WORLDWIDE PDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Sep 20, 2023 – 11:47 AM EDT

PDB ID	:	5K95
Title	:	Crystal Structure of GTP Cyclohydrolase-IB with 8-oxo-GTP
Authors	:	Alvarez, J.; Stec, B.; Swairjo, M.A.
Deposited on	:	2016-05-31
Resolution	:	2.77 Å(reported)

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	:	2.35.1
buster-report	:	1.1.7 (2018)
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
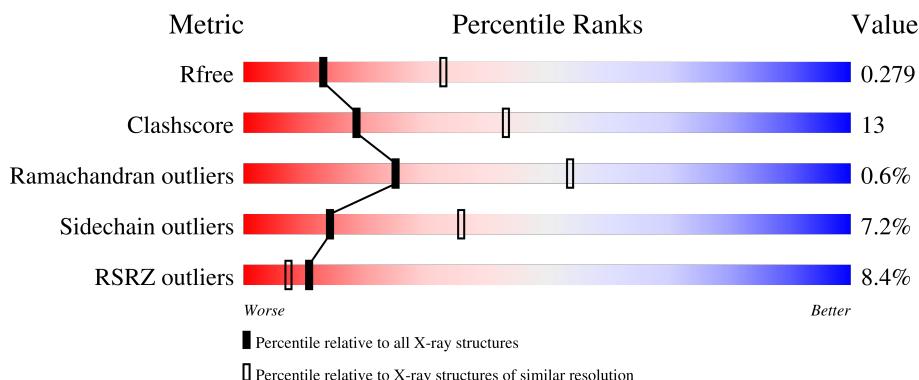
1   Overall quality at a glance   ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION
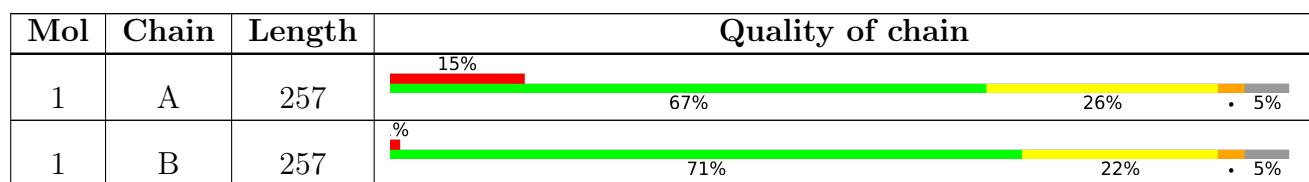
The reported resolution of this entry is 2.77 Å.

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	Percentile Ranks	Value
Rfree		0.279
Clashscore		13
Ramachandran outliers		0.6%
Sidechain outliers		7.2%
RSRZ outliers		8.4%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4107 (2.80-2.76)
Clashscore	141614	4575 (2.80-2.76)
Ramachandran outliers	138981	4487 (2.80-2.76)
Sidechain outliers	138945	4489 (2.80-2.76)
RSRZ outliers	127900	4027 (2.80-2.76)

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	257	15% — 67% / 26% / · 5%
1	B	257	% — 71% / 22% / · 5%

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:

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| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	SNC	A	149	-	-	-	X

2 Entry composition (i)
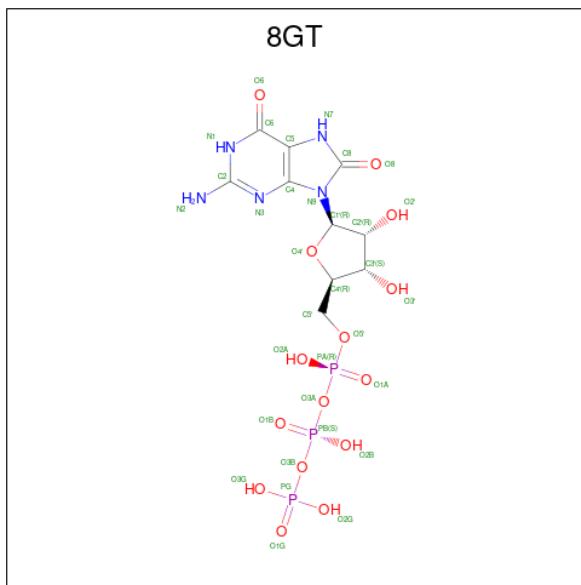
There are 4 unique types of molecules in this entry. The entry contains 4067 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 GTP cyclohydrolase FolE2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	245	Total	C	N	O	S	0	1	0
			1940	1226	331	372	11			
1	B	245	Total	C	N	O	S	0	6	0
			1982	1250	340	379	13			

