



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 06:12 AM GMT

PDB ID : 2W9S
Title : STAPHYLOCOCCUS AUREUS S1:DHFR IN COMPLEX WITH TRIMETHOPRIM
Authors : Soutter, H.H.; Miller, J.R.
Deposited on : 2009-01-28
Resolution : 1.80 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

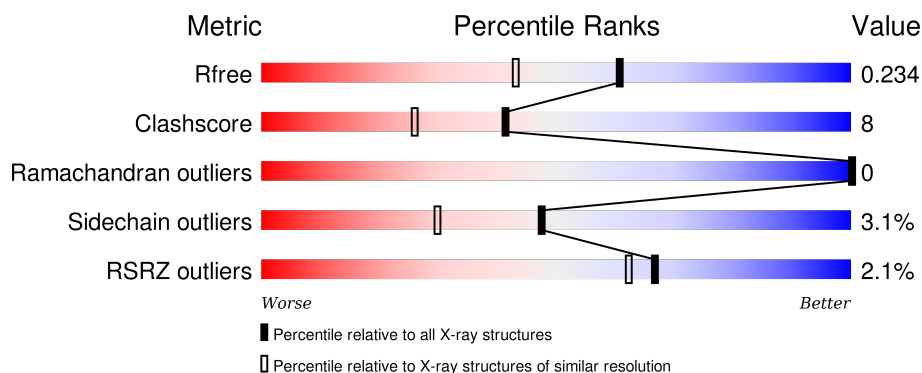
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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}	91344	4533 (1.80-1.80)
Clashscore	102246	5383 (1.80-1.80)
Ramachandran outliers	100387	5320 (1.80-1.80)
Sidechain outliers	100360	5319 (1.80-1.80)
RSRZ outliers	91569	4547 (1.80-1.80)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	161	<div> <div>86%</div> <div>11% ..</div> </div>
1	B	161	<div> <div>86%</div> <div>11% ..</div> </div>
1	C	161	<div> <div>86%</div> <div>11% ..</div> </div>
1	D	161	<div> <div>2%</div> <div>78%</div> <div>18% ..</div> </div>
1	E	161	<div> <div>4%</div> <div>76%</div> <div>20% ..</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	161	

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	GOL	A	1158	-	-	-	X
2	GOL	E	1159	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8277 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 DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	157	Total	C	N	O	S	0	1	0
			1282	820	219	240	3			
1	B	157	Total	C	N	O	S	0	0	0
			1274	814	218	239	3			
1	C	157	Total	C	N	O	S	0	1	0
			1282	820	219	240	3			
1	D	157	Total	C	N	O	S	0	3	0
			1299	828	224	244	3			
1	E	157	Total	C	N	O	S	0	2	0
			1293	825	223	242	3			
1	F	157	Total	C	N	O	S	0	3	0
			1299	828	224	244	3			

There are 12 discrepancies between the modelled and reference sequences:

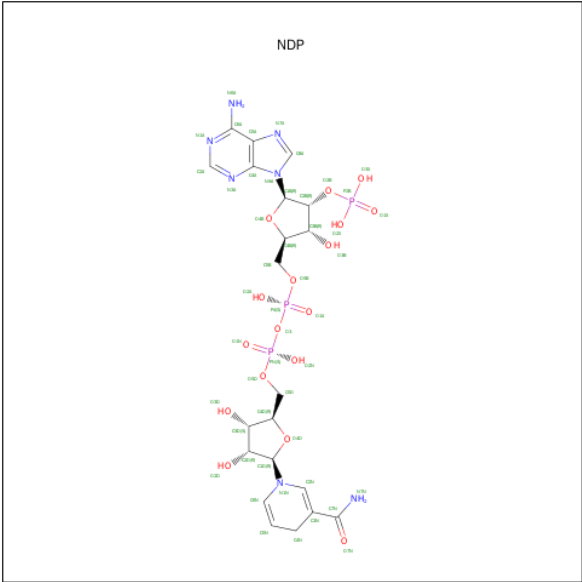
Chain	Residue	Modelled	Actual	Comment	Reference
A	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
A	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955
B	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
B	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955
C	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
C	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955
D	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
D	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955
E	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
E	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955
F	48	GLU	ASN	ENGINEERED MUTATION	UNP P13955
F	130	ASP	ASN	ENGINEERED MUTATION	UNP P13955

