WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Feb 5, 2025 – 12:14 PM EST

PDB ID	:	4NCB
Title	:	Structure of Thermus thermophilus Argonaute bound to guide DNA and 19-mer target DNA with Mg2+
Authors	:	Sheng, G.; Zhao, H.; Wang, J.; Rao, Y.; Wang, Y.
Deposited on	:	2013-10-24
Resolution	:	2.19 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

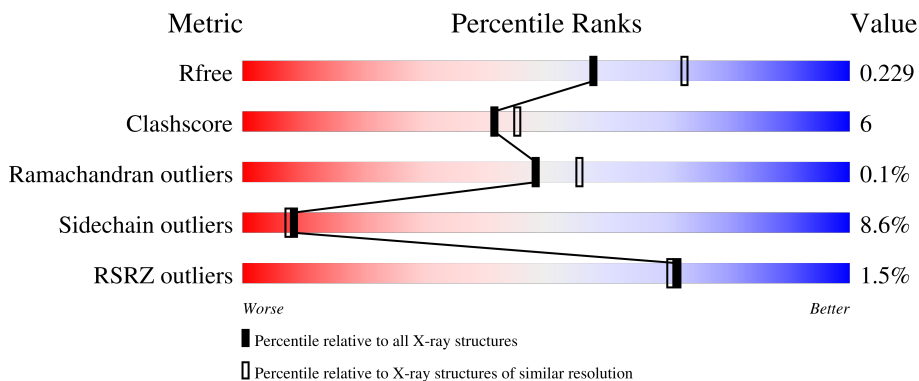|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance ⓘ

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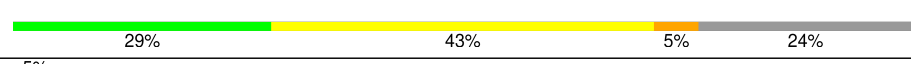*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.19 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.
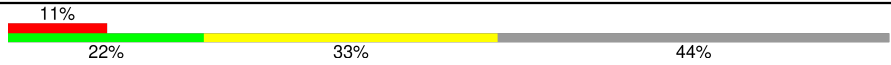
Metric	Percentile Ranks	Value
Rfree		0.229
Clashscore		6
Ramachandran outliers		0.1%
Sidechain outliers		8.6%
RSRZ outliers		1.5%

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$_{free}$	164625	8336 (2.20-2.16)
Clashscore	180529	9404 (2.20-2.16)
Ramachandran outliers	177936	9297 (2.20-2.16)
Sidechain outliers	177891	9297 (2.20-2.16)
RSRZ outliers	164620	8337 (2.20-2.16)

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	685	% 79% 18% • •
1	B	685	2% 79% 17% • •
2	C	21	29% 43% 5% 24%
2	E	21	5% 48% 24% 10% 19%
3	H	9	44% 22% 33%

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Mol	Chain	Length	Quality of chain
3	P	9	11% 22% 33% 44%
4	D	19	5% 47% 26% 5% 21%
5	F	10	90% 10%

2   Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 12444 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 Argonaute.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	676	Total 5275	C 3371	N 992	O 905	S 7	0	0	0
1	B	672	Total 5240	C 3355	N 983	O 895	S 7	0	0	0

- Molecule 2 is a DNA chain called 5'-D(P*TP*GP*AP*GP*GP*TP*AP*GP*TP*AP*GP*GP*TP*TP*GP*TP*AP*TP*AP*GP*T)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	16	Total 338	C 160	N 62	O 100	P 16	0	0	0
2	E	17	Total 359	C 170	N 67	O 105	P 17	0	0	0

- Molecule 3 is a DNA chain called 5'-D(*TP*AP*TP*AP*CP*AP*AP*CP*C)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	P	5	Total 99	C 47	N 19	O 28	P 5	0	5	0
3	H	6	Total 120	C 57	N 24	O 33	P 6	0	0	0

- Molecule 4 is a DNA chain called 5'-D(*TP*AP*TP*AP*CP*AP*AP*CP*CP*TP*AP*CP*TP*AP*CP*CP*TP*CP*G)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	15	Total 320	C 153	N 54	O 97	P 16	0	6	0

- Molecule 5 is a DNA chain called 5'-D(P*TP*AP*CP*TP*AP*CP*CP*TP*CP*G)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	F	10	Total 201	C 96	N 33	O 62	P 10	0	0	0

- Molecule 6 is THYMIDINE-5'-PHOSPHATE (three-letter code: TMP) (formula: $C_{10}H_{15}N_2O_8P$).
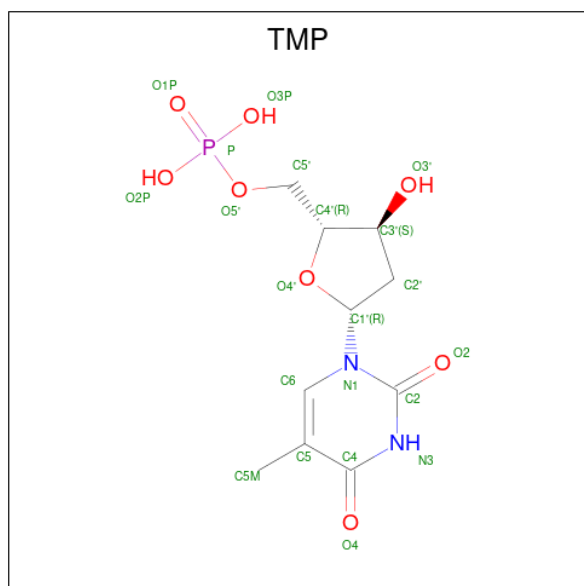
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total 21	C 10	N 2	O 8	P 1	0	0
6	B	1	Total 21	C 10	N 2	O 8	P 1	0	0

