



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 05:26 AM UTC

PDB ID : 4TL9 / pdb_00004tl9
Title : Crystal structure of N-terminal C1 domain of KaiC
Authors : Abe, J.; Hiyama, T.B.; Mukaiyama, A.; Son, S.; Akiyama, S.
Deposited on : 2014-05-29
Resolution : 1.82 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:

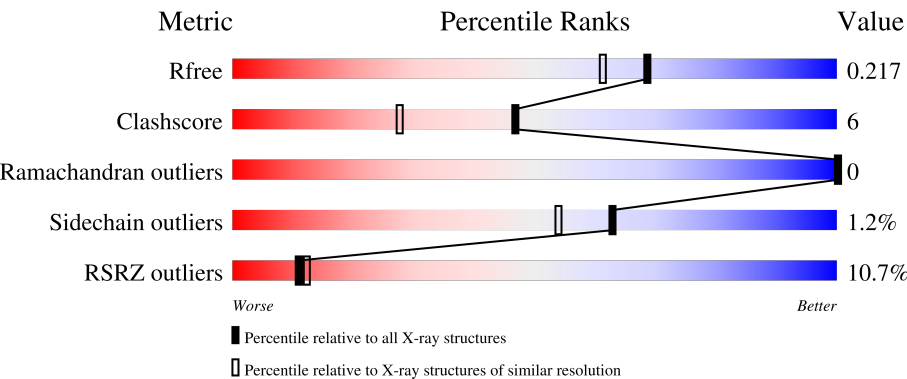
MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 1.82 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}	180053	1112 (1.82-1.82)
Clashscore	190562	1148 (1.82-1.82)
Ramachandran outliers	187476	1140 (1.82-1.82)
Sidechain outliers	187428	1140 (1.82-1.82)
RSRZ outliers	180081	1112 (1.82-1.82)

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 $\leq 5\%$. 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	253	11% 73% 14% 13%
1	B	253	5% 75% 11% 14%
1	C	253	9% 75% 13% 12%
1	D	253	7% 76% 10% 13%
1	E	253	11% 74% 12% 14%

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Mol	Chain	Length	Quality of chain
1	F	253	12% 72% 12% 15%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11933 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 Circadian clock protein kinase KaiC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	220	Total	C	N	O	S	0	11	0
			1815	1161	310	340	4			
1	B	218	Total	C	N	O	S	0	11	0
			1801	1149	314	333	5			
1	C	222	Total	C	N	O	S	0	10	0
			1826	1166	314	341	5			
1	D	220	Total	C	N	O	S	0	8	0
			1789	1140	308	336	5			
1	E	218	Total	C	N	O	S	0	10	0
			1785	1139	305	337	4			
1	F	214	Total	C	N	O	S	0	9	0
			1757	1123	303	327	4			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	48	THR	SER	engineered mutation	UNP Q79PF4
B	48	THR	SER	engineered mutation	UNP Q79PF4
C	48	THR	SER	engineered mutation	UNP Q79PF4
D	48	THR	SER	engineered mutation	UNP Q79PF4
E	48	THR	SER	engineered mutation	UNP Q79PF4
F	48	THR	SER	engineered mutation	UNP Q79PF4

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

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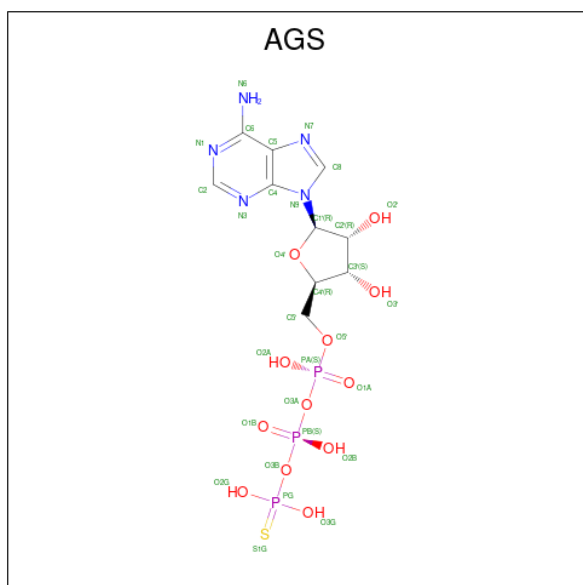
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	1	Total	Mg	0	0
			1	1		
2	E	1	Total	Mg	0	0
			1	1		
2	F	1	Total	Mg	0	0
			1	1		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		
3	C	1	Total	Cl	0	0
			1	1		
3	D	1	Total	Cl	0	0
			1	1		
3	E	1	Total	Cl	0	0
			1	1		
3	F	1	Total	Cl	0	0
			1	1		

- Molecule 4 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (CCD ID: AGS) (formula: C₁₀H₁₆N₅O₁₂P₃S).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
4	A	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0
4	B	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0
4	C	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0
4	D	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0
4	E	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0
4	F	1	Total 31	C 10	N 5	O 12	P 3	S 1	0	0

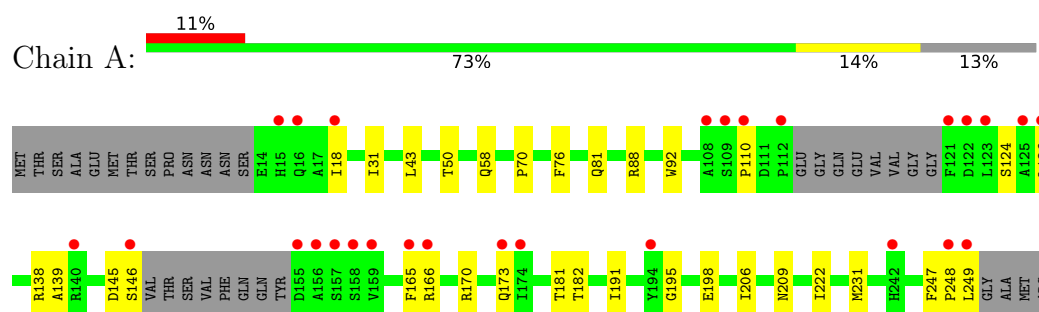
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	146	Total 146	O 146	0	0
5	B	192	Total 192	O 192	0	0
5	C	175	Total 175	O 175	0	0
5	D	181	Total 181	O 181	0	0
5	E	138	Total 138	O 138	0	0
5	F	130	Total 130	O 130	0	0

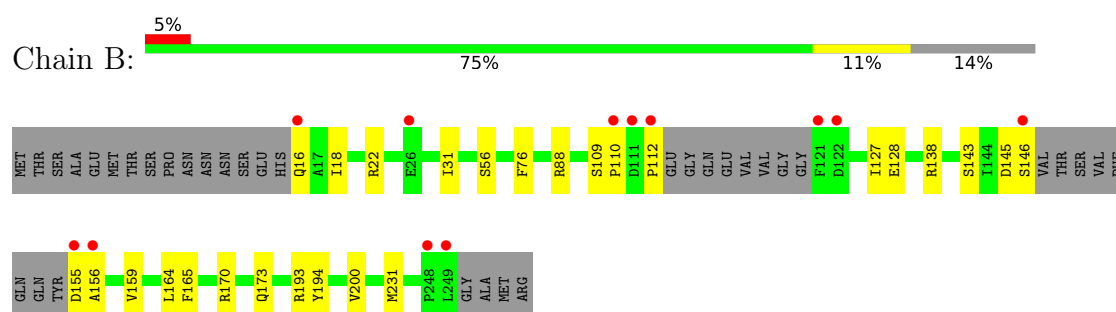
3 Residue-property plots [i](#)

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.