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



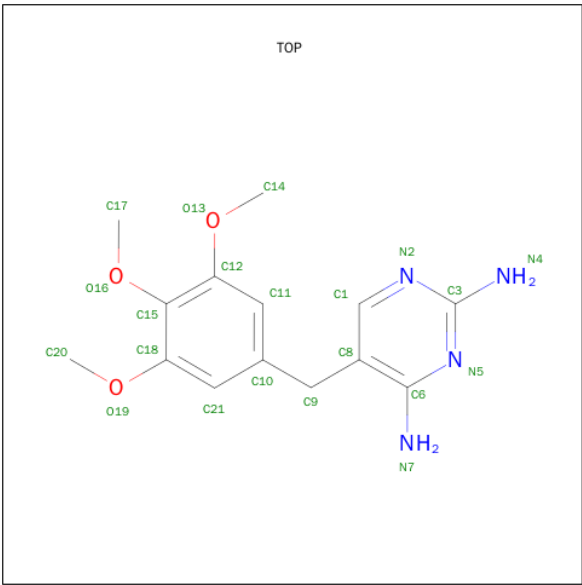
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	C	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is TRIMETHOPRIM (three-letter code: TOP) (formula: C₁₄H₁₈N₄O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			21	14	4	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	N	O	0	0
			21	14	4	3		
4	C	1	Total	C	N	O	0	0
			21	14	4	3		
4	D	1	Total	C	N	O	0	0
			21	14	4	3		
4	E	1	Total	C	N	O	0	0
			21	14	4	3		
4	F	1	Total	C	N	O	0	0
			21	14	4	3		

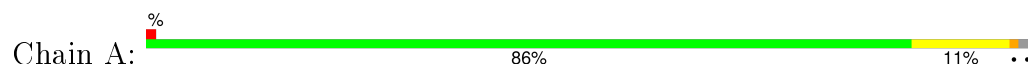
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	41	Total	O	0	0
			41	41		
5	B	47	Total	O	0	0
			47	47		
5	C	46	Total	O	0	0
			46	46		
5	D	36	Total	O	0	0
			36	36		
5	E	36	Total	O	0	0
			36	36		
5	F	36	Total	O	0	0
			36	36		

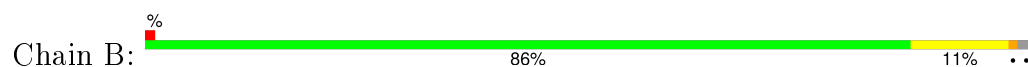
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

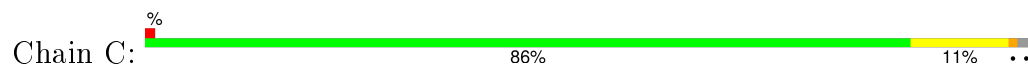
- Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003



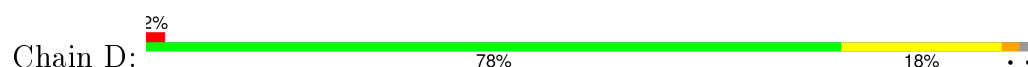
- Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003



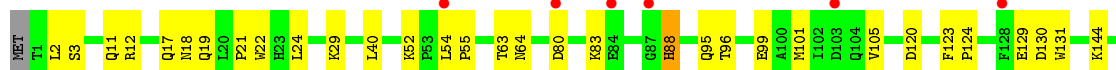
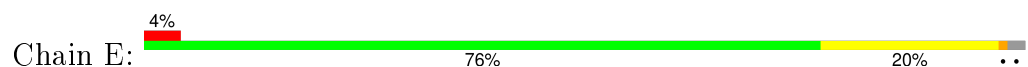
- Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003

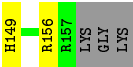


- Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003

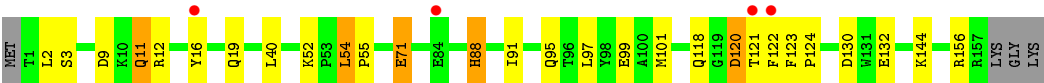
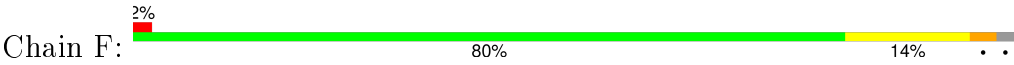


- Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003





● Molecule 1: DIHYDROFOLATE REDUCTASE TYPE 1 FROM TN4003



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	115.24Å 67.38Å 115.25Å 90.00° 120.00° 90.00°	Depositor
Resolution (Å)	100.00 – 1.80 49.90 – 1.80	Depositor EDS
% Data completeness (in resolution range)	86.3 (100.00-1.80) 86.3 (49.90-1.80)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.68 (at 1.81Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.202 , 0.237 0.202 , 0.234	Depositor DCC
R_{free} test set	6110 reflections (5.26%)	DCC
Wilson B-factor (Å ²)	28.2	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
Estimated twinning fraction	0.447 for l,k,-h-l 0.447 for -h-l,k,h 0.045 for h,-k,-h-l 0.037 for l,-k,h 0.041 for -h-l,-k,l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	2 of 122338 reflections (0.002%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8277	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 3.21% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, TOP, NDP

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	0.69	0/1313	0.75	0/1783
1	B	0.67	0/1305	0.72	0/1772
1	C	0.70	0/1313	0.74	0/1783
1	D	0.65	0/1331	0.72	0/1807
1	E	0.66	0/1325	0.70	0/1799
1	F	0.66	0/1331	0.71	1/1807 (0.1%)
All	All	0.67	0/7918	0.73	1/10751 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	120	ASP	CB-CG-OD1	-5.10	113.71	118.30

There are no chirality outliers.

