



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 15, 2023 – 08:00 PM JST

PDB ID : 6JWJ  
Title : Npl4 in complex with Ufd1  
Authors : Sato, Y.; Fukai, S.  
Deposited on : 2019-04-20  
Resolution : 1.58 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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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>.

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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 : 2.36  
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) : 2.36

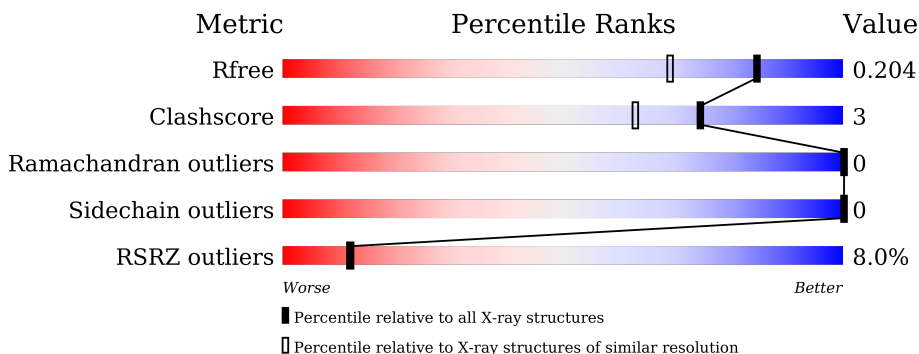
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.58 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	5534 (1.60-1.56)
Clashscore	141614	5861 (1.60-1.56)
Ramachandran outliers	138981	5708 (1.60-1.56)
Sidechain outliers	138945	5703 (1.60-1.56)
RSRZ outliers	127900	5431 (1.60-1.56)

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  $\geq 3$ , 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	473	 8% 93% 6%
2	C	23	 13% 78% 17%

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
4	GOL	A	607	-	-	X	-
4	GOL	A	610	-	-	-	X

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4341 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 Nuclear protein localization protein 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	466	3732	2364	625	722	21	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	108	GLY	-	expression tag	UNP P33755
A	109	PRO	-	expression tag	UNP P33755
A	110	LEU	-	expression tag	UNP P33755
A	111	GLY	-	expression tag	UNP P33755
A	112	SER	-	expression tag	UNP P33755
A	123	ALA	GLU	engineered mutation	UNP P33755
A	124	ALA	LYS	engineered mutation	UNP P33755
A	125	ALA	GLU	engineered mutation	UNP P33755

- Molecule 2 is a protein called Peptide from Ubiquitin fusion degradation protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	19	151	102	21	26	2	0	0	0

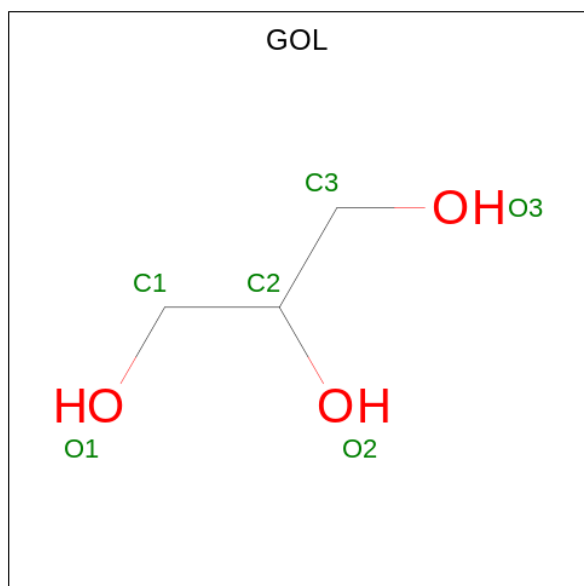
There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	283	GLY	-	expression tag	UNP P53044
C	284	PRO	-	expression tag	UNP P53044
C	285	GLY	-	expression tag	UNP P53044
C	286	HIS	-	expression tag	UNP P53044
C	287	MET	-	expression tag	UNP P53044

