



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 11:31 PM EDT

PDB ID : 3WV9
Title : Guanylylpyridinol (GP)- and ATP-bound HcgE from Methanothermobacter marburgensis
Authors : Fujishiro, T.; Ermler, U.; Shima, S.
Deposited on : 2014-05-16
Resolution : 2.75 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) : 1.20.1
EDS : 2.36.2
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) : 2.36.2

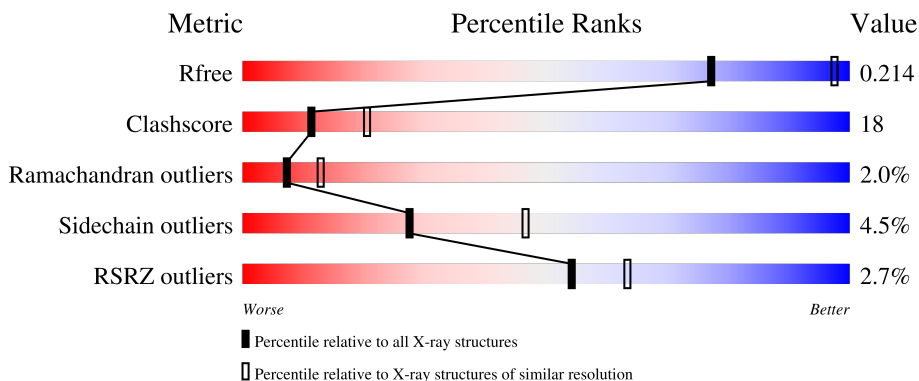
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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	218	 73% 20% • 6%
1	B	218	 74% 18% • 6%
1	C	218	 6% 61% 28% • 6%
1	D	218	 4% 56% 28% 8% • 6%

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 6515 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 Hmd co-occurring protein HcgE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	205	1555	981	270	298	6	0	0	0
1	B	205	1555	981	270	298	6	0	0	0
1	C	205	1555	981	270	298	6	0	0	0
1	D	205	1555	981	270	298	6	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

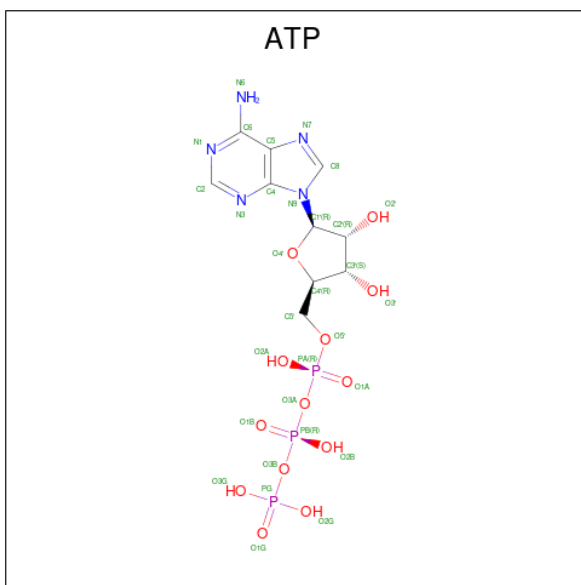
Chain	Residue	Modelled	Actual	Comment	Reference
A	213	LEU	-	expression tag	UNP D9PY12
A	214	GLU	-	expression tag	UNP D9PY12
A	215	LEU	-	expression tag	UNP D9PY12
A	216	VAL	-	expression tag	UNP D9PY12
A	217	PRO	-	expression tag	UNP D9PY12
A	218	ARG	-	expression tag	UNP D9PY12
B	213	LEU	-	expression tag	UNP D9PY12
B	214	GLU	-	expression tag	UNP D9PY12
B	215	LEU	-	expression tag	UNP D9PY12
B	216	VAL	-	expression tag	UNP D9PY12
B	217	PRO	-	expression tag	UNP D9PY12
B	218	ARG	-	expression tag	UNP D9PY12
C	213	LEU	-	expression tag	UNP D9PY12
C	214	GLU	-	expression tag	UNP D9PY12
C	215	LEU	-	expression tag	UNP D9PY12
C	216	VAL	-	expression tag	UNP D9PY12
C	217	PRO	-	expression tag	UNP D9PY12
C	218	ARG	-	expression tag	UNP D9PY12
D	213	LEU	-	expression tag	UNP D9PY12
D	214	GLU	-	expression tag	UNP D9PY12
D	215	LEU	-	expression tag	UNP D9PY12