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total 1	Mg 1	0	0
7	B	2	Total 2	Mg 2	0	0
7	C	1	Total 1	Mg 1	0	0
7	D	1	Total 1	Mg 1	0	0
7	E	1	Total 1	Mg 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	171	Total 171	O 171	0	0
8	B	174	Total 174	O 174	0	0
8	C	23	Total 23	O 23	0	0
8	P	2	Total 2	O 2	0	0
8	D	24	Total 24	O 24	0	0
8	E	27	Total 27	O 27	0	0
8	F	18	Total 18	O 18	0	0
8	H	5	Total 5	O 5	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.
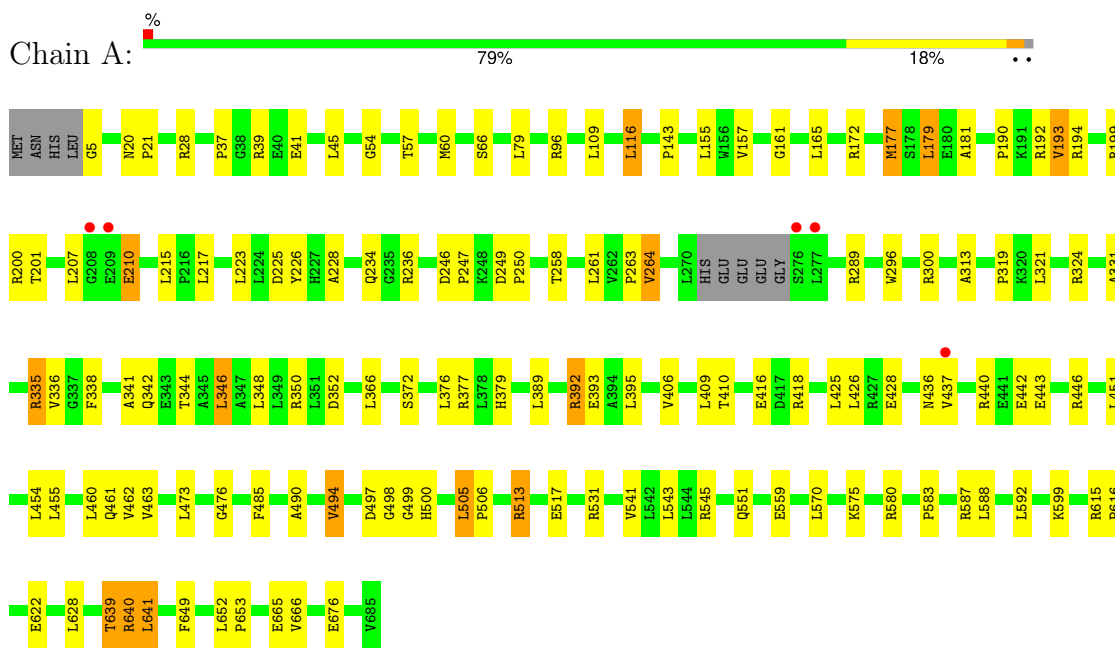
• Molecule 1: Argonaute

• Molecule 1: Argonaute
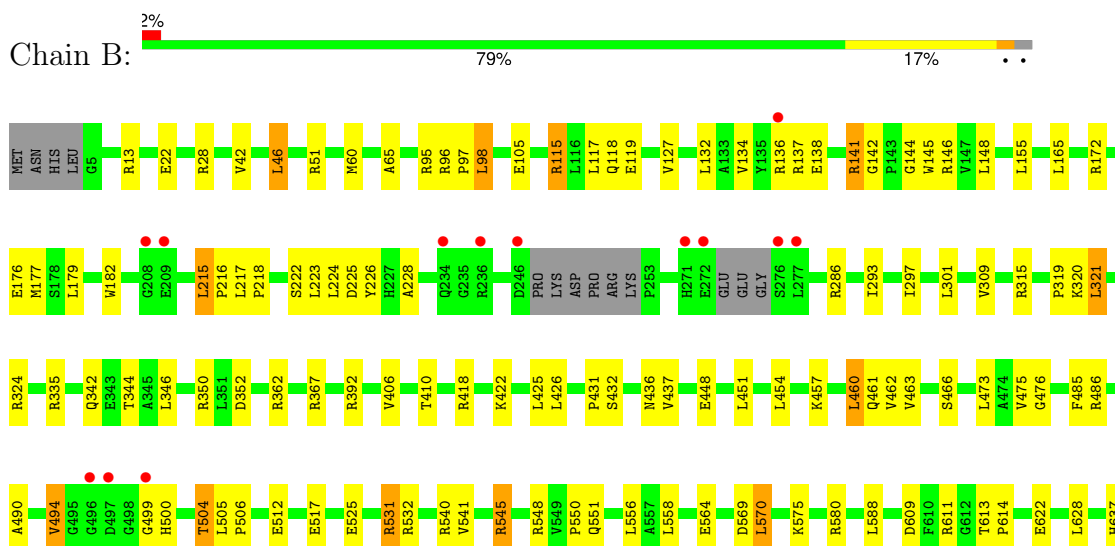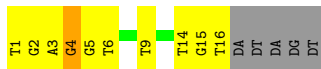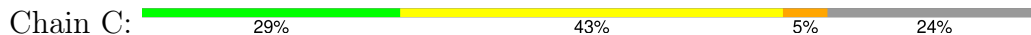
R640 L641 F649 P650 R651 V666 K675 R679 V685

• Molecule 2: 5'-D(P*TP*GP*AP*GP*GP*TP*AP*GP*TP*AP*GP*GP*TP*TP*GP*TP*AP* TP*AP*GP*T)-3'

Chain C:

| 29% | 43% | 5% | 24% |

T1 G2 A3 G4 G5 T6 T9 T14 G15 T16 DA DT DA DG DT

• Molecule 2: 5'-D(P*TP*GP*AP*GP*GP*TP*AP*GP*TP*AP*GP*GP*TP*TP*GP*TP*AP* TP*AP*GP*T)-3'

5%

Chain E:

| 48% | 24% | 10% | 19% |

T1 G2 A3 G4 G5 T9 A10 G11 T14 A17 DT DA DG DT

• Molecule 3: 5'-D(*TP*AP*TP*AP*CP*AP*AP*CP*C)-3'

11%

Chain P:

| 22% | 33% | 44% |

DT DA DT DA C5 A6 A7 C8 C9

• Molecule 3: 5'-D(*TP*AP*TP*AP*CP*AP*AP*CP*C)-3'