- Molecule 2 is 8-OXO-GUANOSINE-5'-TRIPHOSPHATE (three-letter code: 8GT) (formula: $C_{10}H_{16}N_5O_{15}P_3$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			33	10	5	15	3		

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total	Zn	0	0
			1	1		
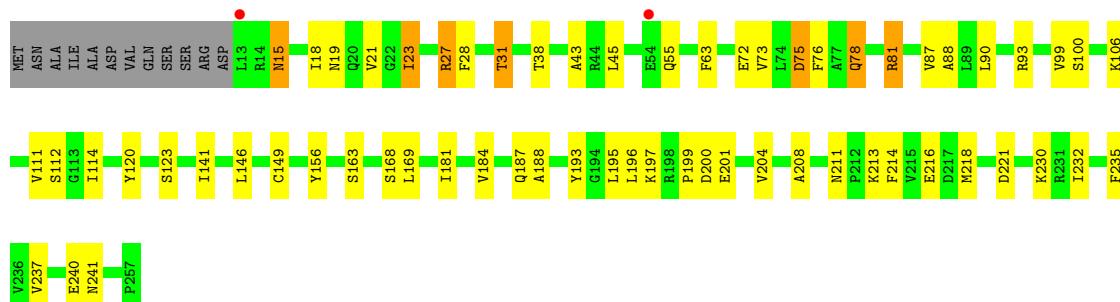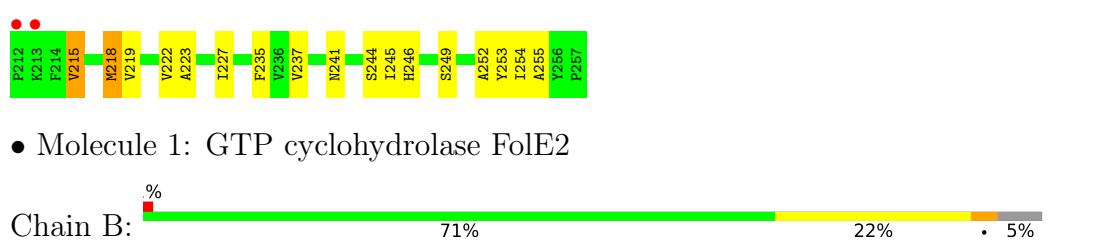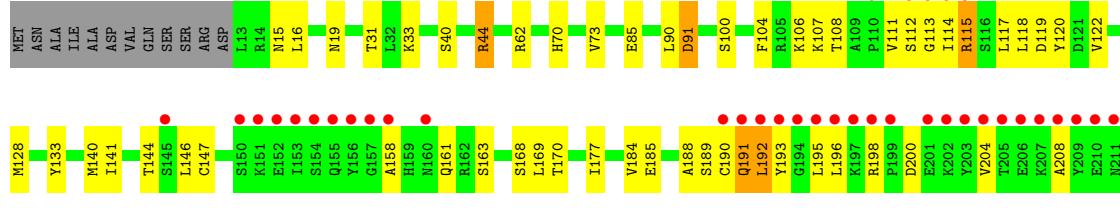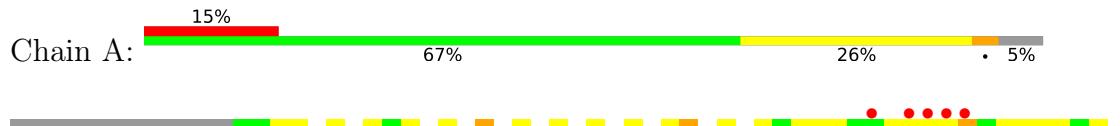
• Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	40	Total O 40 40		0	0
4	B	71	Total O 71 71		0	0