There are no planarity outliers.

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	1282	0	1259	16	0
1	B	1274	0	1249	15	0
1	C	1282	0	1259	16	0
1	D	1299	0	1266	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1293	0	1262	27	0
1	F	1299	0	1266	22	0
2	A	6	0	8	0	0
2	B	6	0	8	0	0
2	C	6	0	8	0	0
2	E	12	0	16	3	0
2	F	6	0	8	0	0
3	A	48	0	26	3	0
3	B	48	0	26	2	0
3	C	48	0	26	2	0
4	A	21	0	18	5	0
4	B	21	0	18	3	0
4	C	21	0	18	3	0
4	D	21	0	18	3	0
4	E	21	0	18	2	0
4	F	21	0	18	2	0
5	A	41	0	0	0	0
5	B	47	0	0	5	0
5	C	46	0	0	4	0
5	D	36	0	0	2	0
5	E	36	0	0	4	0
5	F	36	0	0	2	0
All	All	8277	0	7795	134	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 8.

All (134) 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:F:19:GLN:HB3	5:F:2001:HOH:O	1.26	1.25
1:E:129:GLU:HG3	5:E:2026:HOH:O	1.08	1.20
1:B:21:PRO:C	5:B:2007:HOH:O	1.96	1.03
1:D:17:GLN:H	1:D:120:ASP:CG	1.63	1.01
1:F:16:TYR:O	5:F:2001:HOH:O	1.86	0.93
1:D:71:GLU:CD	1:D:71:GLU:H	1.69	0.93
5:C:2024:HOH:O	1:D:144:LYS:CE	2.19	0.90
3:A:1159:NDP:H42N	4:A:1160:TOP:H91	1.53	0.89
4:E:1160:TOP:O13	4:E:1160:TOP:H172	1.72	0.89
1:B:31:ILE:HD11	4:B:1160:TOP:C1	2.02	0.87
1:F:71:GLU:CD	1:F:71:GLU:H	1.81	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:1159:NDP:H42N	4:C:1160:TOP:H91	1.63	0.81
4:F:1159:TOP:C17	4:F:1159:TOP:O19	2.30	0.80
1:C:31[A]:ILE:HD11	4:C:1160:TOP:C1	2.11	0.80
1:A:31[A]:ILE:HD11	4:A:1160:TOP:C1	2.12	0.79
1:D:17:GLN:N	1:D:120:ASP:OD2	2.14	0.79
3:B:1159:NDP:H42N	4:B:1160:TOP:H91	1.65	0.78
1:B:31:ILE:HD11	4:B:1160:TOP:N2	1.98	0.77
1:A:5:ILE:HD11	1:A:31[B]:ILE:HD12	1.67	0.76
4:E:1160:TOP:O13	4:E:1160:TOP:C17	2.33	0.76
5:C:2024:HOH:O	1:D:144:LYS:HE3	1.83	0.76
4:D:1158:TOP:O19	4:D:1158:TOP:C17	2.35	0.73
1:E:3:SER:OG	1:E:88:HIS:HE1	1.70	0.73
1:C:38:ASN:HD22	1:D:144:LYS:HE3	1.55	0.72
1:D:3:SER:OG	1:D:88:HIS:HE1	1.73	0.72
1:E:64:ASN:H	2:E:1158:GOL:H32	1.56	0.71
1:F:3:SER:OG	1:F:88:HIS:HE1	1.73	0.71
1:C:38:ASN:ND2	1:D:144:LYS:HE3	2.07	0.70
4:F:1159:TOP:H173	4:F:1159:TOP:O19	1.91	0.70
1:E:11[A]:GLN:O	1:E:12:ARG:HB2	1.91	0.70
1:D:120:ASP:OD1	5:D:2024:HOH:O	2.09	0.69
1:A:71:GLU:CD	1:A:71:GLU:H	1.94	0.69
1:C:5:ILE:HD11	1:C:31[B]:ILE:HD12	1.75	0.68
1:E:17:GLN:H	1:E:120:ASP:CG	1.97	0.67
1:E:29:LYS:HB2	1:E:29:LYS:NZ	2.10	0.67
1:D:17:GLN:N	1:D:120:ASP:OD1	2.28	0.67
1:B:71:GLU:H	1:B:71:GLU:CD	1.98	0.66
1:D:17:GLN:N	1:D:120:ASP:CG	2.46	0.65