Chain H:

| 44% | 22% | 33% |

DT DA DT A4 C5 A6 C9
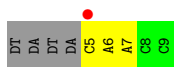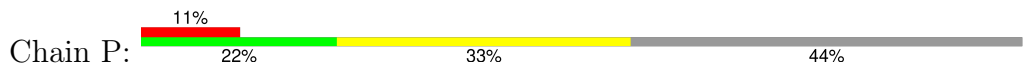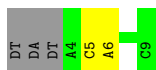
• Molecule 4: 5'-D(*TP*AP*TP*AP*CP*AP*AP*CP*CP*TP*AP*CP*TP*AP*CP*CP*TP*C P*G)-3'

5%

Chain D:

| 47% | 26% | 5% | 21% |

DT DA DT DA C5 A6 A7 C8 C9 T10 A11 C16 G19
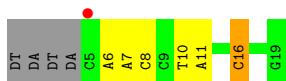
• Molecule 5: 5'-D(P*TP*AP*CP*TP*AP*CP*CP*TP*CP*G)-3'

Chain F:

| 90% | 10% |

T10 G19

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	84.74Å 105.36Å 92.06Å 90.00° 94.25° 90.00°	Depositor
Resolution (Å)	39.22 – 2.19 39.22 – 2.19	Depositor EDS
% Data completeness (in resolution range)	90.6 (39.22-2.19) 90.5 (39.22-2.19)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.59 (at 2.20Å)	Xtriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, R_{free}	0.175 , 0.230 0.175 , 0.229	Depositor DCC
R_{free} test set	3789 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	32.7	Xtriage
Anisotropy	0.332	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 40.5	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	12444	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.39% 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 $< |L| >$, $< L^2 >$ 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: TMP, MG

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	0.30	0/5400	0.52	3/7332 (0.0%)
1	B	0.30	0/5365	0.51	0/7284
2	C	0.78	1/379 (0.3%)	1.23	4/584 (0.7%)
2	E	0.83	1/403 (0.2%)	1.30	4/621 (0.6%)
3	H	0.66	0/134	1.10	0/203
3	P	0.50	0/110	1.07	1/166 (0.6%)
4	D	0.67	0/357	1.27	3/543 (0.6%)
5	F	0.97	1/223 (0.4%)	1.22	0/339
All	All	0.40	3/12371 (0.0%)	0.67	15/17072 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1	DT	OP3-P	-11.05	1.47	1.61
2	E	1	DT	OP3-P	-10.93	1.48	1.61
5	F	10	DT	OP3-P	-10.63	1.48	1.61

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	7[A]	DA	O4'-C1'-N9	7.22	113.05	108.00
4	D	16	DC	O4'-C1'-N1	-6.93	103.15	108.00
2	C	1	DT	OP1-P-OP2	-6.26	110.21	119.60
2	E	1	DT	OP1-P-OP2	-6.12	110.42	119.60
3	P	7[B]	DA	O4'-C1'-N9	6.03	112.22	108.00
2	E	9	DT	O4'-C1'-N1	5.96	112.17	108.00
1	A	116	LEU	CA-CB-CG	5.95	128.98	115.30
4	D	11	DA	O4'-C1'-N9	5.94	112.16	108.00
1	A	247	PRO	N-CA-CB	5.86	110.33	103.30
1	A	250	PRO	N-CA-CB	5.72	110.17	103.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	11	DG	O4'-C1'-N9	5.70	111.99	108.00
2	E	5	DG	O4'-C1'-N9	5.69	111.98	108.00
2	C	9	DT	O4'-C1'-N1	5.42	111.79	108.00
2	C	4	DG	O4'-C4'-C3'	-5.12	102.45	104.50
2	C	6	DT	N3-C4-O4	5.09	122.95	119.90

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	5275	0	5342	69	0
1	B	5240	0	5324	72	0
2	C	338	0	183	7	0
2	E	359	0	194	5	0
3	H	120	0	66	2	0
3	P	99	0	55	2	0
4	D	320	0	180	4	0
5	F	201	0	114	0	0
6	A	21	0	13	3	0
6	B	21	0	13	6	0
7	A	1	0	0	0	0
7	B	2	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
7	E	1	0	0	0	0
8	A	171	0	0	5	0
8	B	174	0	0	4	0
8	C	23	0	0	1	0
8	D	24	0	0	2	0
8	E	27	0	0	0	0
8	F	18	0	0	0	0
8	H	5	0	0	0	0
8	P	2	0	0	1	0
All	All	12444	0	11484	148	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 6.