3 Residue-property plots ⓘ

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: GTP cyclohydrolase FolE2

Chain A:

• Molecule 1: GTP cyclohydrolase FolE2

Chain B:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	91.88Å 100.56Å 115.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.07 – 2.77	Depositor
	46.07 – 2.77	EDS
% Data completeness	98.1 (46.07-2.77)	Depositor
(in resolution range)	98.2 (46.07-2.77)	EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.02 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.175 , 0.277	Depositor
	0.180 , 0.279	DCC
R_{free} test set	684 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	65.4	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 42.5	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4067	wwPDB-VP
Average B, all atoms (Å^2)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: SNC, ZN, 8GT

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	0/1969	0.72	1/2662 (0.0%)
1	B	0.59	0/2013	0.72	1/2719 (0.0%)
All	All	0.57	0/3982	0.72	2/5381 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	44	ARG	NE-CZ-NH2	-7.35	116.63	120.30
1	B	27	ARG	NE-CZ-NH2	-5.34	117.63	120.30

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	1940	0	1935	60	0
1	B	1982	0	1980	50	0
2	B	33	0	12	1	0
3	B	1	0	0	0	0
4	A	40	0	0	7	0
4	B	71	0	0	3	0
All	All	4067	0	3927	104	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 13.

All (104) 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:128:MET:SD	4:A:427:HOH:O	2.25	0.94
1:B:31:THR:HG22	1:B:73:VAL:HG23	1.48	0.93
1:B:81[A]:ARG:HH11	1:B:81[A]:ARG:HG3	1.34	0.90
1:B:31:THR:CG2	1:B:73:VAL:HG23	2.10	0.81
1:A:163:SER:HB3	1:A:241:ASN:HD22	1.48	0.79
1:B:81[A]:ARG:HG3	1:B:81[A]:ARG:NH1	1.93	0.78
1:A:254:ILE:HA	1:B:19:ASN:HD22	1.49	0.77
1:B:15:ASN:HD22	1:B:15:ASN:N	1.83	0.77
1:A:33:LYS:HB2	1:A:73:VAL:HG11	1.69	0.73
1:A:252:ALA:HB2	1:B:21:VAL:HG23	1.71	0.70
1:B:188:ALA:HA	1:B:218[A]:MET:HE1	1.74	0.67
1:B:163:SER:HB2	1:B:241:ASN:ND2	2.10	0.67
1:A:144:THR:HG23	1:A:192:LEU:CD2	2.25	0.66