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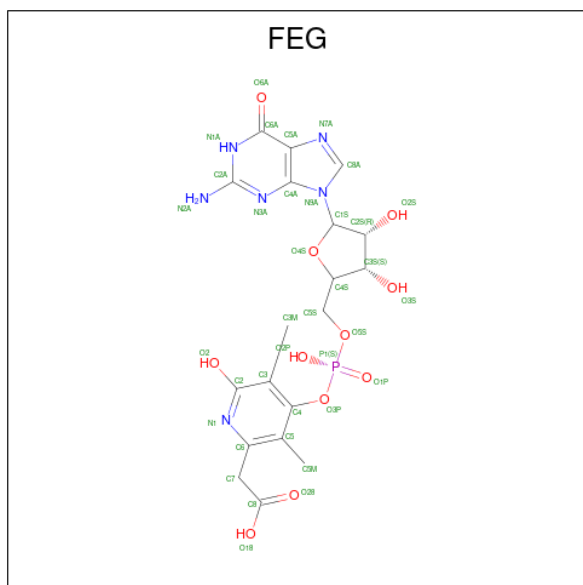
Chain	Residue	Modelled	Actual	Comment	Reference
D	216	VAL	-	expression tag	UNP D9PY12
D	217	PRO	-	expression tag	UNP D9PY12
D	218	ARG	-	expression tag	UNP D9PY12

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 3 is 5'-O-[(S)-{2-(carboxymethyl)-6-hydroxy-3,5-dimethylpyridin-4-yl}oxy](hydroxy)phosphoryl]guanosine (three-letter code: FEG) (formula: $C_{19}H_{23}N_6O_{11}P$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
3	A	1	Total	C	N	O	P	0	0
			37	19	6	11	1		
3	B	1	Total	C	N	O	P	0	0
			37	19	6	11	1		
3	C	1	Total	C	N	O	P	0	0
			37	19	6	11	1		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

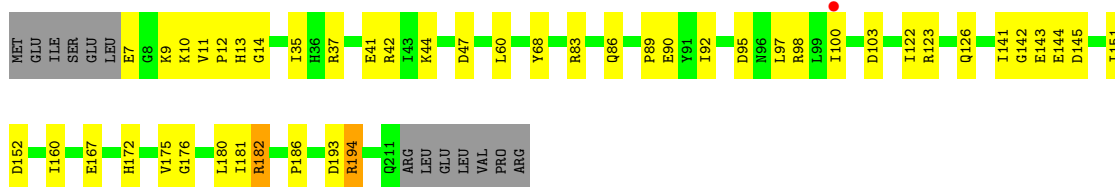
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	3	Total	O	0	0
			3	3		
5	B	5	Total	O	0	0
			5	5		
5	C	3	Total	O	0	0
			3	3		
5	D	4	Total	O	0	0
			4	4		

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.

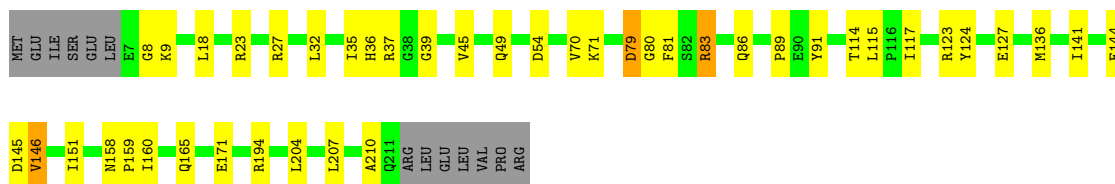
- Molecule 1: Hmd co-occurring protein HcgE

