



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 5ONK
Title : Native YndL
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Resolution : 1.03 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

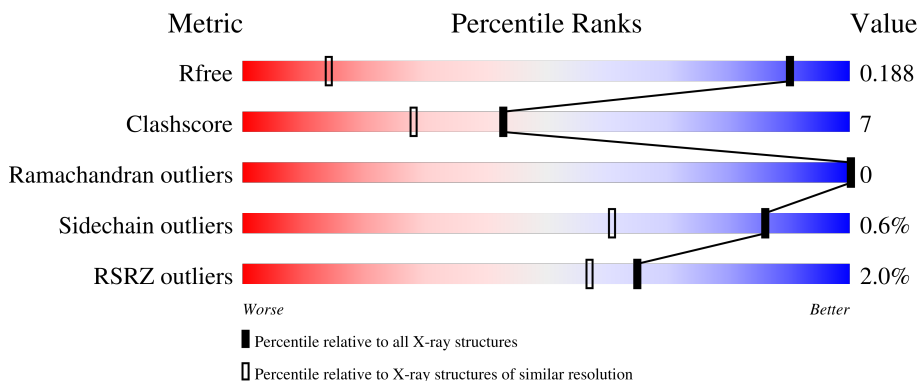
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.03 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}	130704	1596 (1.10-0.98)
Clashscore	141614	1677 (1.10-0.98)
Ramachandran outliers	138981	1591 (1.10-0.98)
Sidechain outliers	138945	1589 (1.10-0.98)
RSRZ outliers	127900	1557 (1.10-0.98)

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	214	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 1916 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 YndL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	202	1636	1027	286	318	5	0	5	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	207	LEU	-	expression tag	UNP A0A164XNU3
A	208	GLU	-	expression tag	UNP A0A164XNU3
A	209	HIS	-	expression tag	UNP A0A164XNU3
A	210	HIS	-	expression tag	UNP A0A164XNU3
A	211	HIS	-	expression tag	UNP A0A164XNU3
A	212	HIS	-	expression tag	UNP A0A164XNU3
A	213	HIS	-	expression tag	UNP A0A164XNU3
A	214	HIS	-	expression tag	UNP A0A164XNU3

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

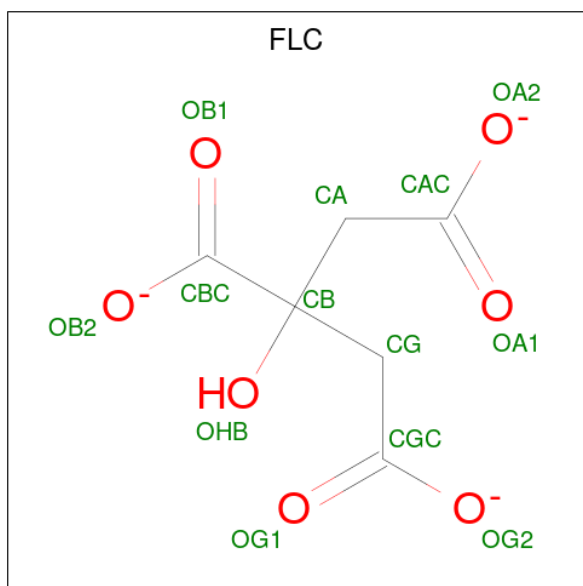
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0

- Molecule 4 is CITRATE ANION (three-letter code: FLC) (formula: $C_6H_5O_7$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 26 12 14	0	1

- Molecule 5 is IMIDAZOLE (three-letter code: IMD) (formula: $C_3H_5N_2$).



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

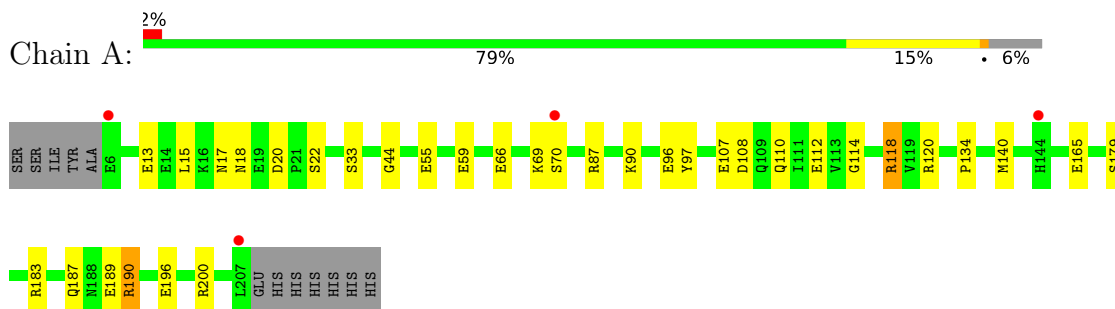
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	238	Total O 238 238	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: YndL