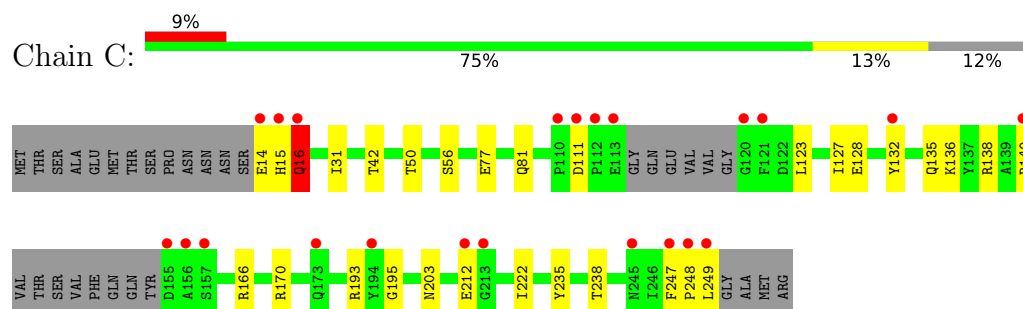
- Molecule 1: Circadian clock protein kinase KaiC



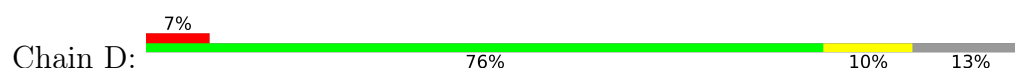
- Molecule 1: Circadian clock protein kinase KaiC

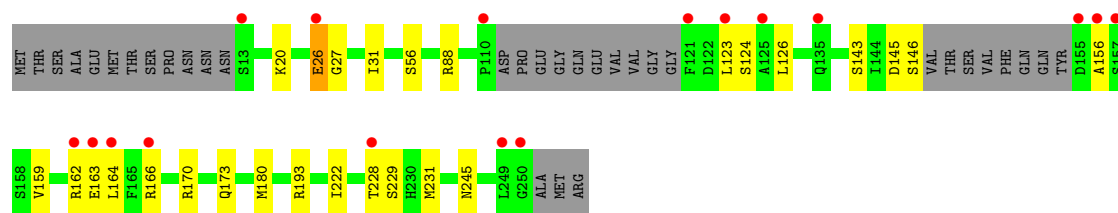


- Molecule 1: Circadian clock protein kinase KaiC

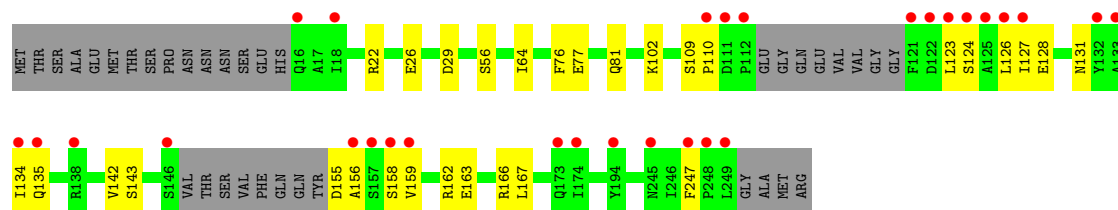
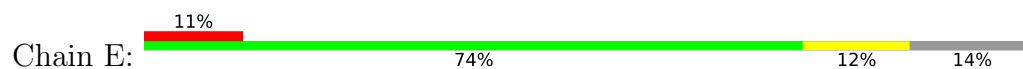


- Molecule 1: Circadian clock protein kinase KaiC

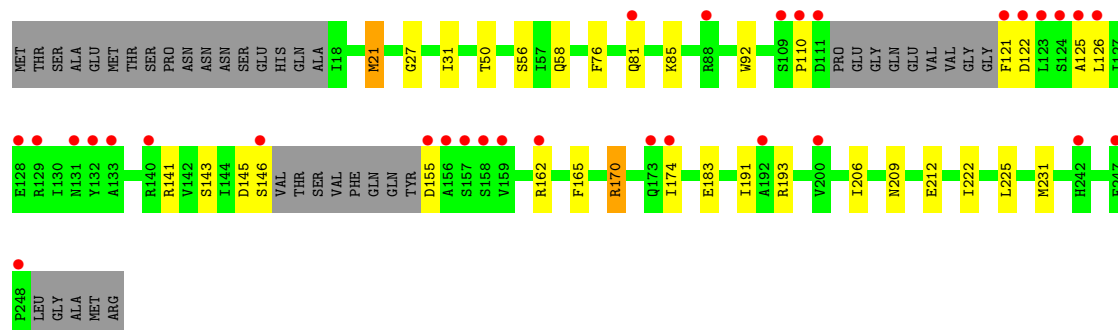




● Molecule 1: Circadian clock protein kinase KaiC



● Molecule 1: Circadian clock protein kinase KaiC



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	80.13Å 133.82Å 151.17Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.98 – 1.82 38.98 – 1.82	Depositor EDS
% Data completeness (in resolution range)	99.0 (38.98-1.82) 98.9 (38.98-1.82)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.07 (at 1.82Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, R_{free}	0.181 , 0.217 0.185 , 0.217	Depositor DCC
R_{free} test set	7219 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	21.8	Xtriage
Anisotropy	0.027	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 48.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11933	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.23% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, AGS, CL

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	0.48	0/1868	0.74	0/2518
1	B	0.53	0/1854	0.78	0/2495
1	C	0.55	0/1877	0.83	4/2528 (0.2%)
1	D	0.55	0/1835	0.77	1/2470 (0.0%)
1	E	0.56	0/1837	0.84	4/2474 (0.2%)
1	F	0.58	0/1802	0.83	0/2426
All	All	0.54	0/11073	0.80	9/14911 (0.1%)

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	C	0	1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	16	GLN	CA-CB-CG	-9.79	94.53	114.10
1	E	109	SER	CA-C-N	7.52	129.24	119.84
1	E	109	SER	C-N-CA	7.52	129.24	119.84
1	D	193	ARG	N-CA-C	5.94	117.75	111.28
1	C	193	ARG	N-CA-C	5.78	117.58	111.28
1	C	16	GLN	CB-CA-C	5.51	119.64	109.71
1	C	16	GLN	N-CA-CB	-5.09	103.01	110.85
1	E	247	PHE	CA-C-N	5.00	124.61	119.56
1	E	247	PHE	C-N-CA	5.00	124.61	119.56

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	16	GLN	Sidechain

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	1815	0	1849	24	0
1	B	1801	0	1844	22	0
1	C	1826	0	1854	28	0
1	D	1789	0	1816	20	0
1	E	1785	0	1819	20	1
1	F	1757	0	1796	26	1
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
4	A	31	0	12	0	0
4	B	31	0	12	0	0
4	C	31	0	12	0	0
4	D	31	0	12	0	0
4	E	31	0	12	0	0
4	F	31	0	12	0	0
5	A	146	0	0	1	0
5	B	192	0	0	4	0
5	C	175	0	0	5	0
5	D	181	0	0	3	0
5	E	138	0	0	0	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	F	130	0	0	0	1
All	All	11933	0	11050	126	2