All (148) 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:D:10[B]:DT:OP2	8:D:203:HOH:O	1.84	0.95
2:C:3:DA:H2'	2:C:4:DG:C8	2.17	0.79
1:A:344:THR:HG21	1:A:460:LEU:HD11	1.71	0.71
2:E:14:DT:H3	3:H:6:DA:H2	1.38	0.71
1:A:39:ARG:NH1	6:B:701:TMP:O2	2.22	0.71
1:B:504:THR:HG21	1:B:525:GLU:HB3	1.72	0.70
1:A:513:ARG:NH2	1:A:551:GLN:O	2.26	0.69
1:A:346:LEU:HG	1:A:454:LEU:HD11	1.74	0.68
1:B:532:ARG:HH12	1:B:679:ARG:HH12	1.39	0.68
1:A:498:GLY:HA3	1:A:641:LEU:HD11	1.74	0.68
1:B:512:GLU:OE2	1:B:545:ARG:NH2	2.26	0.67
1:B:225:ASP:HA	1:B:228:ALA:HB3	1.78	0.66
1:A:494:VAL:HG22	1:A:500:HIS:HB2	1.76	0.66
2:C:14:DT:H3	4:D:6[A]:DA:H2	1.44	0.66
1:A:599:LYS:NZ	8:A:870:HOH:O	2.28	0.65
1:A:473:LEU:HB3	1:A:541:VAL:HG12	1.79	0.65
4:D:16:DC:OP1	8:D:212:HOH:O	2.15	0.64
1:A:236:ARG:NH1	8:A:954:HOH:O	2.29	0.64
1:A:190:PRO:HG3	1:A:263:PRO:HB3	1.80	0.64
1:B:335:ARG:NH2	1:B:448:GLU:OE2	2.30	0.64
1:B:136:ARG:HH12	1:B:293:ILE:HG12	1.63	0.63
1:B:115:ARG:NH2	8:B:915:HOH:O	2.32	0.62
1:A:583:PRO:HD3	1:A:588:LEU:HD13	1.82	0.62
2:E:3:DA:H2'	2:E:4:DG:C8	2.35	0.62
1:B:218:PRO:HD2	6:B:701:TMP:HN3	1.64	0.61
1:A:392:ARG:NH1	1:B:525:GLU:OE1	2.34	0.61
1:B:609:ASP:O	8:B:885:HOH:O	2.16	0.59
2:C:15:DG:N2	3:P:5[B]:DC:O2	2.27	0.59
2:C:16:DT:OP2	8:C:206:HOH:O	2.17	0.59
1:A:161:GLY:O	8:A:911:HOH:O	2.17	0.58
1:A:210:GLU:HG3	1:A:215:LEU:HD23	1.87	0.56
1:A:313:ALA:HB1	1:A:592:LEU:HD12	1.86	0.56
1:A:497:ASP:OD1	1:A:497:ASP:N	2.37	0.56
1:A:440:ARG:HB2	1:A:443:GLU:HG3	1.88	0.56
1:B:177:MET:HE3	1:B:182:TRP:HA	1.87	0.56
1:A:28:ARG:CZ	1:A:96:ARG:HD3	2.36	0.56
1:A:331:ALA:O	1:A:335:ARG:NH1	2.40	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:506:PRO:HG2	1:A:666:VAL:HG21	1.89	0.54
1:B:136:ARG:NH1	1:B:293:ILE:HG12	2.22	0.54
1:B:506:PRO:HG2	1:B:666:VAL:HG21	1.89	0.54
1:A:665:GLU:HG2	8:A:821:HOH:O	2.06	0.54
1:A:389:LEU:HD12	1:B:564:GLU:HG2	1.90	0.54
2:C:14:DT:H3	3:P:6[B]:DA:H2	1.54	0.53
1:A:392:ARG:NH2	1:A:428:GLU:OE2	2.37	0.53
1:B:98:LEU:HG	1:B:105:GLU:HB3	1.90	0.53
1:B:425:LEU:HD12	1:B:432:SER:HB3	1.90	0.53
1:A:350:ARG:HD2	1:A:352:ASP:OD1	2.09	0.52
1:A:179:LEU:HD13	1:A:258:THR:HG22	1.92	0.51
1:B:215:LEU:HD13	1:B:216:PRO:HD2	1.92	0.51
1:B:218:PRO:HD2	6:B:701:TMP:N3	2.26	0.51
1:A:341:ALA:HB2	1:A:372:SER:HB3	1.93	0.51
1:B:342:GLN:O	1:B:344:THR:HG23	2.11	0.50
1:B:640:ARG:HG3	1:B:649:PHE:CE1	2.45	0.50
1:B:146:ARG:NH1	1:B:148:LEU:HD21	2.26	0.50
1:B:226:TYR:CZ	6:B:701:TMP:H51	2.46	0.50
1:A:377:ARG:HD2	1:A:379:HIS:NE2	2.26	0.50
1:B:144:GLY:HA3	1:B:177:MET:HE1	1.94	0.50
1:A:41:GLU:O	1:A:45:LEU:HB2	2.12	0.50
1:B:461:GLN:HG3	1:B:499:GLY:O	2.10	0.50
1:B:494:VAL:HG22	1:B:500:HIS:HB2	1.92	0.50
1:B:531:ARG:HB3	1:B:531:ARG:HH11	1.77	0.50
1:B:570:LEU:HD13	1:B:622:GLU:HB3	1.94	0.49
1:A:193:VAL:HG11	1:A:261:LEU:HD13	1.95	0.49
1:A:446:ARG:HG3	2:C:2:DG:C8	2.48	0.49
1:B:225:ASP:OD1	1:B:225:ASP:N	2.45	0.49
1:B:319:PRO:CG	1:B:640:ARG:HD2	2.42	0.48
1:B:319:PRO:HB3	1:B:637:HIS:CG	2.48	0.48
1:B:410:THR:O	1:B:436:ASN:HA	2.13	0.48
1:B:575:LYS:O	1:B:651:ARG:NH2	2.42	0.48
1:A:321:LEU:HD22	1:A:463:VAL:HB	1.94	0.48
1:B:28:ARG:HD3	1:B:96:ARG:HB2	1.94	0.48
1:B:226:TYR:CE1	6:B:701:TMP:H51	2.49	0.48
1:A:60:MET:HB3	1:A:60:MET:HE2	1.54	0.48
1:A:348:LEU:HD11	1:A:409:LEU:HG	1.95	0.48
1:A:192:ARG:HB3	1:A:264:VAL:HG22	1.96	0.47
1:B:418:ARG:O	1:B:422:LYS:HG3	2.14	0.47