1:A:188:ALA:HB3	1:A:191:GLN:NE2	2.12	0.64
1:A:254:ILE:HA	1:B:19:ASN:ND2	2.13	0.64
1:A:141:ILE:HD13	1:A:184:VAL:HG21	1.79	0.63
1:A:215:VAL:HG23	1:A:241:ASN:HB2	1.80	0.63
1:B:163:SER:HB2	1:B:241:ASN:HD22	1.64	0.62
1:A:118:LEU:HD12	1:A:119:ASP:H	1.64	0.62
1:A:112:SER:O	1:A:114:ILE:N	2.33	0.61
1:B:23:ILE:H	1:B:23:ILE:HD13	1.65	0.61
1:A:140:MET:HE3	4:A:426:HOH:O	2.01	0.60
1:B:81[A]:ARG:HH11	1:B:81[A]:ARG:CG	2.05	0.60
1:A:104:PHE:CE1	1:A:119:ASP:HB3	2.37	0.60
1:B:15:ASN:HD22	1:B:15:ASN:H	1.47	0.60
1:B:114:ILE:HG21	1:B:195:LEU:HD13	1.82	0.59
1:A:196:LEU:HD22	1:A:200:ASP:OD2	2.02	0.59
1:A:169:LEU:HD12	1:A:169:LEU:O	2.03	0.59
1:B:45:LEU:HD23	1:B:99:VAL:HG22	1.85	0.58
1:A:146:LEU:HD21	1:A:158:ALA:HB3	1.85	0.58
1:A:169:LEU:HD12	1:A:169:LEU:C	2.24	0.58
1:A:62:ARG:HB2	1:A:90:LEU:HD21	1.86	0.57
1:A:144:THR:CG2	1:A:192:LEU:HD22	2.36	0.55
1:A:144:THR:HG23	1:A:192:LEU:HD22	1.88	0.54
1:B:45:LEU:CD2	1:B:99:VAL:HG22	2.38	0.54
1:B:55:GLN:N	4:B:403:HOH:O	2.40	0.54
1:A:223:ALA:O	1:A:227:ILE:HD12	2.07	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:245:ILE:HG23	1:A:246:HIS:CD2	2.44	0.53
1:A:170:THR:CG2	4:A:428:HOH:O	2.57	0.52
1:A:106:LYS:HZ2	1:A:115:ARG:HB2	1.74	0.52
1:A:128:MET:CE	4:A:427:HOH:O	2.52	0.52
1:A:146:LEU:HD23	1:A:147:CYS:N	2.25	0.51
1:B:146:LEU:HD13	1:B:208:ALA:C	2.30	0.51
1:A:31:THR:HG22	1:A:40:SER:OG	2.11	0.51
1:A:128:MET:HE2	4:A:427:HOH:O	2.11	0.50
1:B:78:GLN:HA	1:B:78:GLN:HE21	1.75	0.50
1:B:211[B]:ASN:ND2	4:B:406:HOH:O	2.45	0.49
1:B:111:VAL:HG11	1:B:199:PRO:HB2	1.93	0.49
1:A:133:TYR:HA	4:A:427:HOH:O	2.11	0.49
1:A:245:ILE:HG23	1:A:246:HIS:NE2	2.28	0.49
1:B:169:LEU:HD22	1:B:232:ILE:HG12	1.94	0.48
1:A:163:SER:HB3	1:A:241:ASN:ND2	2.23	0.48
1:A:255:ALA:H	1:B:19:ASN:ND2	2.11	0.48
1:A:219:VAL:HG21	1:B:18:ILE:HD13	1.95	0.48
1:B:235:PHE:CD1	1:B:237:VAL:HG23	2.50	0.47
1:A:62:ARG:HD2	1:A:90:LEU:HD23	1.97	0.47
1:B:193:TYR:HB2	1:B:196:LEU:HD21	1.97	0.47
1:A:19:ASN:HD22	1:A:19:ASN:H	1.62	0.47
1:A:31:THR:HG23	4:A:434:HOH:O	2.14	0.47
1:A:111:VAL:HG12	1:A:112:SER:H	1.80	0.47
1:A:215:VAL:HG13	1:A:252:ALA:HB3	1.95	0.47