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 (126) 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:D:164:LEU:HD11	1:D:180[B]:MET:HE1	1.54	0.89
1:B:193:ARG:NH1	1:C:195:GLY:O	2.14	0.80
1:A:173:GLN:NE2	5:A:507:HOH:O	2.01	0.79
1:A:124:SER:OG	1:A:166:ARG:NH1	2.14	0.79
1:A:195:GLY:O	1:F:193:ARG:NH2	2.20	0.75
1:E:131:ASN:OD1	1:E:135:GLN:NE2	2.19	0.75
1:A:31[B]:ILE:HD11	1:A:248:PRO:HG3	1.69	0.74
1:C:212:GLU:OE1	5:C:477:HOH:O	2.06	0.72
1:C:238:THR:HG23	1:C:247:PHE:HZ	1.53	0.72
1:F:81:GLN:H	1:F:81:GLN:CD	2.00	0.70
1:F:183:GLU:OE2	1:F:193:ARG:NH1	2.24	0.70
1:B:112:PRO:O	1:C:166:ARG:NH1	2.25	0.69
1:E:110:PRO:HG3	1:F:162:ARG:HD3	1.76	0.68
1:C:238:THR:HG23	1:C:247:PHE:CZ	2.28	0.68
1:C:15:HIS:C	1:C:16:GLN:HG2	2.19	0.67
1:B:156:ALA:HB3	1:B:159:VAL:HG23	1.79	0.65
1:A:247:PHE:O	1:A:249:LEU:HA	1.97	0.65
1:E:22:ARG:NH1	1:E:29:ASP:OD2	2.30	0.64
1:E:127:ILE:HD12	1:E:127:ILE:H	1.64	0.63
1:F:76:PHE:CE1	1:F:126:LEU:HD21	2.35	0.62
1:B:165:PHE:HB2	1:B:200:VAL:HG21	1.82	0.61
1:B:193:ARG:NH2	5:B:545:HOH:O	2.34	0.61
1:B:76:PHE:O	1:B:110:PRO:HD3	2.02	0.60
1:A:127:ILE:HD13	1:A:170:ARG:HG3	1.83	0.60
1:D:20:LYS:NZ	1:D:228:THR:HG21	2.18	0.59
1:E:124:SER:HA	1:E:127:ILE:HD13	1.83	0.59
1:A:58:GLN:HG2	1:A:92:TRP:CH2	2.39	0.58
1:E:110:PRO:HG2	1:F:165:PHE:CE2	2.39	0.58
1:B:22:ARG:NH1	5:B:578:HOH:O	2.37	0.58
1:D:56[A]:SER:HB2	1:D:143:SER:HB3	1.85	0.57
1:F:58:GLN:HG3	1:F:92:TRP:CH2	2.40	0.57
1:E:162:ARG:O	1:E:166:ARG:HG3	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:124:SER:OG	1:D:166:ARG:NH2	2.38	0.56
1:D:156:ALA:HB3	1:D:159:VAL:HG23	1.88	0.56
1:B:155:ASP:OD1	1:B:194:TYR:HE1	1.88	0.56
1:C:77:GLU:OE1	1:D:162:ARG:NH1	2.38	0.56
1:E:124:SER:HA	1:E:127:ILE:CD1	2.35	0.55
1:B:76:PHE:O	1:B:109:SER:HA	2.07	0.55
1:C:248:PRO:O	1:C:249:LEU:HD12	2.08	0.54
1:D:228:THR:HG22	1:D:229:SER:N	2.23	0.54
1:C:128:GLU:OE2	1:C:170:ARG:NH1	2.41	0.53
1:E:64:ILE:HG23	1:E:102[B]:LYS:HD3	1.90	0.53
1:B:88:ARG:CZ	1:C:15:HIS:HB3	2.38	0.53
1:F:121:PHE:N	1:F:122:ASP:HA	2.23	0.53
1:C:135:GLN:HA	1:C:138:ARG:NH2	2.23	0.53
1:B:112:PRO:HB2	1:C:166:ARG:NH1	2.25	0.52
1:A:165:PHE:CE1	1:F:110:PRO:HG2	2.46	0.51
1:D:26:GLU:OE1	1:D:245:ASN:ND2	2.43	0.51
1:A:191[B]:ILE:HG23	1:A:206[B]:ILE:HD11	1.93	0.50
1:C:146[B]:SER:OG	5:C:543:HOH:O	2.17	0.50
1:E:76:PHE:HZ	1:E:126:LEU:HD21	1.77	0.50
1:E:156:ALA:HB1	1:E:158:SER:OG	2.11	0.50
1:F:56[B]:SER:HB2	1:F:143:SER:HB3	1.95	0.49
1:D:123:LEU:HD12	1:D:126:LEU:HD23	1.95	0.49
1:E:156:ALA:HB3	1:E:159:VAL:HG22	1.95	0.49
1:D:56[B]:SER:HB3	1:D:143:SER:HB3	1.93	0.49
1:F:31[B]:ILE:HD13	1:F:231:MET:SD	2.53	0.48
1:A:18:ILE:HD13	1:F:85:LYS:HE3	1.96	0.48
1:E:123:LEU:O	1:E:127:ILE:HD12	2.13	0.48
1:A:248:PRO:HA	1:A:249:LEU:HB3	1.95	0.48
1:A:145[B]:ASP:HA	1:A:146[B]:SER:HA	1.61	0.47
1:F:191:ILE:HG23	1:F:206[B]:ILE:HD11	1.96	0.47
1:A:76:PHE:O	1:A:110:PRO:HD3	2.15	0.47
1:F:76:PHE:HE1	1:F:126:LEU:HD21	1.78	0.47
1:D:173:GLN:HG3	5:D:505:HOH:O	2.13	0.47
1:B:112:PRO:HB2	1:C:166:ARG:HH11	1.80	0.46
1:A:88:ARG:HD2	1:B:16:GLN:OE1	2.15	0.46
1:A:146[A]:SER:N	1:A:181:THR:OG1	2.45	0.46
1:B:145[A]:ASP:HA	1:B:146[A]:SER:HA	1.70	0.46
1:D:31[B]:ILE:HD13	1:D:231:MET:SD	2.56	0.46
1:E:124:SER:O	1:E:128:GLU:HG3	2.15	0.46
1:B:31:ILE:HG22	1:B:231[A]:MET:SD	2.55	0.46
1:F:31[A]:ILE:HG22	1:F:222:ILE:HD12	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:170[B]:ARG:NH1	1:B:173:GLN:OE1	2.47	0.45
1:D:88:ARG:NH1	5:D:579:HOH:O	2.48	0.45
1:C:56[A]:SER:HB2	1:C:143:SER:HB3	1.97	0.45
1:E:77[B]:GLU:HG2	1:F:165:PHE:HE1	1.81	0.45
1:A:31[B]:ILE:HD13	1:A:231:MET:SD	2.57	0.45
1:E:159:VAL:O	1:E:163:GLU:HG2	2.16	0.45
1:A:70:PRO:HB2	1:A:139:ALA:HA	1.98	0.45
1:A:81:GLN:H	1:A:81:GLN:CD	2.24	0.44
1:C:127:ILE:HG21	1:C:170:ARG:HD3	2.00	0.44
1:F:122:ASP:HB2	1:F:125:ALA:H	1.82	0.44
1:C:135:GLN:HA	1:C:138:ARG:HH22	1.81	0.44
1:D:20:LYS:HZ2	1:D:228:THR:HG21	1.83	0.44
1:B:127:ILE:HD13	1:B:170[A]:ARG:HG3	1.99	0.44
1:B:128:GLU:OE2	5:B:539:HOH:O	2.21	0.44
1:C:123:LEU:HA	1:C:123:LEU:HD12	1.86	0.44
1:C:145[A]:ASP:HA	1:C:146[A]:SER:HA	1.66	0.44
1:D:145[B]:ASP:HA	1:D:146[B]:SER:HA	1.68	0.44
1:A:110:PRO:HG2	1:B:165:PHE:CE2	2.53	0.43
1:B:173:GLN:HG3	5:B:494:HOH:O	2.18	0.43
1:B:56[B]:SER:HB2	1:B:143:SER:HB3	2.01	0.43
1:E:155:ASP:N	1:E:155:ASP:OD1	2.51	0.43
1:C:81:GLN:HG2	5:C:511:HOH:O	2.18	0.43
1:F:76:PHE:O	1:F:110:PRO:HD3	2.19	0.42
1:C:140:ARG:NE	5:C:536:HOH:O	2.52	0.42
1:F:76:PHE:CZ	1:F:126:LEU:HD21	2.53	0.42
1:C:42:THR:HA	1:C:203:ASN:HB2	2.01	0.42
1:C:56[B]:SER:HB3	1:C:143:SER:HB3	2.02	0.42
1:C:31:ILE:HG22	1:C:222:ILE:HD12	2.01	0.42
1:F:50:THR:HG22	1:F:209:ASN:HB2	2.02	0.42
1:C:140:ARG:HE	1:C:140:ARG:HB3	1.72	0.42
1:E:134:ILE:HD11	1:E:142:VAL:HG21	2.02	0.42
1:F:21:MET:HG3	1:F:141:ARG:NH2	2.35	0.42
1:F:81:GLN:CD	1:F:81:GLN:N	2.75	0.42
1:F:222:ILE:HG21	1:F:225:LEU:HG	2.01	0.41
1:A:76:PHE:HZ	1:A:126:LEU:HD21	1.86	0.41
1:E:123:LEU:HD21	1:E:167:LEU:HB2	2.02	0.41
1:D:27:GLY:O	1:D:31[B]:ILE:HG12	2.21	0.41
1:F:27:GLY:O	1:F:31[B]:ILE:HG12	2.20	0.41
1:A:31[A]:ILE:HG22	1:A:222:ILE:HD12	2.02	0.41
1:A:191[B]:ILE:HG21	1:A:198:GLU:HB3	2.03	0.41
1:C:123:LEU:HD23	5:C:487:HOH:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:235:TYR:CD1	1:C:249:LEU:HD22	2.56	0.41
1:D:31[A]:ILE:HG22	1:D:222:ILE:HD12	2.03	0.41
1:D:123:LEU:HD22	1:D:163:GLU:HB3	2.03	0.41
1:F:145[A]:ASP:HA	1:F:146[A]:SER:HA	1.66	0.41
1:A:50:THR:HG22	1:A:209:ASN:HB2	2.02	0.40
1:B:164:LEU:HD12	1:B:164:LEU:HA	1.97	0.40
1:F:170:ARG:O	1:F:174:ILE:HG13	2.22	0.40
1:E:56[A]:SER:HB2	1:E:143:SER:HB3	2.02	0.40
1:A:43:LEU:HD11	1:A:182:THR:CG2	2.52	0.40
1:C:132[B]:TYR:CE2	1:C:136:LYS:HD2	2.57	0.40
1:D:170:ARG:HD3	5:D:497:HOH:O	2.21	0.40
1:D:180[B]:MET:HB3	1:D:180[B]:MET:HE3	1.78	0.40

All (2) 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)
5:E:404:HOH:O	5:F:401:HOH:O[4_455]	2.02	0.18
1:E:102[B]:LYS:NZ	1:F:212:GLU:OE1[4_455]	2.15	0.05

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	224/253 (88%)	218 (97%)	6 (3%)	0	100	100
1	B	222/253 (88%)	216 (97%)	6 (3%)	0	100	100
1	C	225/253 (89%)	221 (98%)	4 (2%)	0	100	100
1	D	221/253 (87%)	216 (98%)	5 (2%)	0	100	100
1	E	221/253 (87%)	212 (96%)	9 (4%)	0	100	100
1	F	216/253 (85%)	211 (98%)	5 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1329/1518 (88%)	1294 (97%)	35 (3%)	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	201/217 (93%)	198 (98%)	3 (2%)	57	46
1	B	199/217 (92%)	197 (99%)	2 (1%)	68	60
1	C	201/217 (93%)	198 (98%)	3 (2%)	57	46
1	D	176/217 (81%)	175 (99%)	1 (1%)	78	74
1	E	185/217 (85%)	183 (99%)	2 (1%)	65	56
1	F	194/217 (89%)	191 (98%)	3 (2%)	57	46
All	All	1156/1302 (89%)	1142 (99%)	14 (1%)	63	54