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	38.67Å 46.86Å 100.07Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.20 – 1.03 36.07 – 1.03	Depositor EDS
% Data completeness (in resolution range)	85.3 (34.20-1.03) 85.3 (36.07-1.03)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.57 (at 1.03Å)	Xtrriage
Refinement program	REFMAC 5.8.0135	Depositor
R, R_{free}	0.166 , 0.187 0.167 , 0.188	Depositor DCC
R_{free} test set	3847 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	11.7	Xtrriage
Anisotropy	0.044	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 35.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	1916	wwPDB-VP
Average B, all atoms (Å ²)	15.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.21% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FLC, ZN, IMD, SO4

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	1.47	15/1669 (0.9%)	1.29	14/2250 (0.6%)

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	A	0	1

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	22	SER	CB-OG	-10.06	1.29	1.42
1	A	97	TYR	CE1-CZ	-8.32	1.27	1.38
1	A	96	GLU	CD-OE2	-7.98	1.16	1.25
1	A	69	LYS	C-O	-6.73	1.10	1.23
1	A	118	ARG	CZ-NH1	-6.58	1.24	1.33
1	A	33	SER	CB-OG	6.58	1.50	1.42
1	A	165	GLU	CD-OE1	6.12	1.32	1.25
1	A	114	GLY	C-O	-5.67	1.14	1.23
1	A	66	GLU	CD-OE2	-5.59	1.19	1.25
1	A	69	LYS	CB-CG	-5.58	1.37	1.52
1	A	44	GLY	N-CA	-5.56	1.37	1.46
1	A	97	TYR	CZ-OH	5.34	1.47	1.37
1	A	55	GLU	CD-OE1	-5.27	1.19	1.25
1	A	179	SER	CA-CB	5.16	1.60	1.52
1	A	112	GLU	CA-CB	-5.11	1.42	1.53

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	190[A]	ARG	NE-CZ-NH1	-10.22	115.19	120.30
1	A	190[B]	ARG	NE-CZ-NH1	-10.22	115.19	120.30
1	A	190[C]	ARG	NE-CZ-NH1	-10.22	115.19	120.30
1	A	120	ARG	NE-CZ-NH1	-9.65	115.47	120.30
1	A	90	LYS	CD-CE-NZ	8.23	130.62	111.70
1	A	183	ARG	NE-CZ-NH1	6.49	123.55	120.30
1	A	87	ARG	NE-CZ-NH2	-6.46	117.07	120.30
1	A	120	ARG	NE-CZ-NH2	6.33	123.46	120.30
1	A	108	ASP	CB-CG-OD2	-6.29	112.64	118.30
1	A	108	ASP	CB-CG-OD1	6.16	123.85	118.30
1	A	20	ASP	CB-CG-OD1	6.09	123.78	118.30
1	A	112	GLU	OE1-CD-OE2	-5.49	116.71	123.30
1	A	87	ARG	NE-CZ-NH1	5.22	122.91	120.30
1	A	13	GLU	OE1-CD-OE2	-5.20	117.06	123.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	18	ASN	Mainchain

5.2 Too-close contacts [i](#)

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	1636	0	1579	21	1
2	A	1	0	0	0	0
3	A	10	0	0	1	0
4	A	26	0	10	0	0
5	A	5	0	5	2	0
6	A	238	0	0	18	3
All	All	1916	0	1594	22	3

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 7.

All (22) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:190[C]:ARG:HD3	6:A:440:HOH:O	1.36	1.22
3:A:303:SO4:O4	6:A:402:HOH:O	1.70	1.07
1:A:110[B]:GLN:OE1	1:A:134:PRO:O	1.88	0.92
1:A:17:ASN:HB3	6:A:565:HOH:O	1.68	0.91
1:A:187[A]:GLN:CD	6:A:406:HOH:O	2.19	0.80
1:A:107:GLU:HG3	6:A:632:HOH:O	1.86	0.73
1:A:107:GLU:HG3	6:A:581:HOH:O	1.88	0.73
1:A:190[C]:ARG:NH1	6:A:404:HOH:O	2.22	0.72
1:A:200:ARG:NH1	6:A:405:HOH:O	2.26	0.69
1:A:187[A]:GLN:NE2	6:A:406:HOH:O	2.29	0.66
1:A:189:GLU:HG2	6:A:573:HOH:O	1.97	0.63
1:A:59:GLU:OE1	5:A:305:IMD:H2	2.02	0.59
1:A:17:ASN:CB	6:A:565:HOH:O	2.40	0.55
1:A:140:MET:HB2	6:A:554:HOH:O	2.08	0.53
1:A:187[A]:GLN:CG	6:A:406:HOH:O	2.55	0.53
1:A:187[B]:GLN:CG	6:A:406:HOH:O	2.62	0.48
1:A:187[B]:GLN:HG3	6:A:406:HOH:O	2.15	0.47
1:A:118:ARG:NH2	6:A:403:HOH:O	1.94	0.46
1:A:196:GLU:OE1	5:A:305:IMD:H4	2.17	0.45
1:A:110[A]:GLN:HG2	6:A:453:HOH:O	2.17	0.45
1:A:190[C]:ARG:CD	6:A:440:HOH:O	2.20	0.41
1:A:15:LEU:HD23	1:A:15:LEU:C	2.41	0.41