1:E:95:GLN:O	1:E:99:GLU:HG3	1.95	0.65
1:B:21:PRO:O	5:B:2007:HOH:O	2.08	0.64
1:B:22:TRP:N	5:B:2007:HOH:O	2.25	0.63
1:E:64:ASN:H	2:E:1158:GOL:C3	2.14	0.60
1:F:120:ASP:OD1	1:F:120:ASP:C	2.42	0.58
1:B:117:PHE:HZ	1:B:147:ILE:HD13	1.69	0.58
1:E:2:LEU:HD21	1:E:101:MET:CE	2.34	0.57
1:F:2:LEU:HD21	1:F:101:MET:CE	2.35	0.57
1:F:120:ASP:OD1	1:F:121:THR:N	2.38	0.57
1:D:17:GLN:CA	1:D:120:ASP:OD2	2.53	0.56
1:D:2:LEU:HD21	1:D:101:MET:CE	2.36	0.56
1:C:31[A]:ILE:HD11	4:C:1160:TOP:N2	2.20	0.55
1:F:71:GLU:N	1:F:71:GLU:CD	2.56	0.54
1:E:17:GLN:N	1:E:120:ASP:OD2	2.35	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:B:2001:HOH:O	1:F:19:GLN:HG2	2.07	0.54
1:A:116:LYS:HD2	1:D:16:TYR:HD2	1.72	0.53
1:B:91:ILE:HG23	1:B:97:LEU:HG	1.89	0.53
1:B:11:GLN:HA	1:F:118:GLN:HB3	1.91	0.53
1:E:63:THR:HA	2:E:1158:GOL:H32	1.91	0.53
5:C:2024:HOH:O	1:D:144:LYS:HE2	1.93	0.52
1:E:29:LYS:HB2	1:E:29:LYS:HZ2	1.75	0.52
4:D:1158:TOP:H172	4:D:1158:TOP:O19	2.09	0.52
1:A:54:LEU:N	1:A:54:LEU:HD12	2.24	0.51
1:D:11[A]:GLN:O	1:D:12:ARG:HB2	2.10	0.51
1:D:19:GLN:NE2	5:D:2002:HOH:O	2.44	0.51
1:E:80:ASP:O	1:E:83:LYS:HG2	2.11	0.51
1:F:95:GLN:O	1:F:99:GLU:HG3	2.10	0.51
1:C:96:THR:HG23	3:C:1159:NDP:O1N	2.12	0.50
1:F:123:PHE:CD1	1:F:124:PRO:HD2	2.46	0.50
1:C:37:GLY:O	1:D:144:LYS:NZ	2.42	0.50
1:C:31[B]:ILE:HG22	1:C:32:LYS:N	2.27	0.50
1:D:71:GLU:CD	1:D:71:GLU:N	2.48	0.49
1:D:18:ASN:O	1:D:49[B]:SER:OG	2.21	0.49
3:A:1159:NDP:H42N	4:A:1160:TOP:C9	2.34	0.49
1:F:121:THR:C	1:F:122:PHE:CD1	2.86	0.49
1:C:38:ASN:O	1:C:57:ARG:HB2	2.13	0.49
1:D:123:PHE:CD1	1:D:124:PRO:HD2	2.47	0.49
1:D:16:TYR:HA	1:D:120:ASP:H	1.78	0.49
1:D:67:SER:O	1:D:69[A]:HIS:HD2	1.96	0.49
1:D:95:GLN:O	1:D:99:GLU:HG3	2.13	0.49
4:D:1158:TOP:O19	4:D:1158:TOP:H173	2.13	0.48
1:A:38:ASN:HD21	1:F:144:LYS:HE2	1.78	0.48
1:E:24:LEU:HD21	1:E:149:HIS:CG	2.49	0.48
1:C:117:PHE:HZ	1:C:147:ILE:HD13	1.79	0.47
1:B:54:LEU:N	1:B:54:LEU:HD12	2.29	0.47
1:D:58:ARG:NE	1:D:74:ASP:OD2	2.44	0.47
1:A:116:LYS:HD2	1:D:16:TYR:CD2	2.49	0.47
1:E:123:PHE:CG	1:E:124:PRO:HD2	2.49	0.47
1:F:40:LEU:CD1	1:F:54:LEU:HD23	2.45	0.47
1:F:11[B]:GLN:O	1:F:12:ARG:HB2	2.15	0.47
1:E:123:PHE:CD1	1:E:124:PRO:HD2	2.50	0.47
1:A:91:ILE:HG23	1:A:97:LEU:HG	1.97	0.47
1:E:2:LEU:HG	1:E:105:VAL:HG12	1.96	0.46
1:A:22:TRP:CE2	1:A:113:ILE:HD12	2.50	0.46
1:F:123:PHE:CG	1:F:124:PRO:HD2	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:B:2015:HOH:O	1:E:144:LYS:HE2	2.15	0.46