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		

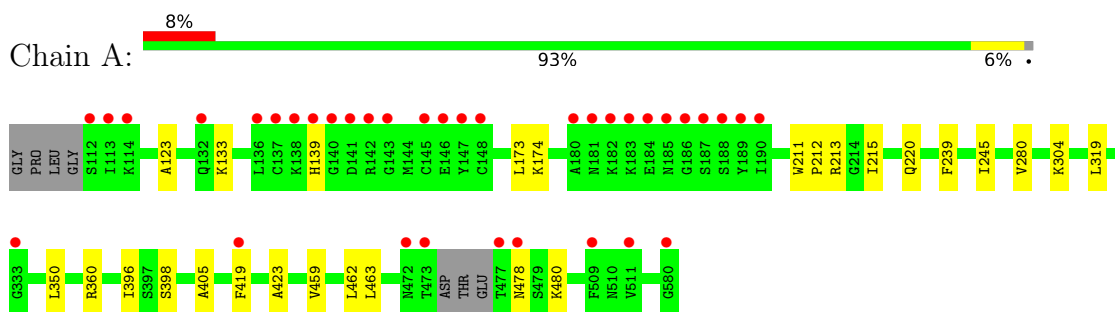
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	372	Total 372	O 372	0	0
5	C	18	Total 18	O 18	0	0

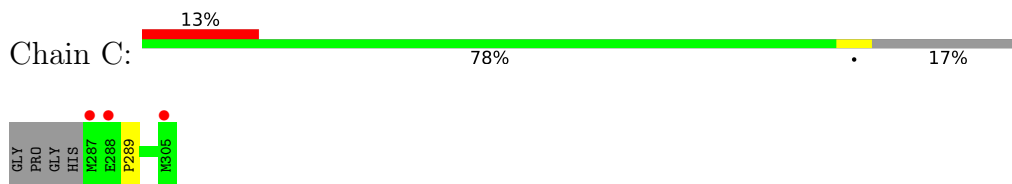
### 3 Residue-property plots [i](#)

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: Nuclear protein localization protein 4



- Molecule 2: Peptide from Ubiquitin fusion degradation protein 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.00Å 82.55Å 94.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.55 – 1.58 47.55 – 1.58	Depositor EDS
% Data completeness (in resolution range)	96.5 (47.55-1.58) 96.5 (47.55-1.58)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.09 (at 1.58Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.178 , 0.206 0.179 , 0.204	Depositor DCC
$R_{free}$ test set	3905 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.4	Xtrriage
Anisotropy	0.464	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 46.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	4341	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.23% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: ZN, GOL

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	0.33	0/3820	0.48	0/5159
2	C	0.35	0/156	0.44	0/209
All	All	0.33	0/3976	0.48	0/5368

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3732	0	3609	24	0
2	C	151	0	146	1	0
3	A	2	0	0	0	0
4	A	54	0	72	11	0
4	C	12	0	16	1	0
5	A	372	0	0	1	0
5	C	18	0	0	0	0
All	All	4341	0	3843	25	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 3.

