Full wwPDB X-ray Structure Validation Report (i)

Aug 26, 2023 – 05:54 PM EDT

PDB ID	:	3FYP
Title	:	Crystal structure of the quadruple mutant (N23C/C246S/D247E/P249A) of 3-deoxy-D-manno-octulosonate 8-phosphate synthase (KDO8PS) from Neisseria meningitidis
Authors	:	Jameson, G.B.; Parker, E.J.; Cochrane, F.P.; Patchett, M.L.
Deposited on	:	2009-01-22
Resolution	:	1.85 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 (i) 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 (i)) were used in the production of this report:

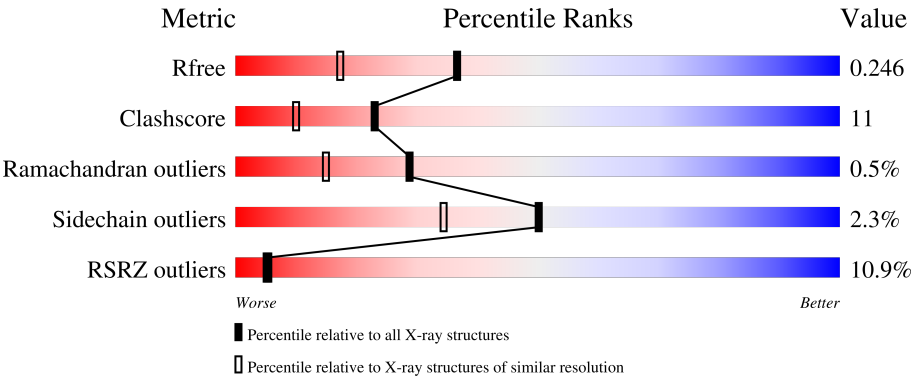
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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 <=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	280	14% 73% 18% • 8%
1	B	280	4% 74% 15% • 10%
1	C	280	3% 78% 13% • 9%
1	D	280	19% 74% 15% • 9%

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
3	GOL	B	281	-	-	X	X

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 8586 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 3-deoxy-D-manno-octulosonic acid 8-phosphate synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	257	Total	C	N	O	S	0	8	0
			2004	1288	339	365	12			
1	B	253	Total	C	N	O	S	0	12	0
			1990	1290	325	363	12			
1	C	256	Total	C	N	O	S	0	7	0
			1994	1287	333	362	12			
1	D	255	Total	C	N	O	S	0	6	0
			1981	1276	330	362	13			

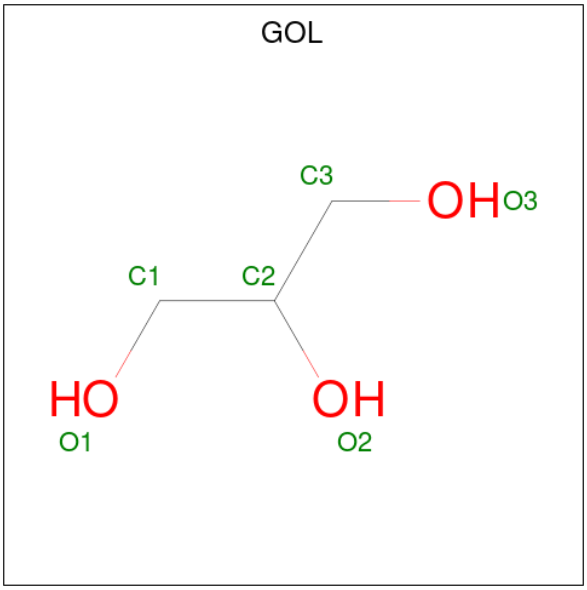
There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	CYS	ASN	engineered mutation	UNP Q9JZ55
A	246	SER	CYS	engineered mutation	UNP Q9JZ55
A	247	GLU	ASP	engineered mutation	UNP Q9JZ55
A	249	ALA	PRO	engineered mutation	UNP Q9JZ55
B	23	CYS	ASN	engineered mutation	UNP Q9JZ55
B	246	SER	CYS	engineered mutation	UNP Q9JZ55
B	247	GLU	ASP	engineered mutation	UNP Q9JZ55
B	249	ALA	PRO	engineered mutation	UNP Q9JZ55
C	23	CYS	ASN	engineered mutation	UNP Q9JZ55
C	246	SER	CYS	engineered mutation	UNP Q9JZ55
C	247	GLU	ASP	engineered mutation	UNP Q9JZ55
C	249	ALA	PRO	engineered mutation	UNP Q9JZ55
D	23	CYS	ASN	engineered mutation	UNP Q9JZ55
D	246	SER	CYS	engineered mutation	UNP Q9JZ55
D	247	GLU	ASP	engineered mutation	UNP Q9JZ55
D	249	ALA	PRO	engineered mutation	UNP Q9JZ55

- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Cl 1 1	0	0
2	D	1	Total Cl 1 1	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

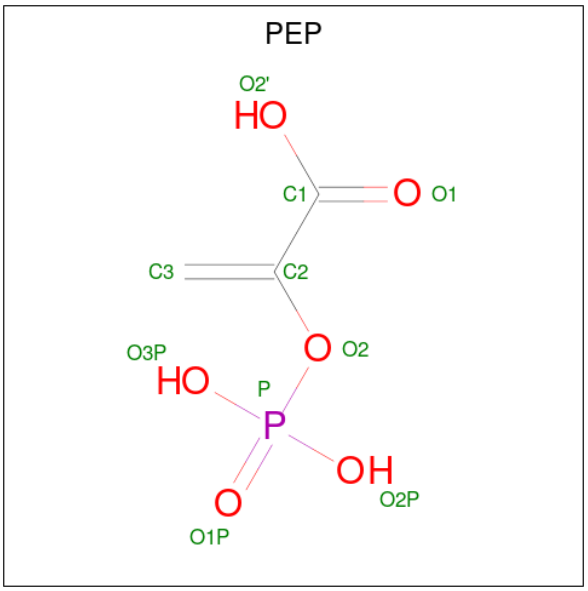


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C O 6 3 3	0	0
3	B	1	Total C O 6 3 3	0	0

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total Na 1 1	0	0
4	D	1	Total Na 1 1	0	0

- Molecule 5 is PHOSPHOENOLPYRUVATE (three-letter code: PEP) (formula: $C_3H_5O_6P$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	D	1	Total C O P 10 3 6 1	0	0

- Molecule 6 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	D	1	Total Mn 1 1	0	0

- Molecule 7 is water.

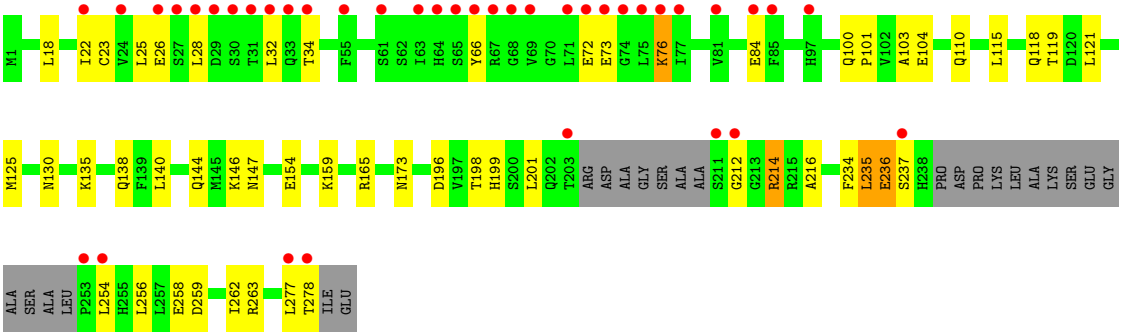
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	131	Total O 131 131	0	0
7	B	163	Total O 163 163	0	0
7	C	162	Total O 162 162	0	0
7	D	134	Total O 134 134	0	0

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.

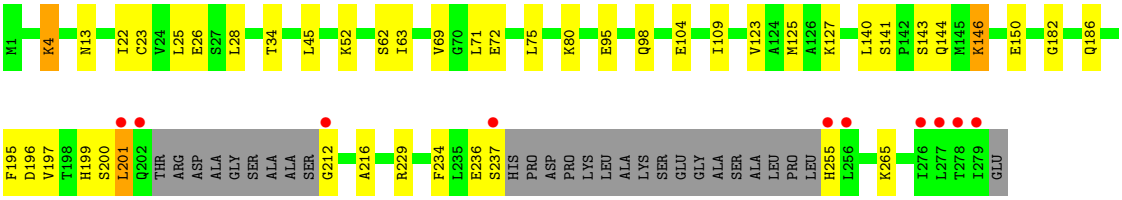
• Molecule 1: 3-deoxy-D-manno-octulosonic acid 8-phosphate synthetase

Chain A:



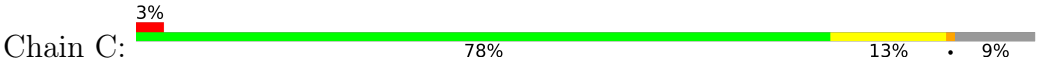
• Molecule 1: 3-deoxy-D-manno-octulosonic acid 8-phosphate synthetase