Chain A: 



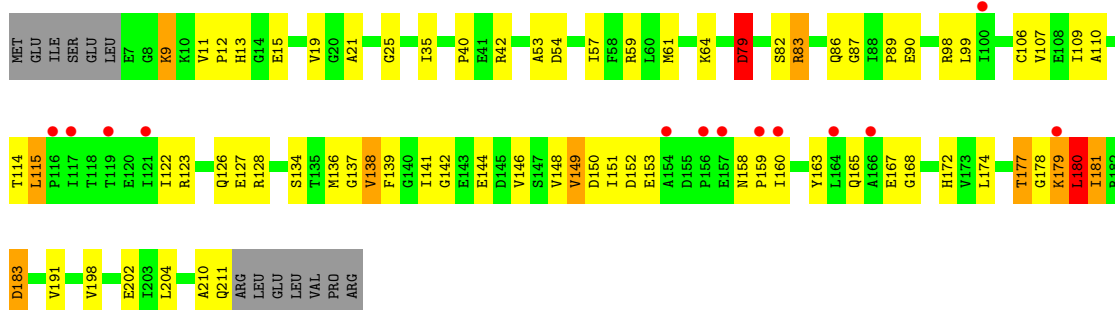
- Molecule 1: Hmd co-occurring protein HcgE

Chain B: 



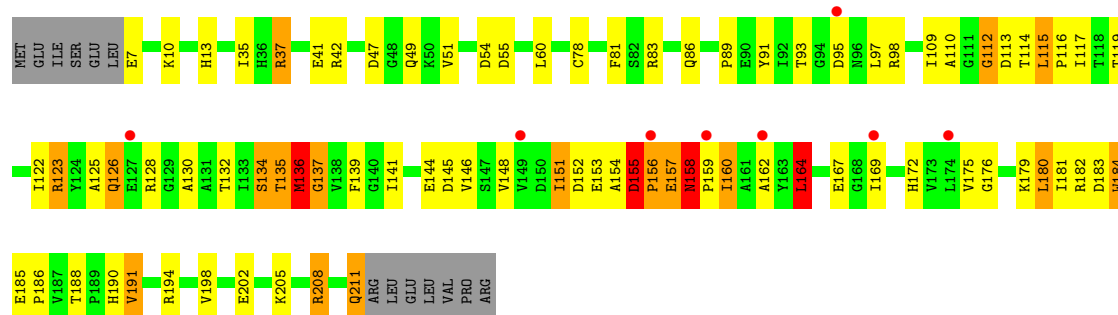
- Molecule 1: Hmd co-occurring protein HcgE

Chain C: 



- Molecule 1: Hmd co-occurring protein HcgE

Chain D: 



4 Data and refinement statistics i

Property	Value	Source
Space group	P 3	Depositor
Cell constants a, b, c, α , β , γ	85.00Å 85.00Å 120.78Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.69 – 2.75 46.69 – 2.75	Depositor EDS
% Data completeness (in resolution range)	100.0 (46.69-2.75) 100.0 (46.69-2.75)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	70.94 (at 2.77Å)	Xtrriage
Refinement program	REFMAC 5.8.0071	Depositor
R, R_{free}	0.165 , 0.214 0.166 , 0.214	Depositor DCC
R_{free} test set	1173 reflections (4.62%)	wwPDB-VP
Wilson B-factor (Å ²)	63.6	Xtrriage
Anisotropy	0.177	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 39.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	0.108 for -h,-k,l 0.034 for h,-h-k,-l 0.027 for -k,-h,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6515	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.94% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FEG, ATP, SO4