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	128[A]	GLU
1	A	128[B]	GLU
1	A	138	ARG
1	B	18	ILE
1	B	138	ARG
1	C	14	GLU
1	C	50	THR
1	C	111	ASP
1	D	26	GLU
1	E	26	GLU
1	E	81	GLN
1	F	21	MET
1	F	155	ASP
1	F	170	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	131	ASN
1	A	245	ASN
1	B	131	ASN
1	B	245	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 12 are monoatomic - leaving 6 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	AGS	D	303	2	32,33,33	0.64	0	45,52,52	0.76	2 (4%)
4	AGS	C	303	2	32,33,33	0.83	2 (6%)	45,52,52	0.79	2 (4%)
4	AGS	B	303	2	32,33,33	0.66	1 (3%)	45,52,52	0.68	1 (2%)
4	AGS	A	303	2	32,33,33	0.72	2 (6%)	45,52,52	0.63	1 (2%)
4	AGS	F	303	2	32,33,33	0.68	1 (3%)	45,52,52	0.91	1 (2%)
4	AGS	E	303	2	32,33,33	0.70	1 (3%)	45,52,52	0.79	2 (4%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	AGS	D	303	2	-	8/21/38/38	0/3/3/3
4	AGS	C	303	2	-	3/21/38/38	0/3/3/3
4	AGS	B	303	2	-	4/21/38/38	0/3/3/3
4	AGS	A	303	2	-	5/21/38/38	0/3/3/3
4	AGS	F	303	2	-	4/21/38/38	0/3/3/3
4	AGS	E	303	2	-	3/21/38/38	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	303	AGS	PG-S1G	3.33	1.97	1.90
4	C	303	AGS	PA-O3A	2.49	1.62	1.59
4	A	303	AGS	PB-O3A	-2.38	1.56	1.59
4	E	303	AGS	PB-O3B	-2.37	1.56	1.59
4	A	303	AGS	PG-S1G	2.29	1.95	1.90
4	B	303	AGS	PA-O2A	-2.05	1.45	1.55
4	F	303	AGS	PA-O2A	-2.03	1.45	1.55

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	303	AGS	O2G-PG-O3B	3.92	117.71	104.64
4	E	303	AGS	O2G-PG-O3B	3.10	114.98	104.64
4	D	303	AGS	O2G-PG-O3B	3.00	114.67	104.64
4	C	303	AGS	O2G-PG-O3B	2.90	114.32	104.64
4	A	303	AGS	O2G-PG-O3B	2.84	114.11	104.64
4	E	303	AGS	O2A-PA-O3A	2.68	114.52	107.27
4	B	303	AGS	O2G-PG-O3B	2.33	112.42	104.64
4	D	303	AGS	O2A-PA-O3A	2.23	113.30	107.27
4	C	303	AGS	O2B-PB-O3A	-2.12	101.54	107.27

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	303	AGS	PB-O3B-PG-O2G

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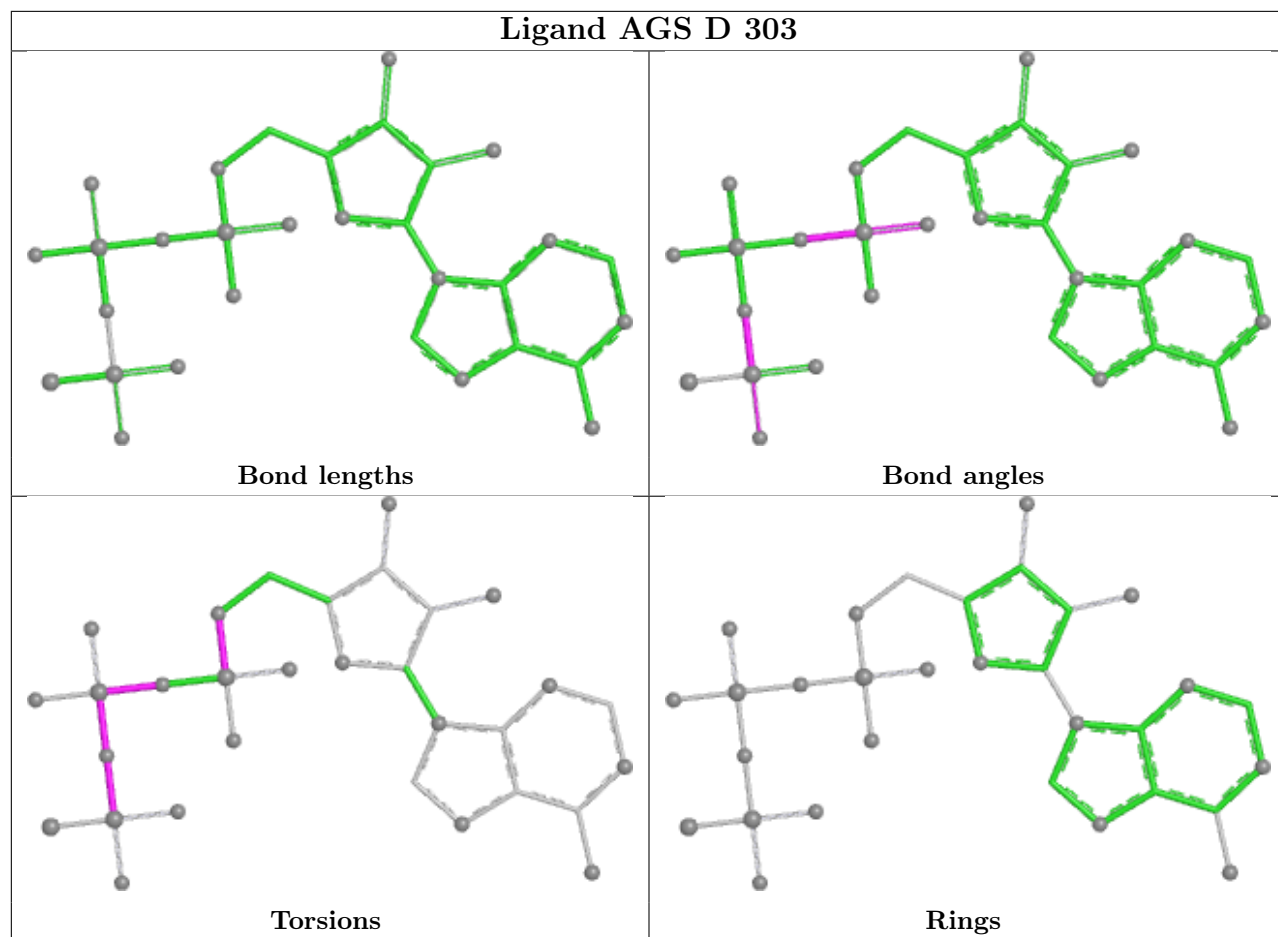
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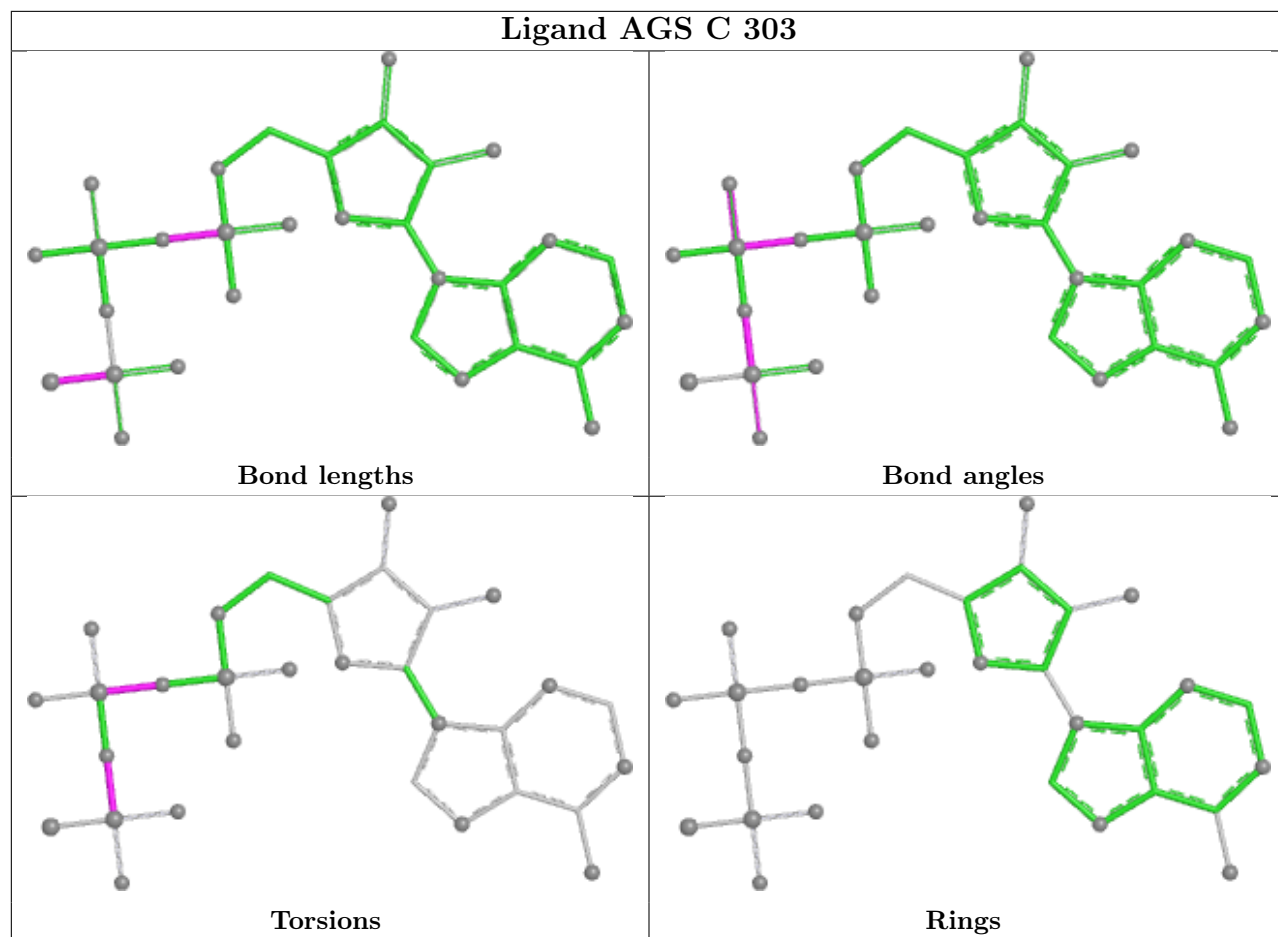
Mol	Chain	Res	Type	Atoms
4	A	303	AGS	PB-O3B-PG-O3G
4	B	303	AGS	PB-O3B-PG-O2G
4	B	303	AGS	PB-O3B-PG-O3G
4	B	303	AGS	C5'-O5'-PA-O1A
4	C	303	AGS	PB-O3B-PG-O2G
4	C	303	AGS	PB-O3B-PG-O3G
4	D	303	AGS	PB-O3B-PG-O2G
4	D	303	AGS	PB-O3B-PG-O3G
4	D	303	AGS	C5'-O5'-PA-O2A
4	E	303	AGS	PB-O3B-PG-O2G
4	E	303	AGS	PB-O3B-PG-O3G
4	F	303	AGS	PB-O3B-PG-O2G
4	F	303	AGS	PB-O3B-PG-O3G
4	A	303	AGS	PA-O3A-PB-O1B
4	E	303	AGS	PA-O3A-PB-O1B
4	F	303	AGS	PA-O3A-PB-O2B
4	D	303	AGS	C5'-O5'-PA-O1A
4	D	303	AGS	C5'-O5'-PA-O3A
4	A	303	AGS	PG-O3B-PB-O2B
4	D	303	AGS	PG-O3B-PB-O2B
4	B	303	AGS	PA-O3A-PB-O2B
4	C	303	AGS	PA-O3A-PB-O2B
4	D	303	AGS	PA-O3A-PB-O1B
4	D	303	AGS	PA-O3A-PB-O2B
4	F	303	AGS	PA-O3A-PB-O1B
4	A	303	AGS	PA-O3A-PB-O2B