1:A:235:PHE:CE1	1:A:237:VAL:HG23	2.50	0.47
1:B:218[B]:MET:HE1	1:B:241:ASN:HD21	1.81	0.46
1:A:33:LYS:HB2	1:A:73:VAL:CG1	2.41	0.46
1:A:70:HIS:NE2	1:A:85:GLU:OE1	2.49	0.46
1:B:72:GLU:N	1:B:72:GLU:OE2	2.50	0.45
1:B:43:ALA:HA	1:B:100:SER:O	2.17	0.45
1:B:149:SNC:SG	2:B:301:8GT:O2'	2.60	0.45
1:A:161:GLN:NE2	1:A:241:ASN:HD21	2.15	0.44
1:B:15:ASN:N	1:B:15:ASN:ND2	2.55	0.44
1:B:187:GLN:NE2	4:B:402:HOH:O	2.29	0.44
1:B:214:PHE:HB3	1:B:216:GLU:OE1	2.17	0.44
1:A:237:VAL:O	1:A:253:TYR:HA	2.17	0.44
1:A:190:CYS:SG	1:A:204:VAL:HG13	2.57	0.44
1:B:169:LEU:HD12	1:B:169:LEU:C	2.38	0.44
1:A:118:LEU:HD12	1:A:119:ASP:N	2.30	0.44
1:A:118:LEU:HD23	1:A:120:TYR:OH	2.18	0.44
1:A:218:MET:O	1:A:222:VAL:HG23	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:31:THR:HG22	1:B:73:VAL:CG2	2.34	0.44
1:A:200:ASP:O	1:A:204:VAL:HG23	2.17	0.43
1:A:108:THR:HA	1:A:115:ARG:HB3	2.01	0.43
1:A:185:GLU:O	1:A:188:ALA:HB3	2.19	0.43
1:B:197:LYS:O	1:B:200:ASP:N	2.51	0.43
1:A:106:LYS:NZ	1:A:115:ARG:O	2.51	0.43
1:A:16:LEU:HD12	1:A:16:LEU:N	2.33	0.43
1:B:111:VAL:HG12	1:B:112:SER:N	2.34	0.43
1:A:122:VAL:HG21	1:A:177:ILE:HG21	2.01	0.42
1:A:188:ALA:HB3	1:A:191:GLN:HE21	1.82	0.42
1:B:240:GLU:C	1:B:241:ASN:HD22	2.23	0.42
1:B:120:TYR:CE2	1:B:181:ILE:HD13	2.54	0.42
1:A:144:THR:CG2	1:A:192:LEU:CD2	2.92	0.42
1:A:146:LEU:HD13	1:A:208:ALA:C	2.40	0.42
1:B:213:LYS:NZ	1:B:221:ASP:OD2	2.42	0.42
1:A:219:VAL:CG2	1:B:18:ILE:HD13	2.51	0.41
1:B:23:ILE:HD12	1:B:63:PHE:CG	2.55	0.41
1:B:23:ILE:HD12	1:B:63:PHE:CB	2.51	0.41
1:B:75:ASP:O	1:B:76:PHE:C	2.57	0.41
1:A:107:LYS:HE2	1:A:118:LEU:HB3	2.01	0.41
1:B:28:PHE:HB3	1:B:45:LEU:HD12	2.02	0.41
1:B:169:LEU:HD12	1:B:169:LEU:O	2.21	0.40
1:A:91:ASP:N	1:A:91:ASP:OD1	2.54	0.40
1:B:63:PHE:CZ	1:B:90:LEU:HD22	2.55	0.40
1:B:141:ILE:HD13	1:B:184:VAL:HG21	2.04	0.40
1:B:201:GLU:HA	1:B:204:VAL:HG22	2.04	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	243/257 (95%)	226 (93%)	15 (6%)	2 (1%)	19	47
1	B	248/257 (96%)	231 (93%)	16 (6%)	1 (0%)	34	64
All	All	491/514 (96%)	457 (93%)	31 (6%)	3 (1%)	25	54