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	1.12	3/1578 (0.2%)	1.15	10/2135 (0.5%)
1	B	1.11	2/1578 (0.1%)	1.15	4/2135 (0.2%)
1	C	1.10	4/1578 (0.3%)	1.29	12/2135 (0.6%)
1	D	1.07	2/1578 (0.1%)	1.31	15/2135 (0.7%)
All	All	1.10	11/6312 (0.2%)	1.23	41/8540 (0.5%)

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	2
1	D	0	2
All	All	0	4

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	153	GLU	CG-CD	11.87	1.69	1.51
1	D	208	ARG	CZ-NH2	9.98	1.46	1.33
1	A	143	GLU	CD-OE2	8.85	1.35	1.25
1	D	208	ARG	NE-CZ	8.71	1.44	1.33
1	C	153	GLU	CB-CG	7.46	1.66	1.52
1	C	153	GLU	CD-OE1	-6.69	1.18	1.25
1	A	7	GLU	CG-CD	6.09	1.61	1.51
1	C	87	GLY	C-O	-5.76	1.14	1.23
1	A	68	TYR	CE1-CZ	5.53	1.45	1.38
1	B	171	GLU	CG-CD	5.18	1.59	1.51
1	B	124	TYR	CE1-CZ	5.05	1.45	1.38

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	208	ARG	NE-CZ-NH2	14.08	127.34	120.30
1	D	208	ARG	NE-CZ-NH1	-9.48	115.56	120.30
1	A	145	ASP	CB-CG-OD1	-8.64	110.52	118.30
1	B	54	ASP	CB-CG-OD1	8.06	125.56	118.30
1	C	180	LEU	N-CA-C	7.66	131.68	111.00
1	D	137	GLY	N-CA-C	-7.56	94.21	113.10
1	B	71	LYS	CD-CE-NZ	-7.55	94.34	111.70
1	D	185	GLU	C-N-CD	-7.51	104.09	120.60
1	C	181	ILE	CG1-CB-CG2	-7.24	95.48	111.40
1	C	142	GLY	N-CA-C	7.23	131.17	113.10
1	B	8	GLY	N-CA-C	-7.12	95.29	113.10
1	C	153	GLU	OE1-CD-OE2	-7.00	114.91	123.30
1	A	145	ASP	CB-CG-OD2	6.83	124.45	118.30
1	D	180	LEU	CB-CG-CD2	-6.66	99.68	111.00
1	C	83	ARG	NE-CZ-NH1	-6.52	117.04	120.30
1	D	123	ARG	NE-CZ-NH2	6.49	123.55	120.30
1	C	54	ASP	CB-CG-OD2	-6.19	112.73	118.30
1	A	60	LEU	CB-CG-CD2	6.03	121.25	111.00
1	A	44	LYS	CD-CE-NZ	-5.79	98.39	111.70
1	C	106	CYS	CA-CB-SG	-5.76	103.63	114.00
1	D	54	ASP	CB-CG-OD2	-5.75	113.13	118.30
1	A	194	ARG	CG-CD-NE	5.72	123.82	111.80
1	C	98	ARG	NE-CZ-NH1	-5.70	117.45	120.30
1	D	60	LEU	CA-CB-CG	5.70	128.42	115.30
1	D	95	ASP	CB-CG-OD1	5.65	123.38	118.30
1	D	112	GLY	N-CA-C	-5.63	99.03	113.10
1	C	115	LEU	CA-CB-CG	-5.58	102.46	115.30
1	A	152	ASP	CB-CG-OD1	5.50	123.25	118.30
1	D	164	LEU	CA-CB-CG	5.45	127.83	115.30
1	D	42	ARG	NE-CZ-NH2	-5.43	117.58	120.30
1	D	155	ASP	C-N-CD	5.39	139.71	128.40
1	C	183	ASP	CB-CG-OD1	5.38	123.15	118.30
1	B	27	ARG	NE-CZ-NH1	5.30	122.95	120.30
1	D	126	GLN	N-CA-CB	5.29	120.12	110.60
1	C	79	ASP	CB-CG-OD2	5.24	123.02	118.30
1	A	37	ARG	NE-CZ-NH2	-5.23	117.69	120.30
1	A	9	LYS	CD-CE-NZ	5.19	123.65	111.70
1	A	95	ASP	CB-CG-OD1	-5.17	113.65	118.30
1	D	95	ASP	CB-CG-OD2	-5.10	113.71	118.30
1	C	79	ASP	N-CA-C	5.07	124.68	111.00
1	A	193	ASP	CB-CG-OD1	5.04	122.84	118.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	152	ASP	Peptide
1	C	179	LYS	Peptide
1	D	135	THR	Peptide
1	D	136	MET	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1555	0	1577	33	0
1	B	1555	0	1577	30	0
1	C	1555	0	1577	91	0
1	D	1555	0	1577	87	0
2	A	31	0	12	1	0
2	B	31	0	12	1	0
2	C	31	0	12	3	0
2	D	31	0	12	2	0
3	A	37	0	21	8	0
3	B	37	0	21	0	0
3	C	37	0	21	12	0
4	A	15	0	0	1	0
4	B	5	0	0	0	0
4	C	20	0	0	0	0
4	D	5	0	0	0	0
5	A	3	0	0	0	0
5	B	5	0	0	0	0
5	C	3	0	0	0	0
5	D	4	0	0	0	0
All	All	6515	0	6419	230	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 18.