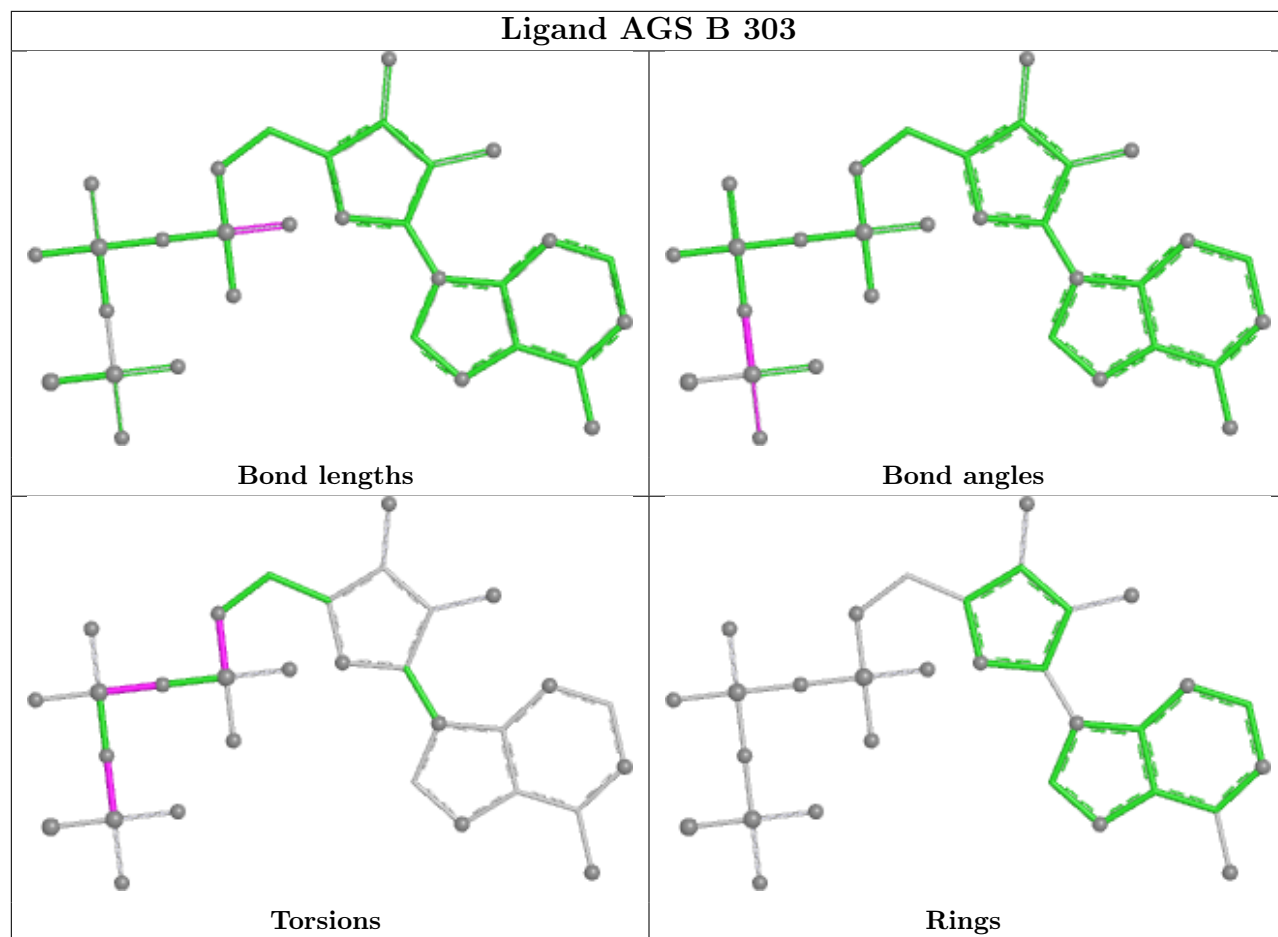
There are no ring outliers.

No monomer is involved in short contacts.