All (25) 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)
4:A:603:GOL:H32	4:A:604:GOL:H2	1.78	0.65
1:A:398:SER:H	4:A:610:GOL:H12	1.64	0.63
1:A:478:ASN:ND2	4:A:608:GOL:H11	2.22	0.55
1:A:133:LYS:HD2	1:A:139:HIS:CE1	2.42	0.54
1:A:215:ILE:HG12	1:A:220:GLN:HB2	1.91	0.52
1:A:173:LEU:HD23	4:A:607:GOL:H12	1.90	0.52
1:A:213:ARG:HE	4:A:611:GOL:H11	1.78	0.49
1:A:239:PHE:CE1	1:A:245:ILE:HD11	2.48	0.49
1:A:123:ALA:HA	4:A:607:GOL:H11	1.95	0.48
1:A:174:LYS:NZ	4:A:607:GOL:H31	2.30	0.47
1:A:304:LYS:NZ	5:A:709:HOH:O	2.48	0.47
1:A:350:LEU:HD12	1:A:463:LEU:HD21	1.97	0.47
1:A:360:ARG:HH12	4:C:402:GOL:H31	1.79	0.46
1:A:280:VAL:HG11	4:A:608:GOL:H2	1.99	0.44
1:A:211:TRP:CD2	1:A:212:PRO:HA	2.53	0.44
1:A:419:PHE:CG	2:C:289:PRO:HB3	2.53	0.44
1:A:174:LYS:HZ1	4:A:607:GOL:H31	1.82	0.44
1:A:133:LYS:HD2	1:A:139:HIS:HE1	1.83	0.44
1:A:398:SER:N	4:A:610:GOL:H12	2.30	0.43
1:A:423:ALA:HB2	1:A:459:VAL:HG12	2.00	0.43
1:A:478:ASN:OD1	4:A:608:GOL:H31	2.18	0.43
1:A:319:LEU:HD21	1:A:480:LYS:HD2	2.00	0.43
1:A:245:ILE:HG21	1:A:396:ILE:HD11	2.00	0.42
1:A:423:ALA:HB2	1:A:459:VAL:CG1	2.50	0.42
1:A:405:ALA:HB2	1:A:462:LEU:HB3	2.02	0.41

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	462/473 (98%)	456 (99%)	6 (1%)	0	100	100
2	C	17/23 (74%)	16 (94%)	1 (6%)	0	100	100
All	All	479/496 (97%)	472 (98%)	7 (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	415/420 (99%)	415 (100%)	0	100	100
2	C	16/18 (89%)	16 (100%)	0	100	100
All	All	431/438 (98%)	431 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 13 ligands modelled in this entry, 2 are monoatomic - leaving 11 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
4	GOL	A	610	-	5,5,5	0.37	0	5,5,5	0.34	0
4	GOL	A	607	-	5,5,5	0.38	0	5,5,5	0.47	0
4	GOL	C	401	-	5,5,5	0.37	0	5,5,5	0.27	0
4	GOL	A	604	-	5,5,5	0.35	0	5,5,5	0.21	0
4	GOL	A	605	-	5,5,5	0.36	0	5,5,5	0.26	0
4	GOL	A	609	-	5,5,5	0.34	0	5,5,5	0.23	0
4	GOL	A	611	-	5,5,5	0.34	0	5,5,5	0.44	0
4	GOL	A	603	-	5,5,5	0.42	0	5,5,5	0.38	0
4	GOL	C	402	-	5,5,5	0.46	0	5,5,5	0.39	0
4	GOL	A	608	-	5,5,5	0.37	0	5,5,5	0.18	0
4	GOL	A	606	-	5,5,5	0.36	0	5,5,5	0.22	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
4	GOL	A	610	-	-	3/4/4/4	-
4	GOL	A	607	-	-	0/4/4/4	-
4	GOL	C	401	-	-	0/4/4/4	-
4	GOL	A	604	-	-	0/4/4/4	-
4	GOL	A	605	-	-	0/4/4/4	-
4	GOL	A	609	-	-	2/4/4/4	-
4	GOL	A	611	-	-	3/4/4/4	-
4	GOL	A	603	-	-	2/4/4/4	-
4	GOL	C	402	-	-	4/4/4/4	-
4	GOL	A	608	-	-	4/4/4/4	-
4	GOL	A	606	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	606	GOL	O1-C1-C2-C3
4	A	608	GOL	O1-C1-C2-C3
4	A	608	GOL	C1-C2-C3-O3
4	A	608	GOL	O2-C2-C3-O3
4	A	609	GOL	O1-C1-C2-C3
4	A	611	GOL	O1-C1-C2-C3
4	C	402	GOL	O1-C1-C2-C3
4	C	402	GOL	C1-C2-C3-O3
4	A	611	GOL	O1-C1-C2-O2
4	A	603	GOL	C1-C2-C3-O3
4	A	610	GOL	C1-C2-C3-O3
4	A	608	GOL	O1-C1-C2-O2
4	A	609	GOL	O1-C1-C2-O2
4	C	402	GOL	O2-C2-C3-O3
4	A	606	GOL	O1-C1-C2-O2
4	A	610	GOL	O2-C2-C3-O3
4	A	603	GOL	O2-C2-C3-O3
4	C	402	GOL	O1-C1-C2-O2
4	A	610	GOL	O1-C1-C2-C3
4	A	611	GOL	C1-C2-C3-O3