All (230) 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:158:ASN:CB	1:D:159:PRO:HA	1.66	1.20
1:D:158:ASN:HB2	1:D:159:PRO:CA	1.75	1.16
1:A:86:GLN:HG2	1:C:86:GLN:HG2	1.34	1.02
1:C:139:PHE:HB2	1:C:180:LEU:HB2	1.43	0.97
1:A:92:ILE:HD12	1:A:100:ILE:HD11	1.48	0.95
1:C:178:GLY:HA2	1:C:180:LEU:HD11	1.49	0.95
1:C:178:GLY:CA	1:C:180:LEU:HD11	1.99	0.92
1:C:158:ASN:HB2	1:C:179:LYS:HD2	1.50	0.92
1:D:141:ILE:HD12	1:D:184:TRP:HH2	1.35	0.92
1:C:180:LEU:HD12	1:C:180:LEU:H	1.34	0.91
1:C:159:PRO:HG2	3:C:303:FEG:C6A	2.00	0.91
1:A:98:ARG:NH2	1:C:90:GLU:HG2	1.86	0.90
1:D:158:ASN:HB3	1:D:162:ALA:HB2	1.52	0.89
1:A:180:LEU:HD22	3:A:302:FEG:C8A	2.05	0.87
1:C:165:GLN:HG3	1:C:168:GLY:HA2	1.57	0.87
1:D:151:ILE:HG21	1:D:164:LEU:HD22	1.58	0.86
1:D:151:ILE:HD13	1:D:164:LEU:CD2	2.05	0.84
1:D:141:ILE:HD12	1:D:184:TRP:CH2	2.12	0.84
1:B:123:ARG:O	1:B:127:GLU:HG3	1.77	0.83
1:C:158:ASN:HD22	1:C:179:LYS:CD	1.92	0.82
1:D:122:ILE:HG22	1:D:126:GLN:HE22	1.45	0.81
1:C:177:THR:OG1	1:C:178:GLY:HA3	1.81	0.81
1:C:15:GLU:HB2	1:C:42:ARG:HH11	1.45	0.79
1:A:86:GLN:CG	1:C:86:GLN:HG2	2.12	0.79
1:C:158:ASN:ND2	1:C:179:LYS:CD	2.46	0.78
1:D:136:MET:HB3	1:D:160:ILE:CD1	2.14	0.78
1:A:41:GLU:HG2	1:C:79:ASP:OD1	1.84	0.78
1:C:158:ASN:ND2	1:C:179:LYS:HD3	2.00	0.77
1:D:139:PHE:HB2	1:D:179:LYS:HB2	1.65	0.77
1:D:158:ASN:HB2	1:D:159:PRO:HA	0.81	0.76
1:C:180:LEU:HD12	1:C:180:LEU:N	2.01	0.75
1:D:159:PRO:HD2	1:D:180:LEU:HD21	1.67	0.74
1:C:177:THR:CB	1:C:178:GLY:HA3	2.18	0.74
1:C:123:ARG:HH22	1:C:167:GLU:HB3	1.54	0.73
1:A:180:LEU:HD22	3:A:302:FEG:N7A	2.04	0.73
1:D:154:ALA:O	1:D:156:PRO:HD3	1.88	0.73
1:D:134:SER:HB3	1:D:172:HIS:HE2	1.53	0.73
1:D:122:ILE:HG23	1:D:132:THR:HG21	1.71	0.72
1:A:180:LEU:HD22	3:A:302:FEG:H8A	1.71	0.71