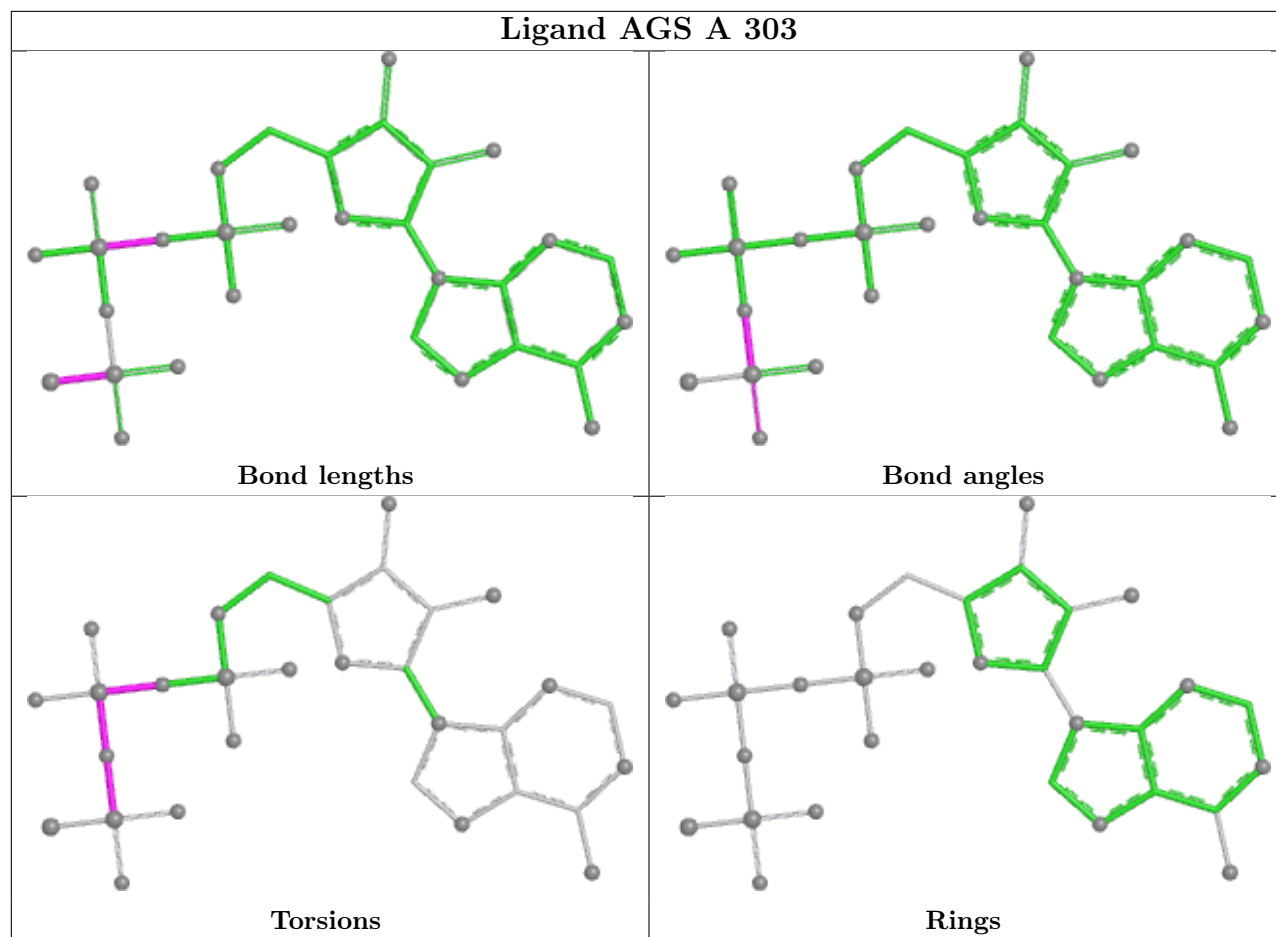
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.