1:A:5:GLY:N	8:A:843:HOH:O	2.46	0.47
1:A:575:LYS:HD3	1:A:652:LEU:HD11	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:395:LEU:HD11	1:A:425:LEU:HD23	1.96	0.47
1:A:346:LEU:HD22	1:A:376:LEU:HD11	1.96	0.47
1:B:46:LEU:HD12	1:B:46:LEU:HA	1.80	0.47
1:A:226:TYR:CZ	6:A:701:TMP:H51	2.50	0.47
1:B:422:LYS:NZ	2:E:1:DT:OP1	2.48	0.47
1:B:117:LEU:HD23	1:B:132:LEU:HD22	1.96	0.47
1:B:28:ARG:HH11	1:B:96:ARG:HB2	1.79	0.46
1:A:461:GLN:HG3	1:A:499:GLY:O	2.15	0.46
1:B:611:ARG:HD3	2:E:5:DG:C1'	2.46	0.46
1:A:350:ARG:HD3	1:A:409:LEU:HD12	1.98	0.45
1:B:115:ARG:NH1	1:B:119:GLU:OE2	2.50	0.45
1:A:410:THR:O	1:A:436:ASN:HA	2.16	0.45
1:B:22:GLU:OE1	1:B:95:ARG:NH1	2.45	0.45
1:A:57:THR:HG22	1:A:66:SER:OG	2.17	0.45
1:A:505:LEU:HD12	1:B:675:LYS:HB2	1.99	0.45
1:B:141:ARG:HG3	1:B:142:GLY:N	2.32	0.45
1:A:226:TYR:CE1	6:A:701:TMP:H51	2.52	0.45
1:A:194:ARG:HB2	1:A:201:THR:HG22	1.98	0.44
1:B:350:ARG:HD2	1:B:352:ASP:OD1	2.17	0.44
1:A:393:GLU:OE1	1:B:531:ARG:NE	2.50	0.44
1:A:615:ARG:HA	1:A:616:PRO:HD2	1.85	0.44
1:B:344:THR:HG21	1:B:460:LEU:HD11	1.99	0.44
1:B:362:ARG:HD2	8:B:906:HOH:O	2.16	0.44
2:C:4:DG:H2'	2:C:5:DG:C8	2.52	0.44
1:A:392:ARG:HD3	1:A:428:GLU:HG2	2.00	0.44
1:B:569:ASP:OD2	8:B:924:HOH:O	2.21	0.44
1:B:142:GLY:HA3	1:B:145:TRP:CE2	2.53	0.44
1:B:611:ARG:HD3	2:E:5:DG:H1'	2.00	0.43
1:A:246:ASP:HB3	1:A:249:ASP:O	2.18	0.43
1:B:286:ARG:HD2	1:B:613:THR:HG21	2.01	0.43
8:P:101:HOH:O	4:D:8[A]:DC:H1'	2.17	0.43
1:B:548:ARG:O	1:B:550:PRO:HD3	2.18	0.43
1:A:207:LEU:HD23	1:A:207:LEU:HA	1.87	0.43
1:A:342:GLN:O	1:A:344:THR:HG23	2.19	0.43
1:A:37:PRO:HB3	1:A:45:LEU:HD23	2.01	0.43
1:A:319:PRO:CG	1:A:640:ARG:HD2	2.48	0.43
1:B:588:LEU:HD21	1:B:614:PRO:HG2	2.00	0.43
1:A:640:ARG:HG3	1:A:649:PHE:CD1	2.54	0.42
1:B:217:LEU:HD22	6:B:701:TMP:C2	2.54	0.42
1:A:476:GLY:O	1:A:490:ALA:HA	2.19	0.42
1:B:60:MET:HE2	1:B:65:ALA:HB2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:177:MET:HG3	1:A:181:ALA:HB3	2.01	0.42
1:B:476:GLY:O	1:B:490:ALA:HA	2.19	0.42
1:B:13:ARG:O	1:B:309:VAL:HG13	2.20	0.42
1:B:222:SER:HB2	1:B:225:ASP:OD1	2.19	0.42
1:B:431:PRO:HB2	1:B:457:LYS:HB3	2.01	0.42
1:A:338:PHE:CZ	1:A:455:LEU:HD13	2.54	0.42
1:B:319:PRO:HG2	1:B:640:ARG:HD2	2.01	0.42
1:A:639:THR:CG2	1:A:640:ARG:HH21	2.33	0.41
1:B:177:MET:HE2	1:B:182:TRP:HE3	1.86	0.41
1:B:321:LEU:HD22	1:B:463:VAL:HB	2.03	0.41
1:A:20:ASN:HB2	1:A:21:PRO:HD2	2.02	0.41
1:B:473:LEU:HB3	1:B:541:VAL:HG12	2.03	0.41
1:B:517:GLU:CD	1:B:517:GLU:H	2.23	0.41
1:A:225:ASP:HA	1:A:228:ALA:HB3	2.03	0.41
1:B:127:VAL:CG1	1:B:134:VAL:HG13	2.51	0.41
1:A:109:LEU:HB3	1:A:157:VAL:HG21	2.03	0.41
1:A:300:ARG:HA	1:A:300:ARG:HD3	1.85	0.41
1:A:366:LEU:HD22	1:A:376:LEU:HD23	2.03	0.41
1:B:95:ARG:O	1:B:97:PRO:HD3	2.20	0.41
1:A:200:ARG:NH2	6:A:701:TMP:O3P	2.46	0.41
1:A:639:THR:HA	1:A:653:PRO:HA	2.02	0.41
1:B:138:GLU:OE1	1:B:141:ARG:HB2	2.21	0.41
1:A:416:GLU:H	1:A:416:GLU:CD	2.23	0.40
1:B:320:LYS:HB2	1:B:466:SER:HB3	2.02	0.40
1:A:485:PHE:HB3	1:B:485:PHE:HB3	2.04	0.40
3:H:5:DC:H2"	3:H:6:DA:C8	2.56	0.40
1:B:505:LEU:HD23	1:B:505:LEU:HA	1.96	0.40
1:A:54:GLY:O	1:A:57:THR:HG23	2.21	0.40
1:B:51:ARG:NH2	1:B:118:GLN:OE1	2.54	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	672/685 (98%)	648 (96%)	23 (3%)	1 (0%)	48	55
1	B	666/685 (97%)	650 (98%)	16 (2%)	0	100	100
All	All	1338/1370 (98%)	1298 (97%)	39 (3%)	1 (0%)	48	55