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	113	GLY
1	A	198	ARG
1	B	88	ALA

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	215/224 (96%)	199 (93%)	16 (7%)	13	34
1	B	220/224 (98%)	203 (92%)	17 (8%)	13	32
All	All	435/448 (97%)	402 (92%)	33 (8%)	14	33

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

Mol	Chain	Res	Type
1	A	15	ASN
1	A	44	ARG
1	A	91	ASP
1	A	100	SER
1	A	115	ARG
1	A	117	LEU
1	A	168	SER
1	A	189	SER
1	A	191	GLN
1	A	192	LEU
1	A	193	TYR
1	A	195	LEU
1	A	215	VAL

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Mol	Chain	Res	Type
1	A	218	MET
1	A	244	SER
1	A	249	SER
1	B	15	ASN
1	B	23	ILE
1	B	27	ARG
1	B	31	THR
1	B	38	THR
1	B	75	ASP
1	B	78	GLN
1	B	81[A]	ARG
1	B	81[B]	ARG
1	B	87	VAL
1	B	93[A]	ARG
1	B	93[B]	ARG
1	B	106	LYS
1	B	123	SER
1	B	156	TYR
1	B	168	SER
1	B	230	LYS

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

Mol	Chain	Res	Type
1	A	15	ASN
1	A	19	ASN
1	A	191	GLN
1	A	241	ASN
1	B	15	ASN
1	B	19	ASN
1	B	78	GLN
1	B	241	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\#|Z| > 2$
1	SNC	B	149	1	4,7,8	1.00	0	1,7,9	0.72	0
1	SNC	A	149	1	4,7,8	0.95	0	1,7,9	0.18	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
1	SNC	B	149	1	-	0/0/6/8	-
1	SNC	A	149	1	-	0/0/6/8	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	149	SNC	1	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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	#$|Z| > 2$
2	8GT	B	301	3	31,35,35	2.01	7 (22%)	45,56,56	2.83	11 (24%)

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	8GT	B	301	3	-	7/22/38/38	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	8GT	C5-C4	7.53	1.48	1.37
2	B	301	8GT	C8-N9	-4.37	1.33	1.40
2	B	301	8GT	O8-C8	3.20	1.28	1.23
2	B	301	8GT	C4-N9	-2.77	1.34	1.39
2	B	301	8GT	C6-N1	-2.39	1.34	1.38
2	B	301	8GT	C5-C6	2.38	1.48	1.42
2	B	301	8GT	C5-N7	-2.09	1.34	1.37

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	8GT	C5-C4-N3	-8.79	118.72	127.80
2	B	301	8GT	N7-C8-N9	7.81	115.84	106.58
2	B	301	8GT	N9-C4-N3	7.75	134.67	125.81
2	B	301	8GT	C2'-C1'-N9	-7.04	106.58	115.94
2	B	301	8GT	C2-N3-C4	5.06	121.31	112.30
2	B	301	8GT	O8-C8-N9	-3.50	121.10	125.99
2	B	301	8GT	C5-N7-C8	-3.41	104.57	109.47
2	B	301	8GT	PA-O3A-PB	-2.97	122.63	132.83
2	B	301	8GT	O6-C6-C5	-2.93	120.52	127.24
2	B	301	8GT	O4'-C1'-N9	2.37	112.24	108.72
2	B	301	8GT	C5-C6-N1	2.25	119.01	112.31

There are no chirality outliers.