1:B:38:ASN:O	1:B:57:ARG:HB2	2.16	0.46
1:C:80:ASP:O	1:C:83:LYS:HG2	2.16	0.46
1:E:130:ASP:HB2	1:E:131:TRP:CD1	2.52	0.45
1:A:71:GLU:N	1:A:71:GLU:CD	2.67	0.45
1:C:84:GLU:HB2	5:C:2023:HOH:O	2.16	0.45
1:E:19:GLN:NE2	5:E:2004:HOH:O	2.50	0.45
1:E:96:THR:HG23	5:E:2019:HOH:O	2.16	0.45
1:A:31[A]:ILE:HG22	1:A:32:LYS:N	2.32	0.45
1:E:96:THR:CG2	5:E:2019:HOH:O	2.64	0.45
1:A:21:PRO:O	1:C:55:PRO:HB3	2.17	0.44
1:D:143:GLU:CD	1:D:143:GLU:H	2.20	0.44
1:E:2:LEU:HD21	1:E:101:MET:HE1	1.97	0.44
1:E:40:LEU:HD11	1:E:54:LEU:HD12	2.00	0.43
1:D:16:TYR:HA	1:D:120:ASP:OD1	2.18	0.43
1:F:9:ASP:C	1:F:9:ASP:OD1	2.57	0.43
1:A:143:GLU:OE2	1:A:144:LYS:NZ	2.41	0.43
1:A:31[B]:ILE:HD11	4:A:1160:TOP:N4	2.34	0.43
1:B:71:GLU:OE2	1:B:71:GLU:N	2.49	0.42
1:A:13:VAL:HG13	1:A:119:GLY:HA3	2.01	0.42
3:A:1159:NDP:C4N	4:A:1160:TOP:H91	2.37	0.42
1:C:9:ASP:C	1:C:9:ASP:OD1	2.55	0.42
1:E:54:LEU:HA	1:E:55:PRO:HD3	1.82	0.42
1:D:123:PHE:CG	1:D:124:PRO:HD2	2.53	0.42
1:D:17:GLN:HA	1:D:120:ASP:OD2	2.19	0.42
1:C:5:ILE:CD1	1:C:31[B]:ILE:HD12	2.48	0.42
1:E:11[A]:GLN:O	1:E:12:ARG:CB	2.65	0.41
1:F:2:LEU:HD21	1:F:101:MET:HE1	2.02	0.41
1:F:54:LEU:HA	1:F:55:PRO:HD3	1.77	0.41
1:D:2:LEU:HD21	1:D:101:MET:HE1	2.02	0.41
1:B:96:THR:HG23	3:B:1159:NDP:O1N	2.20	0.41
1:D:83:LYS:HB2	1:D:83:LYS:HE3	1.58	0.41
1:D:40:LEU:HD11	1:D:54:LEU:HD12	2.03	0.41
1:D:9:ASP:C	1:D:9:ASP:OD1	2.58	0.41
1:D:91:ILE:HG23	1:D:97:LEU:HG	2.01	0.41
1:E:21:PRO:HD2	1:E:22:TRP:CZ3	2.56	0.41
1:B:141:LEU:HD21	1:B:148:PRO:HA	2.03	0.40
1:C:123:PHE:CD1	1:C:124:PRO:HD2	2.56	0.40
1:F:91:ILE:HG23	1:F:97:LEU:HG	2.02	0.40
1:A:135:SER:HB2	1:F:55:PRO:HB3	2.03	0.40
1:B:9:ASP:OD1	1:B:9:ASP:C	2.60	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	156/161 (97%)	154 (99%)	2 (1%)	0	100	100
1	B	155/161 (96%)	153 (99%)	2 (1%)	0	100	100
1	C	156/161 (97%)	154 (99%)	2 (1%)	0	100	100
1	D	158/161 (98%)	155 (98%)	3 (2%)	0	100	100
1	E	157/161 (98%)	153 (98%)	4 (2%)	0	100	100
1	F	158/161 (98%)	155 (98%)	3 (2%)	0	100	100
All	All	940/966 (97%)	924 (98%)	16 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	144/146 (99%)	142 (99%)	2 (1%)	74	65
1	B	143/146 (98%)	140 (98%)	3 (2%)	61	47
1	C	144/146 (99%)	140 (97%)	4 (3%)	51	35
1	D	146/146 (100%)	140 (96%)	6 (4%)	37	19
1	E	145/146 (99%)	141 (97%)	4 (3%)	51	35
1	F	146/146 (100%)	137 (94%)	9 (6%)	23	8