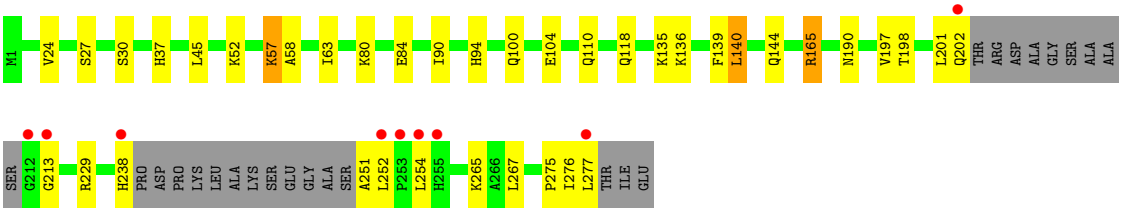
Chain B:



• Molecule 1: 3-deoxy-D-manno-octulosonic acid 8-phosphate synthetase

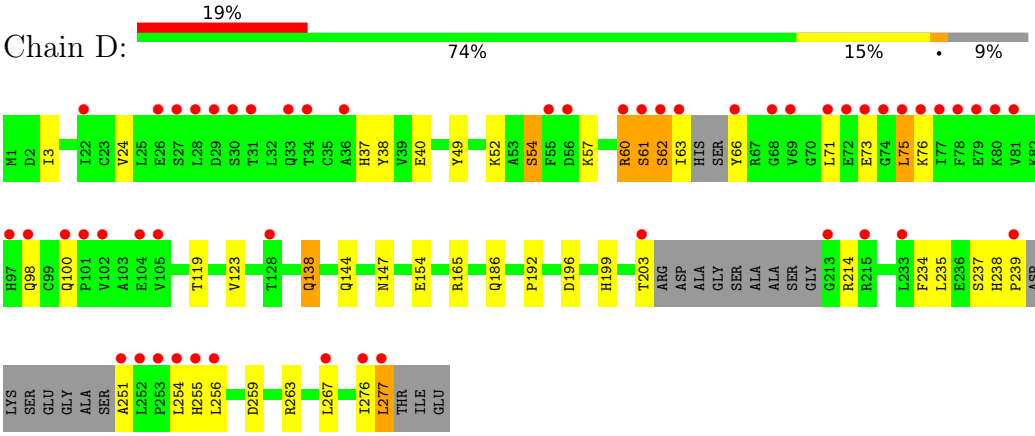
Chain C:





• Molecule 1: 3-deoxy-D-manno-octulosonic acid 8-phosphate synthetase

Chain D:


19%
74%
15%
9%
M1 D2 I3 I22 C23 V24 L25 E26 S27 L28 D29 S30 T31 L32 Q33 T34 C35 A36 H37 Y38 V39 E40 Y49 K52 A53 S54 F55 D56 K57 R60 S61 S62 I63 HIS SER Y66 R67 G68 V69 G70 L71 E72 E73 G74 L75 K76 I77 F78 E79 K80 V81 K82 A83 H94
H97 Q98 C99 Q100 P101 V102 A103 E104 V105 T119 V123 T128 Q138 Q144 N147 E154 R165 Q186 P192 D196 H199 T203 ARG ASP ALA GLY SER ALA ALA SER GLY G213 R214 R215 L233 F234 L235 E236 S237 H238 P239 ASP PRO LYS LEU ALA
LYS SER GLU GLY ALA SER A251 L252 P253 L254 H255 L256 D259 R263 L267 I276 L277 THR ILE GLU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	81.78Å 85.68Å 163.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.96 – 1.85 37.96 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.7 (37.96-1.85) 99.6 (37.96-1.85)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.23 (at 1.85Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.205 , 0.247 0.211 , 0.246	Depositor DCC
R_{free} test set	4964 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	31.6	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 45.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.012 for k,h,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	8586	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.65% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: PEP, CL, GOL, MN, NA

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	0.56	0/2056	0.65	0/2779
1	B	0.62	0/2055	0.66	0/2776
1	C	0.62	0/2046	0.70	0/2763
1	D	0.58	0/2026	0.70	0/2740
All	All	0.60	0/8183	0.68	0/11058

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
1	B	0	3
All	All	0	4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	236	GLU	Peptide
1	B	200	SER	Mainchain
1	B	201	LEU	Peptide
1	B	255	HIS	Peptide

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	2004	0	2050	54	0
1	B	1990	0	2069	55	1
1	C	1994	0	2063	40	0
1	D	1981	0	2029	52	1
2	A	1	0	0	0	0
2	D	1	0	0	1	0
3	B	12	0	16	8	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	D	10	0	2	0	0
6	D	1	0	0	0	0
7	A	131	0	0	8	0
7	B	163	0	0	6	1
7	C	162	0	0	6	3
7	D	134	0	0	8	0
All	All	8586	0	8229	185	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 11.