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	143	PRO

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	521/549 (95%)	476 (91%)	45 (9%)	8	7
1	B	518/549 (94%)	474 (92%)	44 (8%)	8	8
All	All	1039/1098 (95%)	950 (91%)	89 (9%)	8	7

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	79	LEU
1	A	116	LEU
1	A	155	LEU
1	A	165	LEU
1	A	172	ARG
1	A	177	MET
1	A	179	LEU
1	A	193	VAL
1	A	199	ARG
1	A	210	GLU
1	A	217	LEU
1	A	223	LEU
1	A	234	GLN
1	A	264	VAL
1	A	289	ARG

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Mol	Chain	Res	Type
1	A	296	TRP
1	A	324	ARG
1	A	335	ARG
1	A	336	VAL
1	A	346	LEU
1	A	392	ARG
1	A	406	VAL
1	A	418	ARG
1	A	426	LEU
1	A	437	VAL
1	A	442	GLU
1	A	451	LEU
1	A	462	VAL
1	A	494	VAL
1	A	505	LEU
1	A	513	ARG
1	A	517	GLU
1	A	531	ARG
1	A	543	LEU
1	A	545	ARG
1	A	559	GLU
1	A	570	LEU
1	A	580	ARG
1	A	587	ARG
1	A	622	GLU
1	A	628	LEU
1	A	639	THR
1	A	640	ARG
1	A	641	LEU
1	A	676	GLU
1	B	42	VAL
1	B	46	LEU
1	B	98	LEU
1	B	115	ARG
1	B	137	ARG
1	B	141	ARG
1	B	155	LEU
1	B	165	LEU
1	B	172	ARG
1	B	176	GLU
1	B	179	LEU
1	B	215	LEU

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Mol	Chain	Res	Type
1	B	223	LEU
1	B	224	LEU
1	B	297	ILE
1	B	301	LEU
1	B	315	ARG
1	B	321	LEU
1	B	324	ARG
1	B	346	LEU
1	B	367	ARG
1	B	392	ARG
1	B	406	VAL
1	B	426	LEU
1	B	437	VAL
1	B	451	LEU
1	B	454	LEU
1	B	460	LEU
1	B	462	VAL
1	B	475	VAL
1	B	486	ARG
1	B	494	VAL
1	B	504	THR
1	B	531	ARG
1	B	540	ARG
1	B	545	ARG
1	B	551	GLN
1	B	556	LEU
1	B	558	LEU
1	B	570	LEU
1	B	580	ARG
1	B	628	LEU
1	B	640	ARG
1	B	641	LEU

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 ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 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	$\#|Z| > 2$
6	TMP	A	701	-	22,22,22	0.69	0	32,33,33	1.13	3 (9%)
6	TMP	B	701	-	22,22,22	0.71	0	32,33,33	1.10	2 (6%)

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
6	TMP	A	701	-	-	0/10/22/22	0/2/2/2
6	TMP	B	701	-	-	0/10/22/22	0/2/2/2

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	701	TMP	O4-C4-C5	-3.12	121.34	124.92
6	B	701	TMP	O4-C4-C5	-2.97	121.52	124.92
6	B	701	TMP	O3P-P-O2P	2.73	118.06	107.80
6	A	701	TMP	O2P-P-O1P	2.21	119.44	110.83
6	A	701	TMP	C6-C5-C4	2.15	119.79	118.02

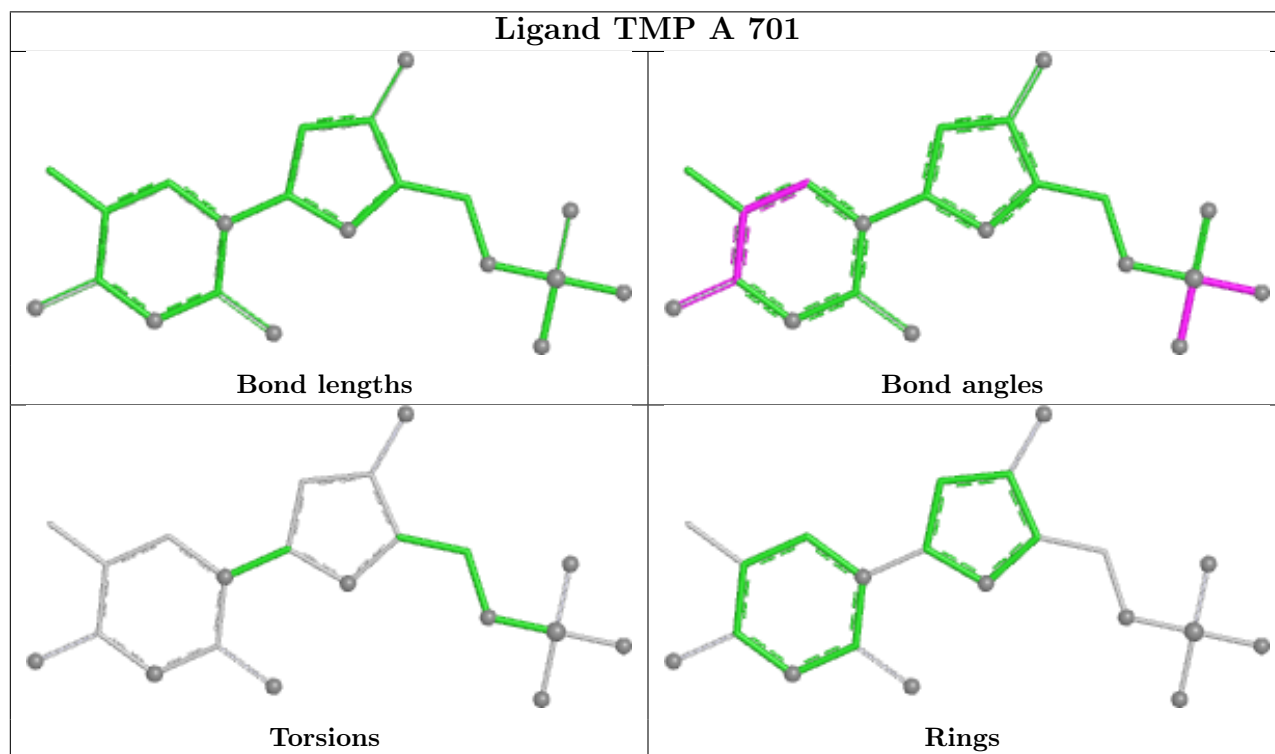There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	701	TMP	3	0
6	B	701	TMP	6	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 TMP A 701