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	868/876 (99%)	840 (97%)	28 (3%)	47 29

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	LYS
1	A	71	GLU
1	B	69	HIS
1	B	71	GLU
1	B	116	LYS
1	C	52	LYS
1	C	69	HIS
1	C	83	LYS
1	C	143	GLU
1	D	52	LYS
1	D	71	GLU
1	D	83	LYS
1	D	84	GLU
1	D	88	HIS
1	D	156	ARG
1	E	18	ASN
1	E	52	LYS
1	E	88	HIS
1	E	156	ARG
1	F	11[A]	GLN
1	F	11[B]	GLN
1	F	52	LYS
1	F	54	LEU
1	F	71	GLU
1	F	88	HIS
1	F	130	ASP
1	F	132	GLU
1	F	156	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	ASN
1	B	11	GLN
1	C	38	ASN
1	D	19	GLN

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Mol	Chain	Res	Type
1	D	38	ASN
1	D	77	ASN
1	D	88	HIS
1	E	19	GLN
1	E	33	GLN
1	E	77	ASN
1	E	88	HIS
1	F	30	HIS
1	F	33	GLN
1	F	38	ASN
1	F	77	ASN
1	F	88	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

15 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	GOL	A	1158	-	5,5,5	0.35	0	5,5,5	0.36	0
3	NDP	A	1159	-	42,52,52	1.22	3 (7%)	55,80,80	1.80	8 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	TOP	A	1160	-	22,22,22	1.05	2 (9%)	30,30,30	2.26	13 (43%)
2	GOL	B	1158	-	5,5,5	0.45	0	5,5,5	0.43	0
3	NDP	B	1159	-	42,52,52	1.25	4 (9%)	55,80,80	1.73	8 (14%)
4	TOP	B	1160	-	22,22,22	1.00	1 (4%)	30,30,30	1.90	6 (20%)
2	GOL	C	1158	-	5,5,5	0.34	0	5,5,5	0.59	0
3	NDP	C	1159	-	42,52,52	1.29	3 (7%)	55,80,80	1.75	6 (10%)
4	TOP	C	1160	-	22,22,22	0.98	1 (4%)	30,30,30	2.14	10 (33%)
4	TOP	D	1158	-	22,22,22	0.97	2 (9%)	30,30,30	2.28	12 (40%)
2	GOL	E	1158	-	5,5,5	1.06	0	5,5,5	1.23	0
2	GOL	E	1159	-	5,5,5	0.39	0	5,5,5	0.39	0
4	TOP	E	1160	-	22,22,22	1.02	3 (13%)	30,30,30	2.27	12 (40%)
2	GOL	F	1158	-	5,5,5	0.39	0	5,5,5	0.50	0
4	TOP	F	1159	-	22,22,22	0.91	1 (4%)	30,30,30	2.27	10 (33%)

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
2	GOL	A	1158	-	-	0/4/4/4	0/0/0/0
3	NDP	A	1159	-	-	0/30/77/77	0/5/5/5
4	TOP	A	1160	-	-	0/10/10/10	0/2/2/2
2	GOL	B	1158	-	-	0/4/4/4	0/0/0/0
3	NDP	B	1159	-	-	0/30/77/77	0/5/5/5
4	TOP	B	1160	-	-	0/10/10/10	0/2/2/2
2	GOL	C	1158	-	-	0/4/4/4	0/0/0/0
3	NDP	C	1159	-	-	0/30/77/77	0/5/5/5
4	TOP	C	1160	-	-	0/10/10/10	0/2/2/2
4	TOP	D	1158	-	-	0/10/10/10	0/2/2/2
2	GOL	E	1158	-	-	0/4/4/4	0/0/0/0
2	GOL	E	1159	-	-	0/4/4/4	0/0/0/0
4	TOP	E	1160	-	-	0/10/10/10	0/2/2/2
2	GOL	F	1158	-	-	0/4/4/4	0/0/0/0
4	TOP	F	1159	-	-	0/10/10/10	0/2/2/2

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1159	NDP	C4N-C5N	-4.32	1.39	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1159	NDP	C4N-C5N	-3.86	1.40	1.49
3	A	1159	NDP	C4N-C5N	-3.78	1.40	1.49
4	E	1160	TOP	C18-C15	-2.38	1.35	1.40
4	D	1158	TOP	C18-C15	-2.30	1.35	1.40
4	E	1160	TOP	C12-C15	-2.24	1.36	1.40
4	A	1160	TOP	C18-C15	-2.04	1.36	1.40
4	D	1158	TOP	C12-C15	-2.04	1.36	1.40
3	B	1159	NDP	C2N-C3N	2.05	1.39	1.34
4	C	1160	TOP	C8-C6	2.09	1.47	1.42
4	E	1160	TOP	C8-C6	2.24	1.48	1.42
4	F	1159	TOP	C8-C6	2.30	1.48	1.42
4	A	1160	TOP	C8-C6	2.38	1.48	1.42
4	B	1160	TOP	C8-C6	2.58	1.49	1.42
3	C	1159	NDP	C6N-C5N	3.28	1.39	1.33
3	B	1159	NDP	C5A-C4A	3.30	1.47	1.40
3	A	1159	NDP	C6N-C5N	3.33	1.39	1.33
3	C	1159	NDP	C5A-C4A	3.38	1.48	1.40
3	B	1159	NDP	C6N-C5N	3.39	1.39	1.33
3	A	1159	NDP	C5A-C4A	3.43	1.48	1.40