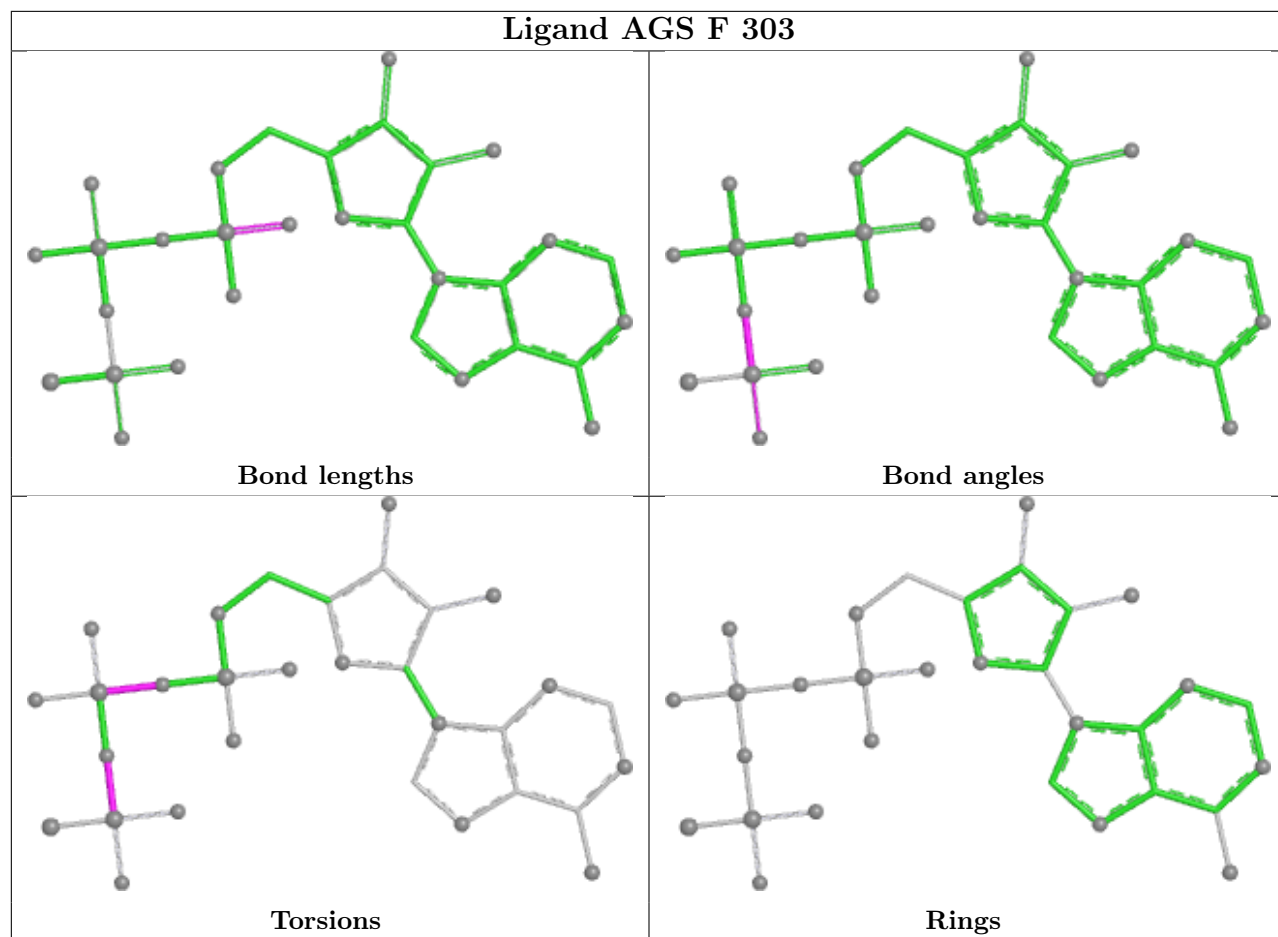


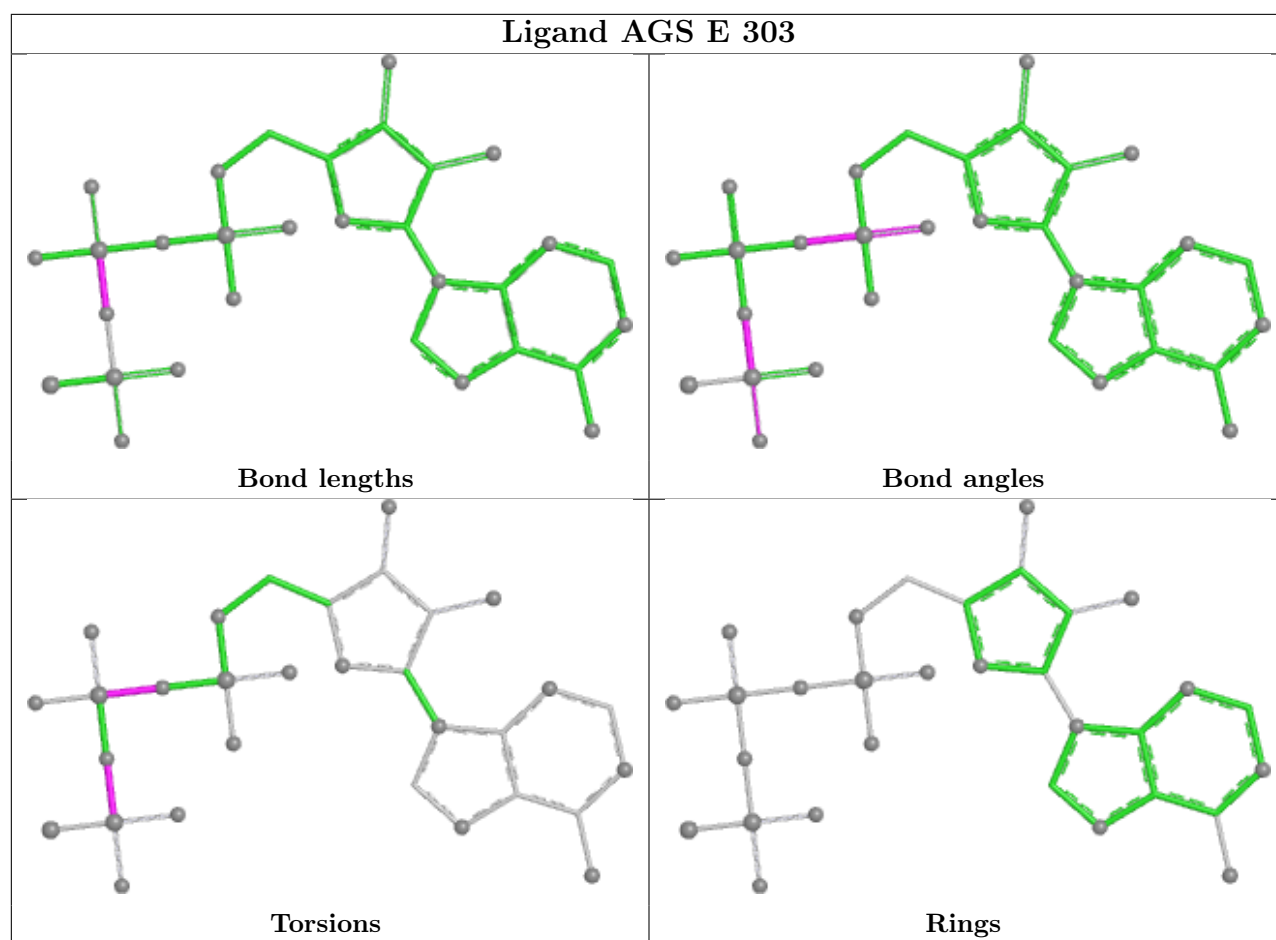


Ligand AGS A 303



Ligand AGS F 303





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	220/253 (86%)	0.60	29 (13%) 7 7	9, 31, 67, 105	11 (5%)
1	B	218/253 (86%)	0.19	12 (5%) 30 35	8, 24, 54, 103	11 (5%)
1	C	222/253 (87%)	0.23	23 (10%) 11 13	9, 23, 56, 99	11 (4%)
1	D	220/253 (86%)	0.15	17 (7%) 19 21	9, 23, 58, 92	8 (3%)
1	E	218/253 (86%)	0.54	29 (13%) 7 7	9, 25, 69, 107	10 (4%)
1	F	214/253 (84%)	0.57	31 (14%) 6 6	7, 26, 64, 108	9 (4%)
All	All	1312/1518 (86%)	0.38	141 (10%) 11 12	7, 25, 63, 108	60 (4%)

All (141) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	121	PHE	9.1
1	D	249	LEU	8.7
1	E	112	PRO	8.1
1	A	249	LEU	6.7
1	E	123	LEU	6.5
1	F	109	SER	6.0
1	E	121	PHE	6.0
1	F	121	PHE	5.8
1	A	121	PHE	5.7
1	B	112	PRO	5.7
1	C	247	PHE	5.5
1	E	249	LEU	5.5
1	E	124	SER	5.1
1	B	156	ALA	5.1
1	E	127	ILE	4.9
1	A	248	PRO	4.7
1	F	156	ALA	4.7
1	E	111	ASP	4.7
1	D	121	PHE	4.7

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Mol	Chain	Res	Type	RSRZ
1	C	249	LEU	4.7
1	C	14	GLU	4.6
1	F	126	LEU	4.5
1	C	111	ASP	4.5
1	A	159	VAL	4.4
1	F	110	PRO	4.3
1	C	248	PRO	4.3
1	E	247	PHE	4.2
1	E	132	TYR	4.2
1	A	112	PRO	4.2
1	A	122	ASP	4.2
1	F	125	ALA	4.1
1	D	250	GLY	4.0
1	E	16	GLN	4.0
1	C	112	PRO	4.0
1	B	16	GLN	4.0
1	F	111	ASP	4.0
1	C	110	PRO	4.0
1	F	158	SER	4.0
1	F	122	ASP	3.9
1	B	249	LEU	3.9
1	E	156	ALA	3.8
1	F	146[A]	SER	3.8
1	B	155	ASP	3.8
1	D	110	PRO	3.8
1	F	129	ARG	3.6
1	F	247	PHE	3.6
1	D	156	ALA	3.6
1	C	157	SER	3.6
1	E	122	ASP	3.6
1	B	111	ASP	3.5
1	B	122	ASP	3.5
1	E	248	PRO	3.5
1	A	173	GLN	3.4
1	E	110	PRO	3.4
1	C	156	ALA	3.4
1	A	146[A]	SER	3.4
1	A	108	ALA	3.3
1	A	156	ALA	3.3
1	E	133	ALA	3.3
1	A	123	LEU	3.3
1	C	194	TYR	3.3

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Mol	Chain	Res	Type	RSRZ
1	D	13	SER	3.3
1	F	157	SER	3.3
1	F	200	VAL	3.2
1	E	158	SER	3.2
1	C	132[A]	TYR	3.1
1	C	155	ASP	3.1
1	B	248	PRO	3.1
1	F	159	VAL	3.0
1	C	15	HIS	3.0
1	A	157	SER	3.0
1	E	146[A]	SER	3.0
1	C	212	GLU	2.9
1	D	26	GLU	2.9
1	A	126	LEU	2.9
1	B	26	GLU	2.9
1	E	194	TYR	2.9
1	F	128	GLU	2.9
1	C	16	GLN	2.8
1	C	113	GLU	2.8
1	F	124	SER	2.8
1	F	123	LEU	2.8
1	B	110	PRO	2.8
1	A	155	ASP	2.8
1	A	109	SER	2.7
1	E	134	ILE	2.7
1	A	158	SER	2.7
1	D	123	LEU	2.7
1	D	164	LEU	2.7
1	E	245	ASN	2.7
1	C	213	GLY	2.6
1	F	88[A]	ARG	2.6
1	D	135	GLN	2.6
1	F	131	ASN	2.6
1	D	162	ARG	2.6
1	A	125	ALA	2.6
1	F	162	ARG	2.6
1	F	81	GLN	2.6
1	F	155	ASP	2.6
1	C	120	GLY	2.6
1	D	125	ALA	2.6
1	D	166	ARG	2.5
1	D	228	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	F	242	HIS	2.5
1	E	159	VAL	2.5
1	A	132	TYR	2.5
1	E	125	ALA	2.5
1	F	132	TYR	2.4
1	C	121	PHE	2.4
1	A	110	PRO	2.4
1	A	194	TYR	2.4
1	D	157	SER	2.4
1	E	135	GLN	2.4
1	F	173	GLN	2.4
1	E	18	ILE	2.4
1	F	133	ALA	2.4
1	A	127	ILE	2.3
1	F	174	ILE	2.3
1	E	138	ARG	2.3
1	C	146[A]	SER	2.3
1	A	18	ILE	2.3
1	A	16[A]	GLN	2.3
1	C	173	GLN	2.3
1	A	166	ARG	2.2
1	B	146[A]	SER	2.2
1	E	157	SER	2.2
1	E	174	ILE	2.2
1	A	174	ILE	2.2
1	F	140	ARG	2.2
1	D	155	ASP	2.2
1	C	140	ARG	2.2
1	D	163	GLU	2.1
1	A	140	ARG	2.1
1	E	126	LEU	2.1
1	A	242	HIS	2.1
1	A	165	PHE	2.1
1	A	15	HIS	2.1
1	F	192	ALA	2.1
1	E	173	GLN	2.0
1	C	245	ASN	2.0
1	F	248	PRO	2.0

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 oligosaccharides in this entry.