All (185) 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:63[A]:ILE:HD13	1:D:119[A]:THR:CG2	1.56	1.35
1:A:277:LEU:O	1:A:278:THR:HG22	1.37	1.24
1:C:190:ASN:HB2	7:C:682:HOH:O	1.53	1.07
1:B:63[A]:ILE:HD13	1:D:119[A]:THR:HG23	1.03	1.02
1:B:63[A]:ILE:CD1	1:D:119[A]:THR:HG23	1.89	1.01
1:A:236:GLU:HB2	7:A:462:HOH:O	1.64	0.96
1:B:63[A]:ILE:CD1	1:D:119[A]:THR:CG2	2.42	0.94
1:C:238:HIS:ND1	1:C:251:ALA:HB3	1.83	0.94
1:A:135:LYS:NZ	1:A:165[B]:ARG:HH21	1.70	0.89
1:B:150[A]:GLU:HG3	7:B:304:HOH:O	1.73	0.87
1:A:118[B]:GLN:OE1	1:C:58:ALA:HB1	1.76	0.84
1:D:24:VAL:HA	7:D:800:HOH:O	1.77	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:237:SER:HB3	7:D:721:HOH:O	1.77	0.83
1:C:201:LEU:O	1:C:202:GLN:HG2	1.79	0.81
1:A:277:LEU:O	1:A:278:THR:CG2	2.25	0.80
1:B:63[A]:ILE:HA	1:D:119[A]:THR:HG21	1.64	0.78
1:A:135:LYS:HZ2	1:A:165[B]:ARG:HH21	1.34	0.76
1:B:63[A]:ILE:HD13	1:D:119[A]:THR:HG22	1.68	0.75
1:D:76:LYS:NZ	7:D:553:HOH:O	2.09	0.75
1:C:100:GLN:O	1:C:104:GLU:HG3	1.87	0.75
1:C:140:LEU:HD12	1:C:144:GLN:HB2	1.69	0.74
1:A:135:LYS:HZ2	1:A:165[B]:ARG:NH2	1.86	0.74
1:A:138:GLN:OE1	7:A:796:HOH:O	2.04	0.74
1:D:61:SER:O	1:D:62:SER:CB	2.35	0.74
1:A:32:LEU:HD22	1:A:84:GLU:OE1	1.89	0.73
1:A:135:LYS:NZ	1:A:165[B]:ARG:HD2	2.04	0.72
1:A:115:LEU:HD22	1:A:118[A]:GLN:OE1	1.91	0.71
1:C:267:LEU:C	1:C:267:LEU:HD23	2.12	0.69
1:A:22:ILE:HD11	1:A:25:LEU:HD23	1.73	0.69
1:C:238:HIS:ND1	1:C:251:ALA:CB	2.56	0.69
1:A:73:GLU:HA	1:A:76:LYS:HG3	1.76	0.68
1:D:154[A]:GLU:OE2	7:D:524:HOH:O	0.69	0.68
1:C:251:ALA:HB2	7:C:549:HOH:O	1.95	0.67
1:D:94:HIS:ND1	7:D:550:HOH:O	2.27	0.67
1:C:139:PHE:CE1	1:C:140:LEU:HD23	2.30	0.67
1:B:63[A]:ILE:HA	1:D:119[A]:THR:CG2	2.25	0.67
1:A:23:CYS:HA	1:A:236:GLU:OE2	1.95	0.66
1:B:28:LEU:HD11	1:B:80:LYS:HG2	1.78	0.66
1:D:73:GLU:O	1:D:76:LYS:HB2	1.95	0.66
1:B:62[B]:SER:OG	7:B:464:HOH:O	2.13	0.65
1:B:212:GLY:CA	1:B:216:ALA:HB2	2.27	0.65
1:B:63[A]:ILE:HD12	1:D:123:VAL:CG2	2.26	0.65
1:A:165[B]:ARG:HG3	1:A:196:ASP:HB3	1.79	0.64
1:B:63[A]:ILE:CD1	1:D:119[A]:THR:HG22	2.25	0.64
1:A:146:LYS:NZ	1:A:147:ASN:OD1	2.31	0.63
1:D:186:GLN:NE2	7:D:778:HOH:O	2.31	0.63
1:A:135:LYS:NZ	1:A:165[B]:ARG:NH2	2.43	0.62
1:D:71:LEU:CD1	1:D:98:GLN:HG2	2.30	0.62
1:D:267:LEU:C	1:D:267:LEU:HD23	2.20	0.62
1:D:100:GLN:O	1:D:100:GLN:NE2	2.33	0.62
1:A:199[B]:HIS:HB2	7:A:334:HOH:O	1.99	0.62
1:B:123:VAL:O	1:B:127[B]:LYS:HG2	2.00	0.62
1:C:201:LEU:O	1:C:202:GLN:CG	2.47	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:62:SER:O	1:D:63:ILE:C	2.39	0.61
1:C:238:HIS:CE1	1:C:251:ALA:HB3	2.34	0.61
1:B:109[A]:ILE:HG22	1:B:125:MET:HE3	1.83	0.61
1:A:173:ASN:CG	7:A:823:HOH:O	2.40	0.60
1:A:135:LYS:HZ3	1:A:165[B]:ARG:HD2	1.66	0.60