All (85) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1159	NDP	N3A-C2A-N1A	-7.70	123.00	128.89
3	A	1159	NDP	N3A-C2A-N1A	-7.70	123.00	128.89
3	C	1159	NDP	N3A-C2A-N1A	-7.58	123.09	128.89
4	C	1160	TOP	N2-C3-N5	-5.47	120.07	125.78
4	A	1160	TOP	N2-C3-N5	-5.44	120.09	125.78
3	C	1159	NDP	C1B-N9A-C4A	-5.02	119.37	126.94
4	E	1160	TOP	N2-C3-N5	-4.99	120.57	125.78
3	A	1159	NDP	C1B-N9A-C4A	-4.79	119.72	126.94
3	A	1159	NDP	C4A-C5A-N7A	-4.47	105.36	109.48
3	B	1159	NDP	C4A-C5A-N7A	-4.42	105.41	109.48
4	D	1158	TOP	N2-C3-N5	-4.40	121.19	125.78
4	B	1160	TOP	N2-C3-N5	-4.22	121.37	125.78
3	C	1159	NDP	C4A-C5A-N7A	-4.21	105.61	109.48
3	B	1159	NDP	C1B-N9A-C4A	-4.01	120.89	126.94
4	F	1159	TOP	N2-C3-N5	-3.97	121.63	125.78
4	D	1158	TOP	C9-C8-C6	-3.90	117.22	122.21
4	F	1159	TOP	C9-C8-C6	-3.65	117.54	122.21
4	E	1160	TOP	C9-C8-C6	-3.31	117.98	122.21
4	D	1158	TOP	C8-C1-N2	-3.14	118.41	123.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	1159	TOP	C8-C1-N2	-2.93	118.77	123.86
4	F	1159	TOP	C9-C10-C11	-2.77	114.97	120.69
4	A	1160	TOP	O13-C12-C11	-2.69	119.61	124.21
4	D	1158	TOP	C9-C10-C11	-2.61	115.30	120.69
4	D	1158	TOP	C8-C6-N7	-2.60	118.44	122.25
4	B	1160	TOP	C9-C8-C6	-2.55	118.95	122.21
3	A	1159	NDP	C1D-N1N-C2N	-2.48	116.58	120.91
4	C	1160	TOP	C9-C8-C6	-2.44	119.08	122.21
4	C	1160	TOP	O13-C12-C11	-2.43	120.06	124.21
4	E	1160	TOP	C9-C10-C11	-2.42	115.69	120.69
3	A	1159	NDP	O3-PA-O5B	-2.39	96.61	102.94
4	A	1160	TOP	C9-C8-C6	-2.36	119.20	122.21
4	A	1160	TOP	C9-C10-C11	-2.34	115.86	120.69
4	E	1160	TOP	C8-C1-N2	-2.34	119.80	123.86
3	B	1159	NDP	O2B-P2B-O1X	-2.29	101.38	107.11
4	E	1160	TOP	C8-C6-N7	-2.25	118.95	122.25
4	B	1160	TOP	C9-C10-C11	-2.15	116.25	120.69
3	A	1159	NDP	C4N-C5N-C6N	-2.06	119.17	122.58
3	B	1159	NDP	C1D-N1N-C2N	-2.06	117.32	120.91
3	C	1159	NDP	O2B-C2B-C1B	-2.05	102.02	110.02
4	A	1160	TOP	C8-C6-N5	-2.04	117.83	121.23
3	B	1159	NDP	O2A-PA-O1A	2.09	123.88	112.53
4	C	1160	TOP	O13-C12-C15	2.11	119.07	115.26
4	E	1160	TOP	C9-C8-C1	2.14	124.89	121.72
4	A	1160	TOP	C9-C10-C21	2.16	125.15	120.69
4	A	1160	TOP	O13-C12-C15	2.21	119.24	115.26
3	A	1159	NDP	C5N-C4N-C3N	2.31	118.87	112.52
4	C	1160	TOP	C9-C8-C1	2.31	125.14	121.72
4	C	1160	TOP	N7-C6-N5	2.43	120.48	116.95
4	D	1158	TOP	C9-C8-C1	2.44	125.32	121.72
4	D	1158	TOP	C17-O16-C15	2.45	121.26	114.82
4	D	1158	TOP	C3-N5-C6	2.47	119.85	117.04
3	B	1159	NDP	C5N-C4N-C3N	2.50	119.42	112.52
4	E	1160	TOP	C20-O19-C18	2.56	121.42	117.54
4	A	1160	TOP	C1-N2-C3	2.56	119.59	116.05
4	A	1160	TOP	C9-C8-C1	2.69	125.71	121.72
4	A	1160	TOP	C20-O19-C18	2.76	121.73	117.54
4	D	1158	TOP	N4-C3-N2	2.76	119.88	117.39
4	E	1160	TOP	C14-O13-C12	2.79	121.77	117.54
4	F	1159	TOP	C14-O13-C12	2.84	121.86	117.54
3	C	1159	NDP	O2X-P2B-O1X	2.88	119.84	110.58
3	C	1159	NDP	C5N-C4N-C3N	3.04	120.89	112.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	1160	TOP	C1-N2-C3	3.15	120.40	116.05
4	F	1159	TOP	C3-N5-C6	3.16	120.63	117.04
4	C	1160	TOP	C20-O19-C18	3.17	122.35	117.54
4	E	1160	TOP	N4-C3-N2	3.20	120.28	117.39
4	F	1159	TOP	C20-O19-C18	3.23	122.44	117.54
4	D	1158	TOP	C20-O19-C18	3.26	122.48	117.54
4	D	1158	TOP	N7-C6-N5	3.26	121.67	116.95
4	B	1160	TOP	C1-N2-C3	3.26	120.55	116.05
4	B	1160	TOP	N7-C6-N5	3.32	121.77	116.95
4	F	1159	TOP	N4-C3-N2	3.33	120.39	117.39
4	A	1160	TOP	N7-C6-N5	3.41	121.88	116.95
4	F	1159	TOP	N7-C6-N5	3.50	122.03	116.95
3	B	1159	NDP	O2X-P2B-O1X	3.58	122.10	110.58
3	A	1159	NDP	O2X-P2B-O1X	3.60	122.17	110.58
4	E	1160	TOP	N7-C6-N5	3.60	122.17	116.95
4	E	1160	TOP	C3-N5-C6	3.65	121.19	117.04
4	A	1160	TOP	N4-C3-N2	3.67	120.70	117.39
4	C	1160	TOP	N4-C3-N2	3.93	120.93	117.39
4	B	1160	TOP	C3-N5-C6	4.21	121.83	117.04
4	F	1159	TOP	C1-N2-C3	4.57	122.36	116.05
4	E	1160	TOP	C1-N2-C3	4.65	122.47	116.05
4	D	1158	TOP	C1-N2-C3	5.22	123.26	116.05
4	C	1160	TOP	C3-N5-C6	5.43	123.22	117.04
4	A	1160	TOP	C3-N5-C6	6.09	123.97	117.04