1:D:115:LEU:HG	1:D:160:ILE:HG23	1.72	0.70
1:B:45:VAL:HG23	1:B:70:VAL:HB	1.74	0.70
1:C:139:PHE:HB2	1:C:180:LEU:CB	2.21	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:180:LEU:HG	1:D:181:ILE:HD12	1.75	0.69
1:D:158:ASN:CB	1:D:162:ALA:HB2	2.24	0.68
1:D:148:VAL:HG22	1:D:175:VAL:HG22	1.76	0.68
1:C:158:ASN:CB	1:C:179:LYS:HD2	2.21	0.68
1:D:151:ILE:HD11	1:D:172:HIS:HB3	1.75	0.68
1:C:11:VAL:HG13	1:C:12:PRO:HD2	1.76	0.67
1:D:202:GLU:HA	1:D:205:LYS:HE3	1.76	0.67
1:A:11:VAL:HG12	1:A:12:PRO:O	1.94	0.66
1:B:35:ILE:HB	1:B:83:ARG:HH22	1.59	0.66
1:C:160:ILE:HD11	3:C:303:FEG:H8A	1.76	0.66
1:C:158:ASN:ND2	1:C:179:LYS:HD2	2.10	0.66
1:C:139:PHE:CE1	1:C:181:ILE:HG13	2.30	0.66
1:D:132:THR:HG22	1:D:172:HIS:ND1	2.11	0.66
1:D:134:SER:OG	1:D:135:THR:N	2.29	0.65
1:D:109:ILE:HD12	1:D:114:THR:HB	1.78	0.65
1:B:146:VAL:HG23	1:B:146:VAL:O	1.96	0.65
1:A:35:ILE:O	1:A:83:ARG:NH2	2.29	0.65
1:D:155:ASP:OD1	1:D:155:ASP:N	2.24	0.65
1:C:15:GLU:HG3	1:C:42:ARG:HB2	1.79	0.64
1:C:137:GLY:HA3	1:C:178:GLY:O	1.97	0.64
1:D:167:GLU:O	1:D:167:GLU:HG3	1.95	0.64
1:B:145:ASP:OD1	1:B:146:VAL:HG13	1.98	0.64
1:A:86:GLN:HG2	1:C:86:GLN:CG	2.19	0.64
1:C:141:ILE:N	1:C:144:GLU:OE2	2.30	0.64
1:D:180:LEU:H	1:D:183:ASP:HB2	1.63	0.63
1:C:138:VAL:HG21	3:C:303:FEG:H3MA	1.79	0.63
1:D:141:ILE:HB	1:D:184:TRP:CZ3	2.32	0.63
1:C:146:VAL:HG11	1:C:198:VAL:HG21	1.81	0.62
1:A:160:ILE:HD11	3:A:302:FEG:H8A	1.81	0.62
1:A:97:LEU:HA	1:A:100:ILE:HD13	1.80	0.61
1:B:89:PRO:O	1:D:98:ARG:HD2	1.99	0.61
1:D:208:ARG:O	1:D:211:GLN:HG3	2.00	0.61
1:B:86:GLN:HG2	1:D:86:GLN:HG2	1.82	0.61
1:D:159:PRO:HD2	1:D:180:LEU:CD2	2.31	0.61
1:A:92:ILE:HD12	1:A:100:ILE:CD1	2.26	0.61
1:C:35:ILE:O	1:C:83:ARG:NH2	2.34	0.61
1:D:134:SER:HB3	1:D:172:HIS:NE2	2.16	0.61
1:C:158:ASN:HD22	1:C:179:LYS:HD2	1.64	0.60