1:A:135:LYS:HD2	1:A:165[B]:ARG:HD3	1.82	0.59
1:B:71[A]:LEU:HD11	1:B:75:LEU:HD11	1.84	0.59
1:A:154:GLU:HG2	1:C:63:ILE:HD11	1.85	0.59
1:D:61:SER:O	1:D:62:SER:HB2	2.03	0.58
1:B:236:GLU:HA	3:B:281:GOL:H2	1.85	0.58
1:D:54:SER:N	7:D:800:HOH:O	2.19	0.58
1:B:237:SER:HA	7:B:311:HOH:O	2.02	0.57
1:C:80:LYS:NZ	1:C:84:GLU:OE1	2.37	0.57
1:A:72:GLU:O	1:A:76:LYS:HG2	2.03	0.57
1:B:212:GLY:HA3	1:B:216:ALA:HB2	1.86	0.57
1:D:276:ILE:O	1:D:277:LEU:HB2	2.04	0.57
1:B:22:ILE:HG23	1:B:34:THR:HG21	1.85	0.57
1:B:23:CYS:CA	3:B:281:GOL:H11	2.35	0.56
1:A:22:ILE:HG23	1:A:34:THR:HG21	1.87	0.55
1:C:140:LEU:HD12	1:C:144:GLN:CB	2.35	0.55
1:B:52:LYS:HE2	1:B:234:PHE:CZ	2.42	0.55
1:B:23:CYS:HA	3:B:281:GOL:H11	1.88	0.55
1:B:45:LEU:O	1:B:265:LYS:HE3	2.07	0.54
1:D:251:ALA:N	7:D:607:HOH:O	2.40	0.54
1:A:110:GLN:NE2	1:A:135:LYS:HE3	2.23	0.54
1:D:73:GLU:HA	1:D:76:LYS:HD3	1.89	0.54
1:D:138:GLN:NE2	1:D:138:GLN:H	2.05	0.54
1:B:195:PHE:CE2	1:B:197[B]:VAL:HG22	2.43	0.53
1:D:24:VAL:HB	1:D:57:LYS:HD3	1.90	0.53
1:D:119[A]:THR:O	1:D:123:VAL:HG23	2.08	0.53
1:B:23:CYS:SG	3:B:281:GOL:H31	2.49	0.52
1:B:63[A]:ILE:HD12	1:D:123:VAL:HG23	1.90	0.52
1:B:25:LEU:O	1:B:69:VAL:HG13	2.10	0.52
1:B:237:SER:N	3:B:281:GOL:H12	2.24	0.52
1:A:100:GLN:N	1:A:101:PRO:HD2	2.24	0.52
1:C:27:SER:OG	1:C:30:SER:HB3	2.09	0.52
1:A:135:LYS:HD2	1:A:165[A]:ARG:HD2	1.92	0.52
1:D:276:ILE:O	1:D:277:LEU:CB	2.58	0.51
1:B:199:HIS:HB2	1:B:236:GLU:OE2	2.10	0.51
1:B:95:GLU:HB2	1:B:98:GLN:HG3	1.92	0.51
1:D:61:SER:O	1:D:62:SER:HB3	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:165:ARG:HG3	1:C:165:ARG:NH1	2.24	0.51
1:B:186:GLN:NE2	7:B:751:HOH:O	2.43	0.51
1:B:199:HIS:C	1:B:201:LEU:H	2.15	0.51
1:B:22:ILE:CG2	1:B:34:THR:HG21	2.41	0.51
1:C:276:ILE:HD12	7:C:507:HOH:O	2.10	0.51
1:B:237:SER:H	3:B:281:GOL:H12	1.75	0.50
1:B:13[A]:ASN:OD1	1:B:229:ARG:NH2	2.37	0.50
1:C:197[A]:VAL:CG1	1:C:198:THR:N	2.74	0.50
1:A:119:THR:HG21	1:C:63:ILE:HA	1.92	0.50
1:C:165:ARG:HG3	1:C:165:ARG:HH11	1.75	0.50
1:A:140:LEU:HD11	1:A:144:GLN:HB2	1.94	0.50
1:C:197[A]:VAL:HG13	1:C:198:THR:N	2.26	0.50
1:A:159:LYS:HD2	7:A:696:HOH:O	2.10	0.49
1:D:138:GLN:H	1:D:138:GLN:HE21	1.60	0.49
1:A:173:ASN:CB	7:A:823:HOH:O	2.59	0.49
1:C:140:LEU:CD1	1:C:144:GLN:CB	2.91	0.49
1:A:140:LEU:HD11	1:A:144:GLN:CB	2.43	0.49
1:A:173:ASN:HB2	7:A:823:HOH:O	2.13	0.49
1:B:141:SER:OG	1:B:144:GLN:HG2	2.13	0.49
1:B:196:ASP:HA	1:B:234:PHE:HB3	1.94	0.48
1:A:258:GLU:O	1:A:262:ILE:HG13	2.13	0.48
1:D:71:LEU:HD23	1:D:75:LEU:HD22	1.96	0.48
1:D:144:GLN:OE1	1:D:147:ASN:ND2	2.47	0.48
1:A:28:LEU:HD11	1:A:32:LEU:HD11	1.95	0.48
1:D:196:ASP:HA	1:D:234:PHE:HB3	1.95	0.47
1:A:198:THR:HG21	1:A:236:GLU:HB3	1.97	0.47
