU:HD23	1:B:396:TYR:CD2	2.33	0.64
1:B:252:THR:HG21	3:B:570:HOH:O	1.97	0.63
1:B:286:VAL:HG13	1:B:299:VAL:HB	1.82	0.62
1:A:281:GLN:HG2	1:A:304:PRO:HD2	1.83	0.61
1:A:288:LEU:HD13	1:A:297:MSE:HE3	1.83	0.60
1:B:321:GLN:HE22	1:B:323:ASP:HB2	1.67	0.60
1:B:287:SER:OG	1:B:296:HIS:HE1	1.85	0.59
1:A:384:VAL:HG11	1:A:457:GLU:HG2	1.84	0.58
1:B:286:VAL:CG2	1:B:288:LEU:HD13	2.28	0.58
1:B:318:LEU:HD23	1:B:318:LEU:H	1.68	0.58
1:B:286:VAL:HG23	1:B:288:LEU:CD1	2.28	0.58
1:B:424:ARG:HH12	1:B:455:LYS:HD3	1.70	0.57
3:A:613:HOH:O	1:B:470:LEU:HD23	2.06	0.56
1:B:376:LYS:HD3	3:B:566:HOH:O	2.04	0.56
1:A:421:ASN:HB2	1:A:438:GLU:HB3	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:297:MSE:HE2	1:B:405:LEU:HD13	1.88	0.55
1:B:376:LYS:CD	3:B:566:HOH:O	2.56	0.54
1:A:374:GLU:HG3	1:A:464:PHE:HE2	1.73	0.54
1:B:287:SER:C	1:B:288:LEU:CD1	2.80	0.54
1:A:460:LEU:HA	1:A:463:GLN:HG2	1.91	0.53
1:B:260:ASP:OD2	1:B:269:ARG:HD3	2.09	0.53
1:B:269:ARG:NH1	3:B:543:HOH:O	2.41	0.53
1:B:267:ARG:NH2	3:B:517:HOH:O	2.42	0.52
1:A:384:VAL:CG1	1:A:457:GLU:HG2	2.38	0.52
1:A:237:VAL:HG12	1:A:239:GLY:H	1.75	0.52
1:B:349:TYR:OH	1:B:359:HIS:CD2	2.58	0.51
1:B:367:ARG:HH11	1:B:367:ARG:CG	2.24	0.51
1:B:318:LEU:N	1:B:318:LEU:CD2	2.69	0.51
1:B:252:THR:CG2	3:B:576:HOH:O	2.59	0.50
1:A:371:VAL:HB	1:A:372:PRO:HD2	1.93	0.49
1:B:252:THR:HG23	3:B:576:HOH:O	2.12	0.49
1:B:280:ARG:HD3	1:B:280:ARG:C	2.38	0.48
1:A:329:GLN:HG2	1:A:348:GLN:HG2	1.96	0.48
1:B:275:TYR:CE1	1:B:307:ARG:O	2.62	0.47
1:A:271:LYS:HE2	3:A:522:HOH:O	2.16	0.46
1:A:374:GLU:HG3	1:A:464:PHE:CE2	2.51	0.46
1:A:260:ASP:OD2	1:A:269:ARG:NE	2.28	0.45
1:A:282:ILE:HD13	1:A:300:MSE:HE1	1.98	0.45
1:A:391:ASN:HB3	1:A:407:LYS:O	2.17	0.45
1:B:424:ARG:NH1	1:B:455:LYS:HD3	2.32	0.44
1:B:250:PHE:CE2	1:B:318:LEU:HD22	2.52	0.44
1:B:306:LEU:HD23	1:B:306:LEU:HA	1.78	0.44
1:B:367:ARG:HH11	1:B:367:ARG:HG3	1.81	0.44
1:B:306:LEU:O	1:B:312:THR:HA	2.17	0.44
1:B:244:SER:OG	1:B:260:ASP:OD1	2.35	0.44
1:B:406:THR:O	1:B:407:LYS:C	2.61	0.44
1:B:281:GLN:HG2	1:B:304:PRO:HD2	2.00	0.44
1:B:388:PHE:CE1	1:B:448:THR:HG23	2.52	0.44
1:A:308:GLN:O	1:A:311:THR:HG23	2.18	0.43
1:A:308:GLN:NE2	3:A:559:HOH:O	2.50	0.43
1:A:338:GLU:HG3	1:A:342:LYS:HE3	2.00	0.43
1:B:266:ILE:HD11	1:B:277:LEU:HD12	2.01	0.42
1:A:277:LEU:HD11	1:A:302:ILE:HD12	2.01	0.42
1:A:288:LEU:HD22	1:A:396:TYR:CE2	2.55	0.42
1:A:405:LEU:HA	1:A:406:THR:HA	1.81	0.42
1:A:443:SER:HB2	1:A:445:ARG:HD3	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:466:LYS:HE3	1:A:472:VAL:HB	2.00	0.42
1:B:344:LYS:HD3	1:B:363:GLY:O	2.19	0.42
1:A:237:VAL:HG12	1:A:238:ALA:N	2.33	0.42
1:B:377:SER:HB2	1:B:457:GLU:OE1	2.19	0.42
1:B:405:LEU:HA	1:B:406:THR:HA	1.79	0.42
1:B:434:THR:HG23	1:B:452:ASN:HA	2.02	0.42
1:B:391:ASN:HB3	1:B:407:LYS:CB	2.49	0.41
1:A:288:LEU:CD1	1:A:297:MSE:HE3	2.49	0.41
1:A:243:VAL:HG23	1:A:328:VAL:HG21	2.02	0.41
1:B:338:GLU:HG3	1:B:339:GLU:N	2.36	0.41
1:B:419:MSE:HE3	1:B:419:MSE:HB2	1.92	0.41
1:A:282:ILE:HD13	1:A:300:MSE:CE	2.51	0.41
1:A:344:LYS:HE3	3:A:542:HOH:O	2.21	0.41
1:A:422:ILE:HB	1:A:474:ASN:CB	2.52	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	226/261 (87%)	220 (97%)	5 (2%)	1 (0%)	30	33
1	B	227/261 (87%)	217 (96%)	10 (4%)	0	100	100
All	All	453/522 (87%)	437 (96%)	15 (3%)	1 (0%)	43	50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	377	SER