Bond lengths

Bond angles

Torsions

Rings

Ligand TMP B 701

Bond lengths

Bond angles

Torsions

Rings
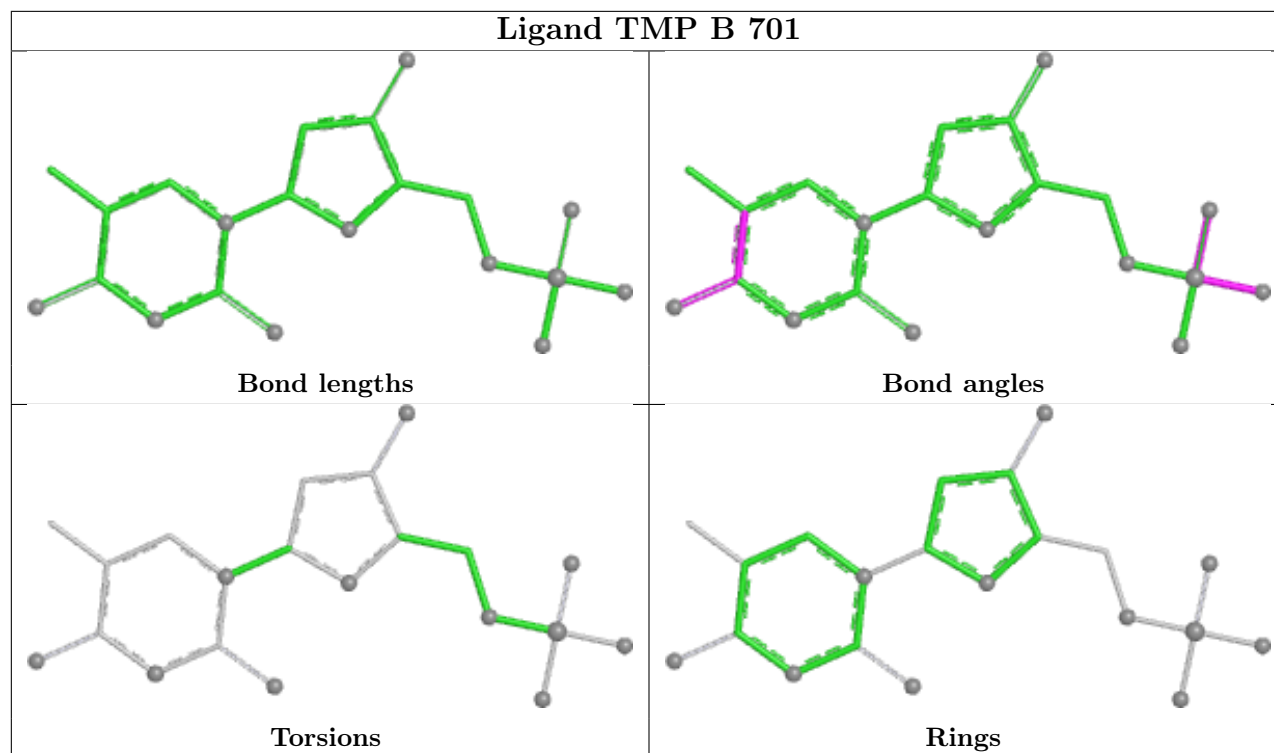
5.7 Other polymers ⓘ

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(Å^2)	Q<0.9
1	A	676/685 (98%)	-0.31	5 (0%) 84	83	14, 30, 63, 150	0
1	B	672/685 (98%)	-0.30	13 (1%) 66	65	12, 30, 72, 131	0
2	C	16/21 (76%)	-0.82	0 100	100	18, 25, 75, 84	0
2	E	17/21 (80%)	-0.79	1 (5%) 29	29	15, 20, 67, 133	0
3	H	6/9 (66%)	-0.12	0 100	100	36, 50, 66, 71	0
3	P	5/9 (55%)	1.15	1 (20%) 3	3	21, 26, 53, 97	5 (100%)
4	D	15/19 (78%)	-0.51	1 (6%) 25	25	15, 26, 35, 74	6 (40%)
5	F	10/10 (100%)	-1.19	0 100	100	22, 24, 27, 29	0
All	All	1417/1459 (97%)	-0.32	21 (1%) 71	70	12, 30, 67, 150	11 (0%)

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	272	GLU	5.0
1	B	277	LEU	4.4
3	P	5[B]	DC	3.8
1	B	136	ARG	3.5
1	A	208	GLY	3.4
1	B	276	SER	3.3
4	D	5[A]	DC	3.2
1	B	246	ASP	3.2
1	A	437	VAL	3.0
1	A	209	GLU	3.0
1	B	496	GLY	2.9
1	B	271	HIS	2.8
1	A	276	SER	2.7
1	B	497	ASP	2.6
1	B	499	GLY	2.6
1	B	208	GLY	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	234	GLN	2.4
1	B	236	ARG	2.4
1	A	277	LEU	2.2
1	B	209	GLU	2.2
2	E	17	DA	2.1

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

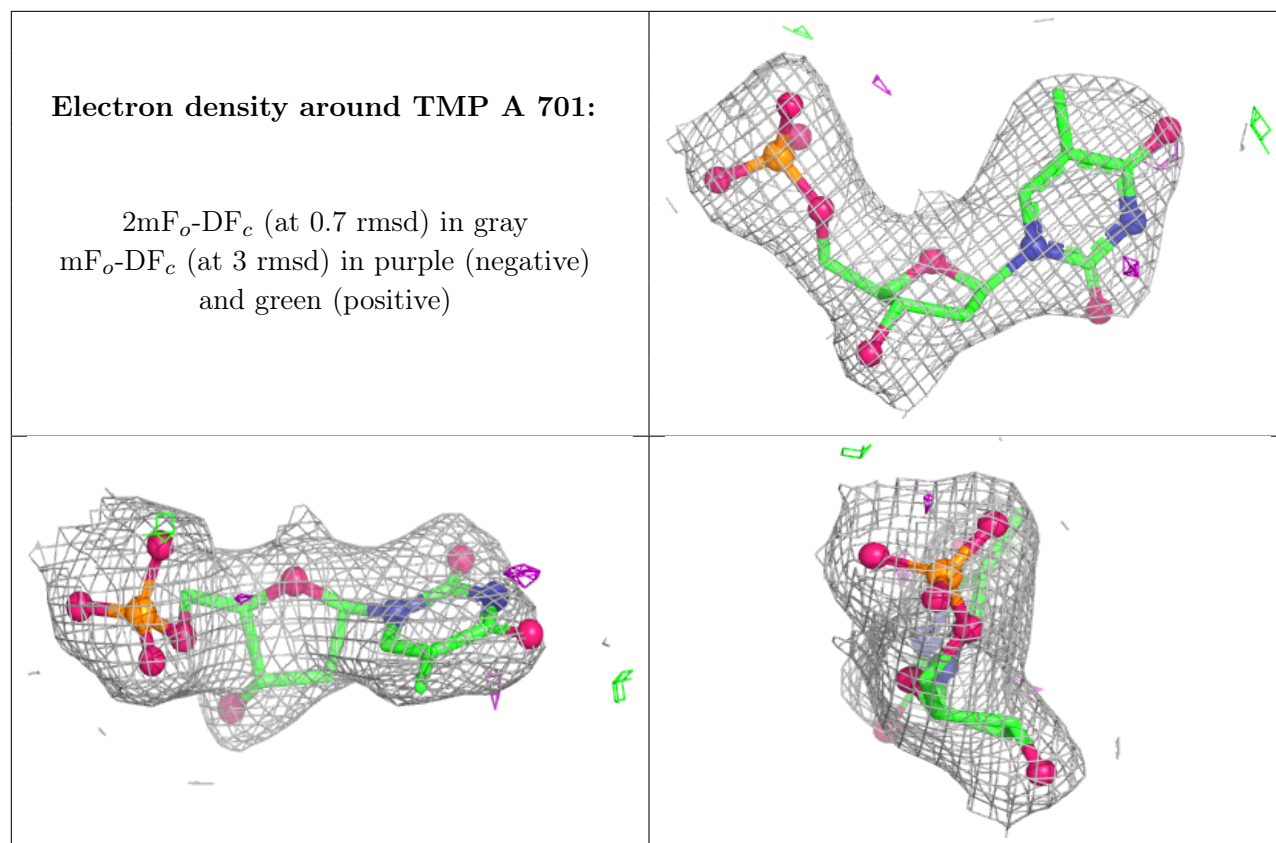There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