1:D:71:LEU:HD11	1:D:98:GLN:HG2	1.94	0.47
1:A:196:ASP:HA	1:A:234:PHE:HB3	1.95	0.47
1:C:140:LEU:CD1	1:C:144:GLN:HB2	2.42	0.47
1:D:196:ASP:OD2	1:D:199:HIS:ND1	2.30	0.47
1:A:26:GLU:HG3	1:A:66:TYR:HE2	1.79	0.46
1:A:121:LEU:O	1:A:125:MET:HG3	2.16	0.46
1:A:212:GLY:HA3	1:A:216:ALA:HB2	1.97	0.46
1:A:259:ASP:O	1:A:263[B]:ARG:HD2	2.15	0.46
1:B:140:LEU:HG	1:B:144:GLN:HB2	1.97	0.46
1:D:38:TYR:HB3	1:D:49:TYR:CZ	2.51	0.46
1:D:235:LEU:C	1:D:235:LEU:HD12	2.36	0.46
1:B:143:SER:O	1:B:146:LYS:HE2	2.16	0.46
1:B:212:GLY:HA2	1:B:216:ALA:HB2	1.96	0.46
1:B:236:GLU:HB3	3:B:281:GOL:H2	1.98	0.45
1:C:267:LEU:HD23	1:C:267:LEU:O	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:212:GLY:HA3	1:B:216:ALA:CB	2.47	0.45
1:B:236:GLU:CA	3:B:281:GOL:H2	2.45	0.45
1:B:26:GLU:O	1:B:69:VAL:CG1	2.64	0.45
1:C:267:LEU:C	1:C:267:LEU:CD2	2.84	0.45
1:A:214:ARG:O	1:A:214:ARG:HG3	2.14	0.45
1:C:139:PHE:CD1	1:C:140:LEU:HD23	2.51	0.45
1:A:18:LEU:HD11	1:A:235:LEU:HD22	1.99	0.45
1:C:37:HIS:HE1	1:C:254:LEU:O	2.00	0.44
1:B:199:HIS:C	1:B:201:LEU:N	2.69	0.44
1:C:275:PRO:O	1:D:263:ARG:NH2	2.44	0.44
1:A:26:GLU:HA	1:A:66:TYR:OH	2.17	0.44
1:C:238:HIS:CE1	1:C:251:ALA:CB	3.01	0.44
1:D:255:HIS:CE1	1:D:256:LEU:CD2	3.00	0.44
1:A:119:THR:CG2	1:C:63:ILE:HA	2.47	0.44
1:C:45:LEU:O	1:C:265:LYS:HE3	2.18	0.43
1:D:238:HIS:HB2	1:D:239:PRO:HD2	2.00	0.43
1:D:255:HIS:CE1	1:D:256:LEU:HD21	2.54	0.43
1:B:72:GLU:HG2	7:B:505:HOH:O	2.18	0.43
1:C:27:SER:HB2	7:C:472:HOH:O	2.19	0.43
1:C:277:LEU:HB2	1:D:263:ARG:CZ	2.49	0.43
1:B:199:HIS:O	1:B:201:LEU:N	2.52	0.43
1:D:119[B]:THR:O	1:D:123:VAL:HG23	2.18	0.43
1:B:182:GLY:O	1:B:186:GLN:HG2	2.18	0.43
1:C:252:LEU:HD12	7:C:669:HOH:O	2.18	0.42
1:D:63:ILE:HD12	1:D:63:ILE:HA	1.90	0.42
1:C:110:GLN:NE2	1:C:135:LYS:HD2	2.35	0.42
1:A:100:GLN:N	1:A:101:PRO:CD	2.83	0.42
1:C:24:VAL:HG22	1:C:57:LYS:HB2	2.01	0.42
1:D:76:LYS:HB2	1:D:76:LYS:HZ3	1.84	0.42
1:A:100:GLN:O	1:A:104:GLU:HG2	2.19	0.42
1:A:135:LYS:HZ2	1:A:165[B]:ARG:HD2	1.82	0.42
1:A:165[A]:ARG:NH1	7:A:333:HOH:O	2.52	0.42
1:A:214:ARG:HE	1:A:214:ARG:HB2	1.64	0.42
1:B:52:LYS:CD	1:B:234:PHE:CZ	3.02	0.42
1:D:52:LYS:HE3	2:D:282:CL:CL	2.57	0.41
1:B:4:LYS:HA	1:B:4:LYS:HD2	1.85	0.41
1:C:52[A]:LYS:HG2	1:C:90:ILE:HG23	2.02	0.41
1:D:37:HIS:HD2	1:D:254:LEU:HD11	1.84	0.41
1:B:52:LYS:CE	1:B:234:PHE:CZ	3.04	0.41
1:A:26:GLU:HG3	1:A:66:TYR:CE2	2.55	0.41
1:A:103:ALA:HB1	1:A:130:ASN:OD1	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:95:GLU:OE1	7:B:662:HOH:O	2.21	0.41
1:D:57:LYS:HB3	1:D:60:ARG:HG2	2.03	0.40
1:A:199[B]:HIS:C	1:A:201:LEU:H	2.24	0.40
1:A:254:LEU:HB3	1:A:256:LEU:CD2	2.51	0.40
1:C:94:HIS:CD2	7:C:713:HOH:O	2.74	0.40
1:D:3:ILE:HD12	1:D:192:PRO:HG2	2.03	0.40