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:MET:CE	6:A:502:HOH:O[4_455]	1.76	0.44
6:A:453:HOH:O	6:A:526:HOH:O[4_555]	1.99	0.21
6:A:554:HOH:O	6:A:620:HOH:O[4_455]	2.15	0.05

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	206/214 (96%)	201 (98%)	5 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	177/183 (97%)	176 (99%)	1 (1%)	86	61

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	70	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	144	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry

Of 6 ligands modelled in this entry, 1 is monoatomic - leaving 5 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	SO4	A	303	-	4,4,4	0.44	0	6,6,6	0.52	0
4	FLC	A	304[B]	2	12,12,12	1.36	1 (8%)	17,17,17	6.68	9 (52%)
4	FLC	A	304[A]	2	12,12,12	2.60	5 (41%)	17,17,17	2.21	4 (23%)
3	SO4	A	302	-	4,4,4	0.60	0	6,6,6	0.30	0
5	IMD	A	305	-	3,5,5	0.24	0	4,5,5	0.69	0

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
5	IMD	A	305	-	-	-	0/1/1/1
4	FLC	A	304[A]	2	-	0/16/16/16	-
4	FLC	A	304[B]	2	-	6/16/16/16	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	304[A]	FLC	CA-CB	-5.84	1.46	1.53
4	A	304[A]	FLC	OB2-CBC	-4.01	1.15	1.30
4	A	304[B]	FLC	CB-CBC	3.23	1.56	1.53
4	A	304[A]	FLC	CB-CBC	3.03	1.56	1.53
4	A	304[A]	FLC	OA2-CAC	-2.29	1.23	1.30
4	A	304[A]	FLC	OB1-CBC	-2.11	1.15	1.22

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	304[B]	FLC	OHB-CB-CBC	-21.09	79.25	108.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	304[B]	FLC	OB1-CBC-CB	-8.49	110.23	122.25
4	A	304[B]	FLC	CA-CB-CBC	8.43	128.22	110.11
4	A	304[B]	FLC	OB2-CBC-CB	8.04	127.01	113.05
4	A	304[B]	FLC	OHB-CB-CA	-7.77	91.21	109.40
4	A	304[A]	FLC	OB2-CBC-CB	5.90	123.30	113.05
4	A	304[A]	FLC	CA-CB-CBC	3.69	118.04	110.11
4	A	304[B]	FLC	OHB-CB-CG	-3.63	100.91	109.40
4	A	304[A]	FLC	OB2-CBC-OB1	-3.62	112.29	123.82
4	A	304[B]	FLC	CG-CB-CBC	3.51	117.64	110.11
4	A	304[A]	FLC	OA2-CAC-OA1	-2.68	116.61	123.30
4	A	304[B]	FLC	OA2-CAC-CA	2.61	122.73	114.35
4	A	304[B]	FLC	OA2-CAC-OA1	-2.25	117.69	123.30

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	304[B]	FLC	CAC-CA-CB-CBC
4	A	304[B]	FLC	CA-CB-CG-CGC
4	A	304[B]	FLC	OHB-CB-CG-CGC
4	A	304[B]	FLC	CA-CB-CBC-OB2
4	A	304[B]	FLC	CBC-CB-CG-CGC
4	A	304[B]	FLC	CA-CB-CBC-OB1

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	303	SO4	1	0
5	A	305	IMD	2	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	202/214 (94%)	0.03	4 (1%) 65 57	8, 12, 22, 35	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	144	HIS	3.4
1	A	6	GLU	3.3
1	A	70	SER	2.9
1	A	207	LEU	2.9

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 [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
5	IMD	A	305	5/5	0.80	0.11	25,26,27,28	0
4	FLC	A	304[B]	13/13	0.92	0.16	11,14,19,22	13
4	FLC	A	304[A]	13/13	0.92	0.16	9,16,43,46	13

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	SO4	A	303	5/5	0.93	0.12	19,25,26,30	5
3	SO4	A	302	5/5	0.97	0.07	11,12,13,14	5
2	ZN	A	301	1/1	1.00	0.04	8,8,8,8	0

6.5 Other polymers [i](#)

There are no such residues in this entry.