All (7) torsion outliers are listed below:
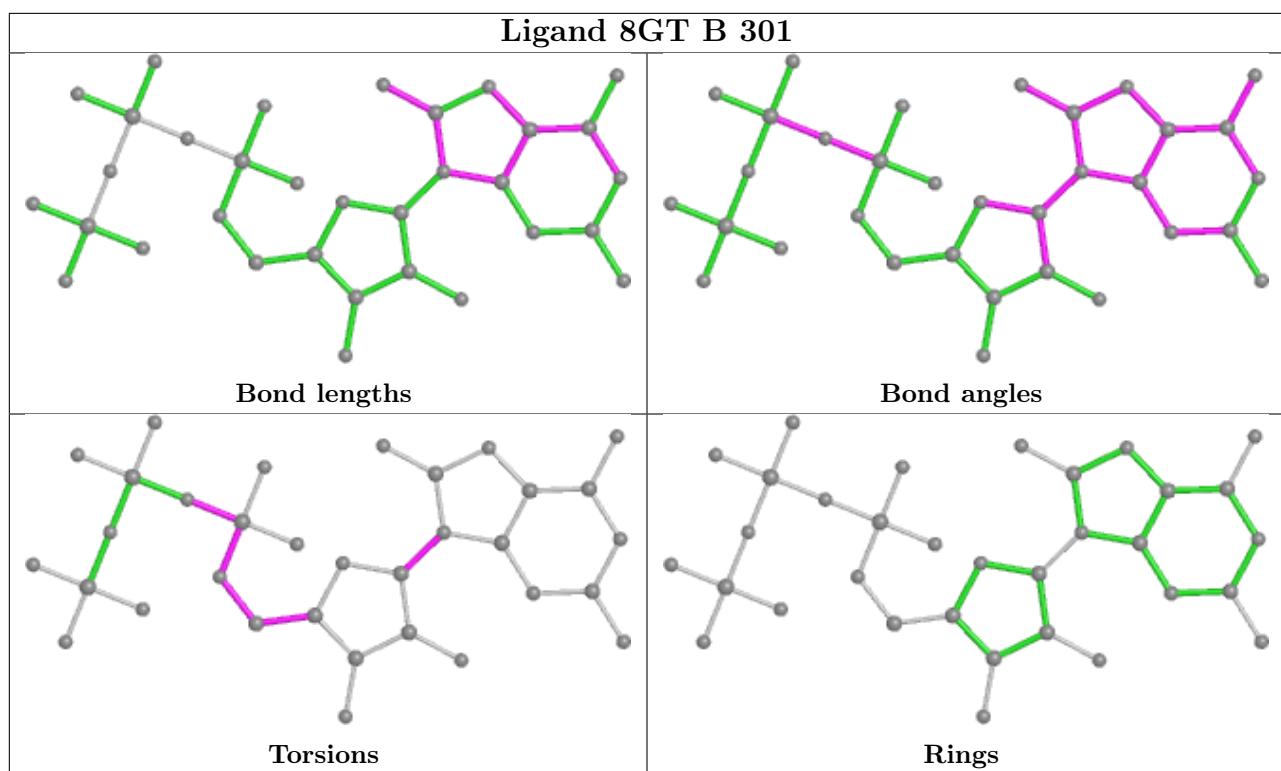
Mol	Chain	Res	Type	Atoms
2	B	301	8GT	PB-O3A-PA-O5'
2	B	301	8GT	C5'-O5'-PA-O1A
2	B	301	8GT	C4'-C5'-O5'-PA
2	B	301	8GT	O4'-C4'-C5'-O5'
2	B	301	8GT	C3'-C4'-C5'-O5'
2	B	301	8GT	C2'-C1'-N9-C8
2	B	301	8GT	O4'-C1'-N9-C8

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	8GT	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand 8GT B 301

Bond lengths

Bond angles

Torsions

Rings

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, 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(Å²)	Q<0.9
1	A	244/257 (94%)	0.80	39 (15%)	1	1	34, 64, 192, 228	0
1	B	244/257 (94%)	-0.39	2 (0%)	86	84	33, 54, 84, 143	0
All	All	488/514 (94%)	0.20	41 (8%)	11	7	33, 58, 178, 228	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	205	THR	16.5
1	A	206	GLU	16.1
1	A	193	TYR	15.1
1	A	203	TYR	15.0
1	A	194	GLY	14.6
1	A	199	PRO	12.1
1	A	204	VAL	10.2
1	A	150	SER	10.1
1	A	156	TYR	9.3
1	A	192	LEU	8.9
1	A	152	GLU	8.4
1	A	153	ILE	7.5
1	A	198	ARG	7.4
1	A	201	GLU	6.6
1	A	196	LEU	6.5
1	A	191	GLN	6.3
1	A	113	GLY	6.3
1	A	114	ILE	6.2
1	A	197	LYS	6.0
1	A	190	CYS	5.5
1	A	155	GLN	5.2
1	A	195	LEU	5.1
1	A	210	GLU	4.7
1	A	151	LYS	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	110	PRO	4.1
1	A	112	SER	3.9
1	A	207	LYS	3.8
1	A	202	LYS	3.6
1	A	157	GLY	3.6
1	A	158	ALA	3.5
1	A	211	ASN	3.1
1	A	154	SER	3.1
1	A	115	ARG	3.0
1	A	209	TYR	2.8
1	A	212	PRO	2.7
1	B	13	LEU	2.5
1	B	54[A]	GLU	2.5
1	A	208	ALA	2.4
1	A	213	LYS	2.3
1	A	160	ASN	2.1
1	A	145	SER	2.0