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)
7:B:689:HOH:O	7:C:544:HOH:O[2_555]	1.94	0.26
1:B:104:GLU:OE1	7:C:544:HOH:O[2_555]	1.95	0.25
1:D:259:ASP:CG	7:C:795:HOH:O[3_645]	2.16	0.04

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	259/280 (92%)	248 (96%)	10 (4%)	1 (0%)	34 19
1	B	259/280 (92%)	252 (97%)	7 (3%)	0	100 100
1	C	257/280 (92%)	250 (97%)	5 (2%)	2 (1%)	19 7
1	D	252/280 (90%)	245 (97%)	5 (2%)	2 (1%)	19 7
All	All	1027/1120 (92%)	995 (97%)	27 (3%)	5 (0%)	29 15

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	213	GLY
1	D	60	ARG

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Mol	Chain	Res	Type
1	D	62	SER
1	A	237	SER
1	C	229	ARG

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	221/235 (94%)	218 (99%)	3 (1%)	67	55
1	B	223/235 (95%)	221 (99%)	2 (1%)	78	72
1	C	222/235 (94%)	217 (98%)	5 (2%)	50	34
1	D	219/235 (93%)	209 (95%)	10 (5%)	27	11
All	All	885/940 (94%)	865 (98%)	20 (2%)	50	34

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	LYS
1	A	214	ARG
1	A	235	LEU
1	B	4	LYS
1	B	146	LYS
1	C	57	LYS
1	C	118	GLN
1	C	136	LYS
1	C	140	LEU
1	C	165	ARG
1	D	40	GLU
1	D	54	SER
1	D	61	SER
1	D	66	TYR
1	D	75	LEU
1	D	138	GLN
1	D	165	ARG
1	D	203	THR

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Mol	Chain	Res	Type
1	D	214	ARG
1	D	277	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	6	ASN
1	A	217	GLN
1	B	118	GLN
1	B	186	GLN
1	C	37	HIS
1	C	100	GLN
1	C	118	GLN
1	D	59	ASN
1	D	138	GLN

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 (i)

Of 8 ligands modelled in this entry, 5 are monoatomic - leaving 3 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	GOL	B	281	-	5,5,5	0.47	0	5,5,5	0.51	0
3	GOL	B	2647	-	5,5,5	0.40	0	5,5,5	0.21	0
5	PEP	D	281	-	9,9,9	1.13	0	11,13,13	1.67	3 (27%)

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	GOL	B	281	-	-	2/4/4/4	-
3	GOL	B	2647	-	-	0/4/4/4	-
5	PEP	D	281	-	-	0/9/9/9	-

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	D	281	PEP	O2'-C1-C2	3.47	119.83	113.91
5	D	281	PEP	O1-C1-C2	-3.20	116.96	121.79
5	D	281	PEP	O2P-P-O2	2.24	112.08	105.25

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	281	GOL	C1-C2-C3-O3
3	B	281	GOL	O2-C2-C3-O3

There are no ring outliers.