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	212/232 (91%)	201 (95%)	11 (5%)	21	25
1	B	213/232 (92%)	191 (90%)	22 (10%)	7	6
All	All	425/464 (92%)	392 (92%)	33 (8%)	11	12

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	288	LEU
1	A	290	LYS
1	A	311	THR
1	A	312	THR
1	A	318	LEU
1	A	338	GLU
1	A	407	LYS
1	A	441	LEU
1	A	457	GLU
1	A	459	GLN
1	A	471	ARG
1	B	252	THR
1	B	280	ARG
1	B	284	ARG
1	B	286	VAL
1	B	297	MSE
1	B	310	GLN
1	B	318	LEU
1	B	322	LYS
1	B	327	GLU
1	B	338	GLU
1	B	342	LYS
1	B	344	LYS
1	B	362	LYS
1	B	367	ARG
1	B	389	LYS
1	B	407	LYS

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Mol	Chain	Res	Type
1	B	423	SER
1	B	433	ARG
1	B	434	THR
1	B	459	GLN
1	B	472	VAL
1	B	474	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	308	GLN
1	A	321	GLN
1	A	452	ASN
1	B	295	HIS
1	B	296	HIS
1	B	321	GLN
1	B	359	HIS
1	B	474	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	226/261 (86%)	0.08	7 (3%) 51 49	15, 33, 68, 97	6 (2%)
1	B	227/261 (86%)	0.33	7 (3%) 51 49	20, 44, 72, 87	4 (1%)
All	All	453/522 (86%)	0.20	14 (3%) 51 49	15, 39, 72, 97	10 (2%)

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	425	ALA	5.0
1	A	376	LYS	3.0
1	B	407	LYS	2.9
1	A	291	ALA	2.8
1	B	423	SER	2.6
1	A	237	VAL	2.6
1	B	292	ASP	2.4
1	A	390	ALA	2.4
1	A	309	GLY	2.3
1	B	406	THR	2.2
1	B	288	LEU	2.0
1	A	424	ARG	2.0
1	B	424	ARG	2.0
1	A	436	ASP	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	CL	A	482	1/1	0.78	0.23	72,72,72,72	0
2	CL	A	479	1/1	0.86	0.17	70,70,70,70	0
2	CL	A	481	1/1	0.99	0.04	37,37,37,37	0
2	CL	A	480	1/1	0.99	0.05	27,27,27,27	0

6.5 Other polymers [i](#)

There are no such residues in this entry.