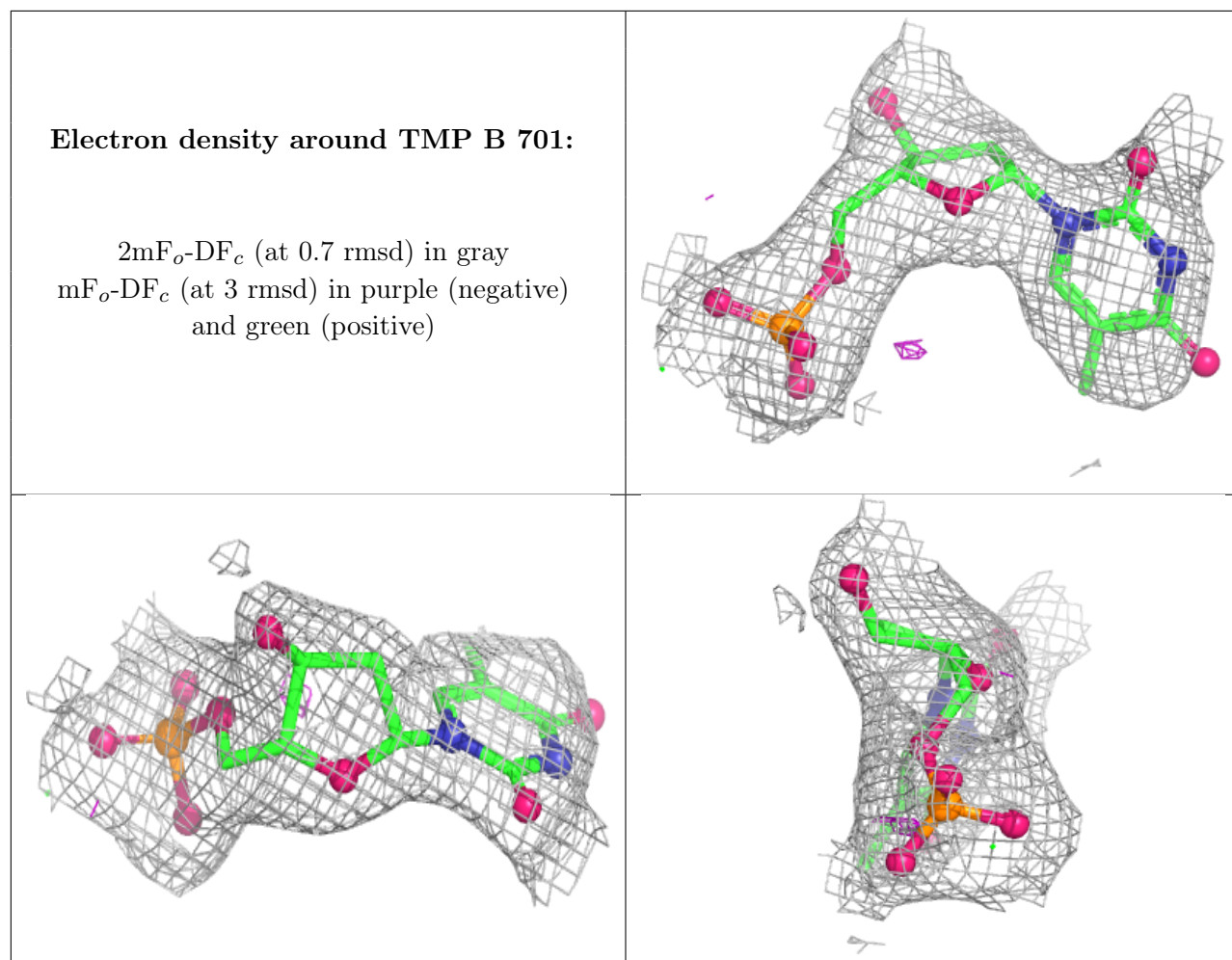There are no monosaccharides in this entry.

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(Å^2)	Q<0.9
7	MG	A	702	1/1	0.93	0.06	27,27,27,27	0
6	TMP	A	701	21/21	0.95	0.08	43,45,58,78	0
6	TMP	B	701	21/21	0.96	0.07	37,47,63,71	0
7	MG	B	703	1/1	0.96	0.04	25,25,25,25	0
7	MG	D	101	1/1	0.97	0.04	24,24,24,24	0
7	MG	E	101	1/1	0.97	0.04	24,24,24,24	0
7	MG	B	702	1/1	0.99	0.05	24,24,24,24	0
7	MG	C	101	1/1	0.99	0.02	20,20,20,20	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 TMP A 701:

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

Electron density around TMP B 701:

$2mF_o$-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.