1 monomer is involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	281	GOL	8	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, 95^{th} 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	257/280 (91%)	0.87	39 (15%) 2 2	12, 25, 60, 74	1 (0%)
1	B	253/280 (90%)	0.30	10 (3%) 38 36	13, 20, 37, 65	1 (0%)
1	C	256/280 (91%)	0.27	9 (3%) 44 41	11, 19, 40, 70	1 (0%)
1	D	255/280 (91%)	1.11	53 (20%) 1 0	13, 24, 55, 82	0
All	All	1021/1120 (91%)	0.64	111 (10%) 5 5	11, 22, 50, 82	3 (0%)

All (111) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	63	ILE	10.9
1	C	255	HIS	8.9
1	A	211	SER	8.8
1	A	66	TYR	8.1
1	B	279	ILE	8.1
1	A	278	THR	7.4
1	A	237	SER	7.3
1	A	277	LEU	6.2
1	C	212	GLY	6.0
1	A	253	PRO	5.6
1	D	66	TYR	5.3
1	D	105	VAL	5.2
1	D	30	SER	5.1
1	D	27	SER	5.0
1	A	74	GLY	4.7
1	D	253	PRO	4.6
1	D	277	LEU	4.5
1	A	31	THR	4.5
1	D	203	THR	4.5
1	D	71	LEU	4.4
1	D	213	GLY	4.4

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Mol	Chain	Res	Type	RSRZ
1	D	75	LEU	4.3
1	A	76	LYS	4.2
1	D	61	SER	4.2
1	D	239	PRO	4.2
1	D	97	HIS	4.2
1	A	30	SER	4.1
1	A	29	ASP	4.1
1	A	32	LEU	4.1
1	D	69	VAL	4.1
1	A	75	LEU	4.1
1	A	64	HIS	4.1
1	D	251	ALA	4.1
1	D	78	PHE	4.0
1	A	97	HIS	4.0
1	D	68	GLY	3.9
1	D	29	ASP	3.9
1	D	77	ILE	3.9
1	D	76	LYS	3.8
1	A	203	THR	3.8
1	C	254	LEU	3.8
1	A	33	GLN	3.7
1	A	69	VAL	3.6
1	C	213	GLY	3.5
1	D	101	PRO	3.5
1	A	61	SER	3.5
1	D	83	ALA	3.5
1	A	73	GLU	3.4
1	A	81	VAL	3.3
1	D	255	HIS	3.3
1	A	24	VAL	3.2
1	C	277	LEU	3.2
1	D	74	GLY	3.2
1	D	33	GLN	3.2
1	A	72	GLU	3.2
1	A	84	GLU	3.2
1	D	104	GLU	3.2
1	B	255	HIS	3.1
1	D	254	LEU	3.1
1	D	62	SER	3.1
1	D	72	GLU	3.0
1	C	252	LEU	3.0
1	D	60	ARG	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	254	LEU	3.0
1	B	256	LEU	3.0
1	A	77	ILE	2.9
1	D	28	LEU	2.9
1	D	267	LEU	2.8
1	A	68	GLY	2.8
1	A	28	LEU	2.8
1	C	253	PRO	2.8
1	A	71	LEU	2.8
1	A	212	GLY	2.8
1	A	34	THR	2.7
1	B	201	LEU	2.7
1	D	252	LEU	2.7
1	D	81	VAL	2.7
1	B	202	GLN	2.6
1	D	36	ALA	2.6
1	D	233	LEU	2.6
1	A	27	SER	2.6
1	D	80	LYS	2.6
1	D	26	GLU	2.6
1	B	237	SER	2.5
1	B	277	LEU	2.5
1	A	85	PHE	2.5
1	A	67	ARG	2.5
1	D	31	THR	2.5
1	B	212	GLY	2.4
1	A	26	GLU	2.4
1	D	73	GLU	2.4
1	D	79	GLU	2.4
1	D	55	PHE	2.4
1	D	100	GLN	2.4
1	A	65	SER	2.4
1	A	22	ILE	2.4
1	D	34	THR	2.3
1	D	215	ARG	2.3
1	D	276	ILE	2.3
1	A	55	PHE	2.3
1	D	22	ILE	2.3
1	D	98	GLN	2.2
1	D	102	VAL	2.2
1	B	278	THR	2.2
1	C	238	HIS	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	128	THR	2.2
1	A	63	ILE	2.1
1	D	256	LEU	2.1
1	C	202	GLN	2.1
1	D	56	ASP	2.1
1	B	276	ILE	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^{th} 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	GOL	B	281	6/6	0.61	0.58	26,30,30,32	6
6	MN	D	284	1/1	0.62	0.36	31,31,31,31	1
3	GOL	B	2647	6/6	0.83	0.21	40,43,45,46	0
5	PEP	D	281	10/10	0.92	0.20	17,22,24,25	10
4	NA	D	283	1/1	0.93	0.36	46,46,46,46	0
2	CL	D	282	1/1	0.97	0.12	37,37,37,37	1
2	CL	A	281	1/1	0.97	0.05	33,33,33,33	0
4	NA	C	281	1/1	0.98	0.06	22,22,22,22	0

6.5 Other polymers (i)

There are no such residues in this entry.