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

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
1	SNC	A	149	8/9	0.32	0.80	131,168,187,188	0
1	SNC	B	149	8/9	0.91	0.14	59,70,81,85	0

6.3 Carbohydrates ⓘ
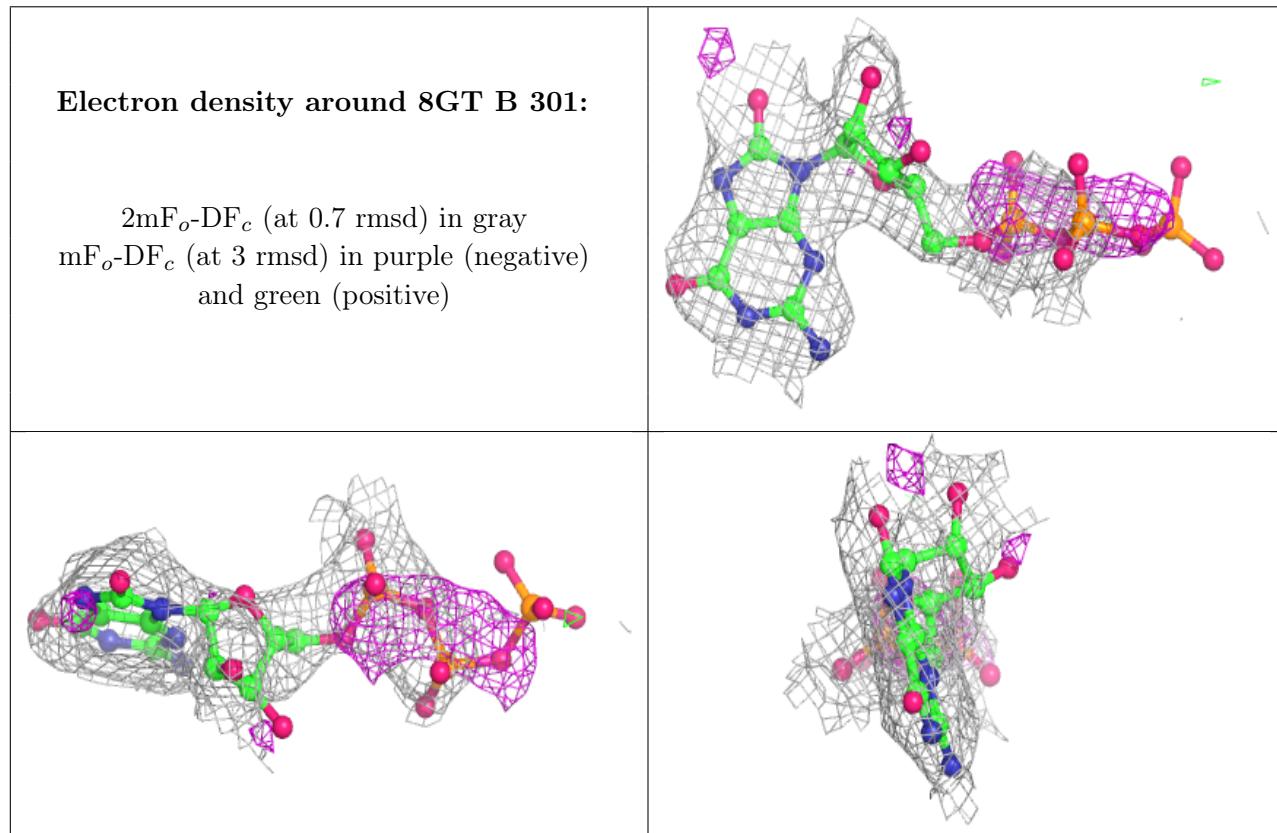
There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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(Å²)	Q<0.9
2	8GT	B	301	33/33	0.92	0.28	56,84,114,118	8
3	ZN	B	302	1/1	1.00	0.04	55,55,55,55	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around 8GT B 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.