There are no ring outliers.

7 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	610	GOL	2	0
4	A	607	GOL	4	0
4	A	604	GOL	1	0
4	A	611	GOL	1	0
4	A	603	GOL	1	0
4	C	402	GOL	1	0
4	A	608	GOL	3	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	466/473 (98%)	0.44	36 (7%) <b>13</b>   <b>13</b>	15, 29, 64, 104	0
2	C	19/23 (82%)	0.43	3 (15%) <b>2</b>   <b>1</b>	27, 34, 64, 85	0
All	All	485/496 (97%)	0.44	39 (8%) <b>12</b>   <b>12</b>	15, 29, 64, 104	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	580	GLY	9.0
1	A	113	ILE	8.8
1	A	140	GLY	7.7
1	A	188	SER	7.1
1	A	142	ARG	7.0
1	A	472	ASN	6.0
1	A	141	ASP	6.0
1	A	112	SER	5.9
1	A	137	CYS	5.5
1	A	186	GLY	5.4
1	A	185	ASN	5.3
1	A	477	THR	5.1
1	A	473	THR	5.0
1	A	184	GLU	4.8
1	A	146	GLU	4.8
1	A	139	HIS	4.6
1	A	136	LEU	4.6
1	A	190	ILE	4.4
1	A	189	TYR	4.4
1	A	147	TYR	4.3
1	A	138	LYS	4.2
1	A	145	CYS	4.1
1	A	187	SER	4.0
1	A	182	LYS	3.9

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Mol	Chain	Res	Type	RSRZ
1	A	183	LYS	3.8
1	A	509	PHE	3.6
2	C	287	MET	3.4
1	A	181	ASN	3.3
1	A	333	GLY	3.3
1	A	143	GLY	3.3
1	A	180	ALA	3.0
1	A	114	LYS	2.6
2	C	288	GLU	2.3
2	C	305	MET	2.3
1	A	148	CYS	2.3
1	A	419	PHE	2.3
1	A	132	GLN	2.3
1	A	511	VAL	2.1
1	A	478	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 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	GOL	A	610	6/6	0.23	0.48	65,79,81,84	0
4	GOL	C	401	6/6	0.59	0.38	65,73,75,81	0
4	GOL	A	611	6/6	0.68	0.16	65,67,70,70	0
4	GOL	A	606	6/6	0.71	0.13	53,66,68,70	0
4	GOL	A	608	6/6	0.75	0.32	59,68,72,82	0
4	GOL	A	603	6/6	0.81	0.28	28,48,53,54	0
4	GOL	A	607	6/6	0.82	0.25	36,56,60,67	0
4	GOL	A	609	6/6	0.86	0.25	39,59,64,66	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	GOL	C	402	6/6	0.88	0.20	42,45,50,53	0
4	GOL	A	604	6/6	0.92	0.25	31,69,73,76	0
4	GOL	A	605	6/6	0.93	0.12	24,40,46,46	0
3	ZN	A	601	1/1	0.96	0.04	45,45,45,45	0
3	ZN	A	602	1/1	0.97	0.10	27,27,27,27	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.