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1159	NDP	3	0
4	A	1160	TOP	5	0
3	B	1159	NDP	2	0
4	B	1160	TOP	3	0
3	C	1159	NDP	2	0
4	C	1160	TOP	3	0
4	D	1158	TOP	3	0
2	E	1158	GOL	3	0
4	E	1160	TOP	2	0
4	F	1159	TOP	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 ⓘ

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	A	157/161 (97%)	0.41	2 (1%) 79 76	20, 30, 42, 54	8 (5%)
1	B	157/161 (97%)	0.46	2 (1%) 79 76	21, 30, 42, 48	9 (5%)
1	C	157/161 (97%)	0.45	2 (1%) 79 76	20, 29, 43, 48	7 (4%)
1	D	157/161 (97%)	0.51	4 (2%) 61 56	22, 33, 46, 56	8 (5%)
1	E	157/161 (97%)	0.58	6 (3%) 44 38	23, 33, 48, 56	6 (3%)
1	F	157/161 (97%)	0.59	4 (2%) 61 56	22, 33, 48, 53	6 (3%)
All	All	942/966 (97%)	0.50	20 (2%) 67 62	20, 32, 45, 56	44 (4%)

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	122	PHE	4.2
1	C	68	PHE	3.9
1	F	16	TYR	3.1
1	F	84	GLU	2.8
1	B	113	ILE	2.6
1	E	80	ASP	2.6
1	C	152	LEU	2.6
1	E	87	GLY	2.5
1	A	31[A]	ILE	2.4
1	A	54	LEU	2.4
1	F	121	THR	2.4
1	B	94	GLY	2.2
1	E	84	GLU	2.2
1	D	86	SER	2.2
1	D	122	PHE	2.2
1	E	103	ASP	2.1
1	E	54	LEU	2.1
1	D	137	VAL	2.1
1	E	128	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	71	GLU	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	GOL	A	1158	6/6	0.75	0.24	4.56	38,46,48,48	0
2	GOL	E	1159	6/6	0.69	0.21	3.12	52,53,54,55	0
2	GOL	B	1158	6/6	0.84	0.18	1.00	38,44,48,49	0
4	TOP	B	1160	21/21	0.92	0.14	0.12	19,24,28,33	0
2	GOL	C	1158	6/6	0.94	0.14	-0.10	36,46,48,48	0
3	NDP	B	1159	48/48	0.94	0.12	-0.24	20,25,29,33	0
4	TOP	C	1160	21/21	0.91	0.13	-0.53	19,24,27,33	0
3	NDP	C	1159	48/48	0.96	0.12	-0.54	20,25,32,35	0
2	GOL	F	1158	6/6	0.78	0.13	-0.60	54,59,61,62	0
4	TOP	D	1158	21/21	0.94	0.11	-0.72	20,29,35,48	0
3	NDP	A	1159	48/48	0.95	0.12	-0.78	20,25,31,34	0
4	TOP	F	1159	21/21	0.93	0.11	-0.80	22,28,38,45	0
4	TOP	A	1160	21/21	0.96	0.12	-0.85	19,23,29,32	0
4	TOP	E	1160	21/21	0.94	0.10	-1.23	22,28,34,40	0
2	GOL	E	1158	6/6	0.92	0.14	-	44,56,58,67	0

6.5 Other polymers [i](#)

There are no such residues in this entry.