6.4 Ligands ⓘ

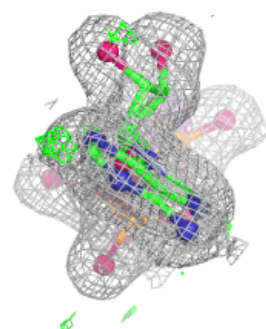
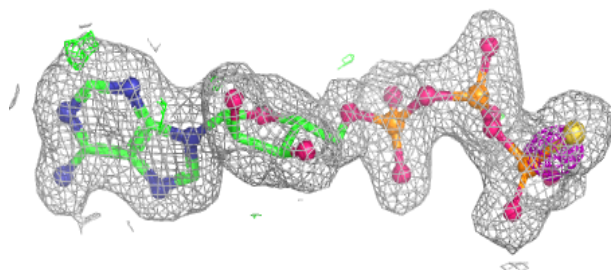
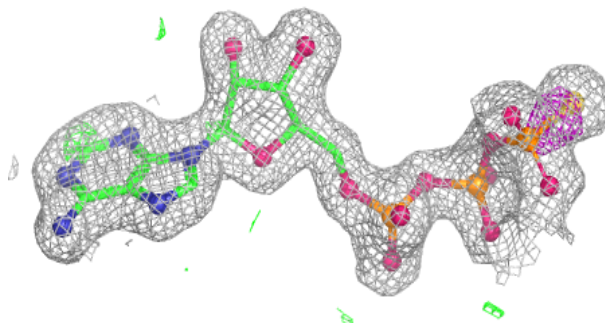
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	AGS	C	303	31/31	0.97	0.05	13,17,22,28	0
4	AGS	E	303	31/31	0.97	0.06	14,18,27,33	0
4	AGS	B	303	31/31	0.98	0.05	13,17,21,24	0
2	MG	D	301	1/1	0.98	0.03	17,17,17,17	0
4	AGS	D	303	31/31	0.98	0.05	12,16,22,25	0
4	AGS	A	303	31/31	0.98	0.06	18,22,27,28	0
4	AGS	F	303	31/31	0.98	0.06	14,18,28,35	0
3	CL	B	302	1/1	0.99	0.09	26,26,26,26	0
3	CL	D	302	1/1	0.99	0.02	18,18,18,18	0
3	CL	E	302	1/1	0.99	0.09	22,22,22,22	0
3	CL	F	302	1/1	0.99	0.03	22,22,22,22	0
2	MG	B	301	1/1	0.99	0.02	19,19,19,19	0
2	MG	C	301	1/1	0.99	0.05	19,19,19,19	0
2	MG	A	301	1/1	0.99	0.05	22,22,22,22	0
2	MG	E	301	1/1	0.99	0.07	20,20,20,20	0
2	MG	F	301	1/1	0.99	0.02	22,22,22,22	0
3	CL	A	302	1/1	0.99	0.04	25,25,25,25	0
3	CL	C	302	1/1	1.00	0.01	21,21,21,21	0

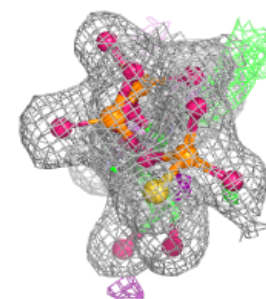
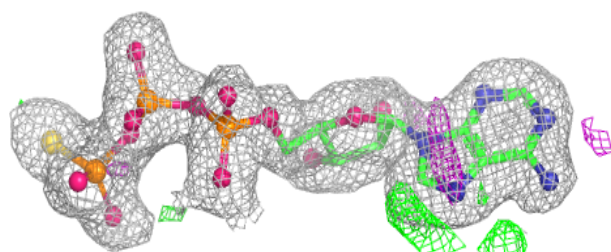
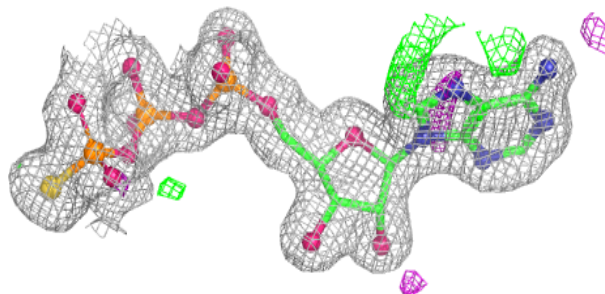
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around AGS C 303:

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

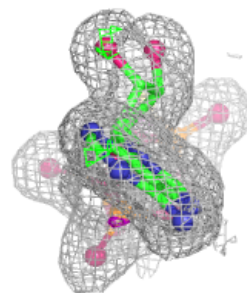
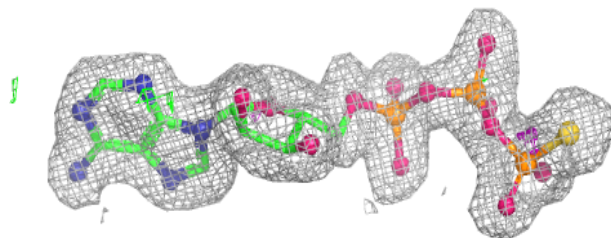
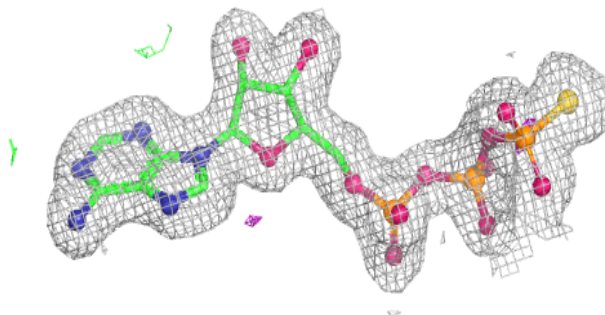
**Electron density around AGS E 303:**

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

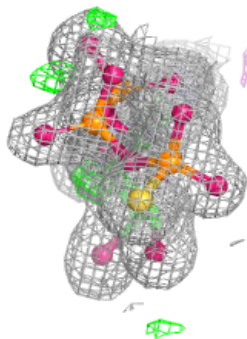
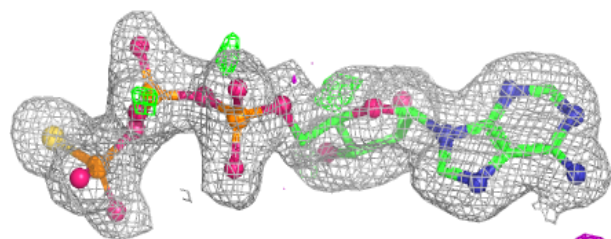
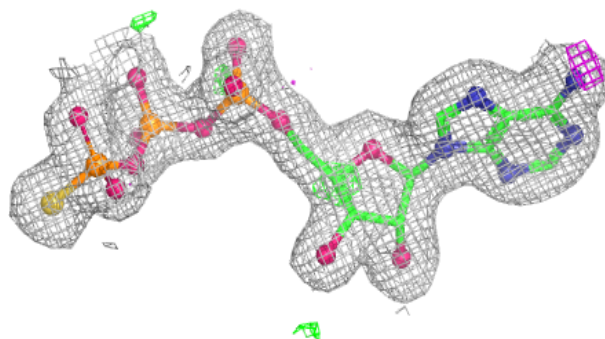


Electron density around AGS B 303:

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

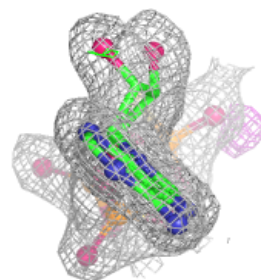
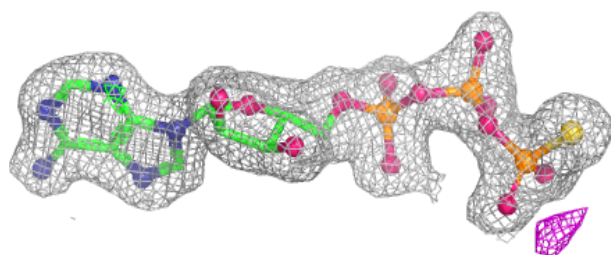
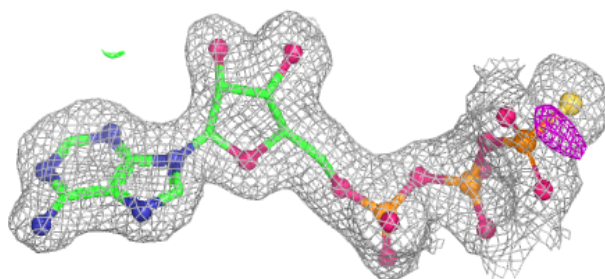
**Electron density around AGS D 303:**

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

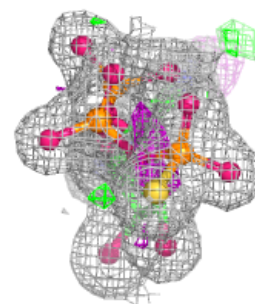
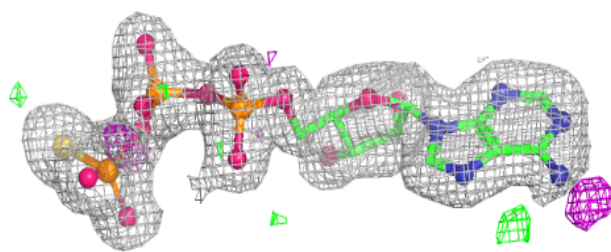
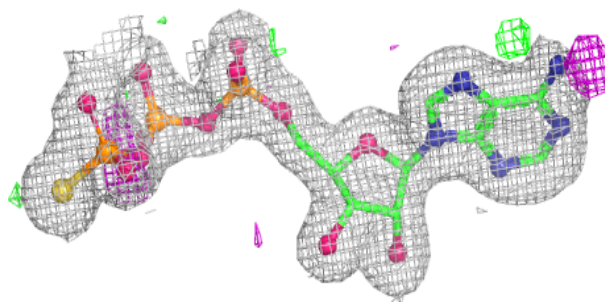


Electron density around AGS A 303:

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

**Electron density around AGS F 303:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.