1:C:128:ARG:HG3	1:C:128:ARG:HH11	1.66	0.60
1:C:149:VAL:CG2	1:C:174:LEU:HB2	2.32	0.60
1:D:151:ILE:HD13	1:D:164:LEU:HD23	1.82	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:LEU:HB3	3:A:302:FEG:N7A	2.18	0.59
1:C:158:ASN:HD22	1:C:179:LYS:HD3	1.62	0.59
1:C:179:LYS:N	1:C:180:LEU:HD12	2.17	0.59
1:D:157:GLU:C	1:D:158:ASN:HD22	2.06	0.59
1:D:156:PRO:O	1:D:157:GLU:HB2	2.03	0.59
1:D:78:CYS:O	1:D:81:PHE:HB2	2.03	0.58
1:C:149:VAL:HG22	1:C:174:LEU:HB2	1.84	0.58
1:C:177:THR:CB	1:C:178:GLY:CA	2.81	0.58
1:D:135:THR:OG1	1:D:136:MET:N	2.35	0.58
1:C:57:ILE:O	1:C:61:MET:HG2	2.03	0.58
1:C:109:ILE:HD12	1:C:114:THR:HB	1.86	0.58
1:C:148:VAL:HG11	1:C:202:GLU:OE2	2.05	0.57
1:D:132:THR:HG22	1:D:172:HIS:CE1	2.40	0.57
1:D:49:GLN:HG3	1:D:91:TYR:OH	2.05	0.56
1:D:110:ALA:HB3	2:D:301:ATP:H5'1	1.87	0.56
1:D:35:ILE:O	1:D:83:ARG:NH2	2.30	0.56
1:B:32:LEU:O	1:B:83:ARG:NH2	2.38	0.56
1:D:151:ILE:HD13	1:D:164:LEU:HD21	1.87	0.56
1:A:90:GLU:OE2	1:C:99:LEU:HD21	2.06	0.56
1:A:14:GLY:HA2	1:A:103:ASP:OD2	2.06	0.55
1:D:158:ASN:CB	1:D:162:ALA:CB	2.84	0.55
1:B:141:ILE:N	1:B:144:GLU:OE2	2.30	0.55
1:D:153:GLU:H	1:D:154:ALA:HA	1.72	0.55
1:B:79:ASP:OD2	1:D:13:HIS:HD2	1.89	0.54
1:C:11:VAL:CG1	1:C:12:PRO:HD2	2.37	0.54
1:B:146:VAL:HG13	1:B:194:ARG:HH21	1.73	0.54
1:C:141:ILE:O	1:C:191:VAL:CG2	2.56	0.54
1:B:151:ILE:HD11	1:B:165:GLN:HG3	1.90	0.53
1:C:179:LYS:N	1:C:180:LEU:CD1	2.72	0.53
1:D:198:VAL:O	1:D:202:GLU:HG2	2.08	0.53
1:D:109:ILE:CD1	1:D:114:THR:HB	2.38	0.53
1:D:93:THR:HA	1:D:117:ILE:HD11	1.90	0.53
1:D:153:GLU:N	1:D:154:ALA:HA	2.24	0.53
1:C:115:LEU:HD11	3:C:303:FEG:H23	1.91	0.52
1:A:144:GLU:CD	1:A:144:GLU:H	2.11	0.52
1:D:179:LYS:HD2	1:D:184:TRP:HB3	1.91	0.52
1:D:159:PRO:CD	1:D:180:LEU:HD21	2.38	0.52
1:D:112:GLY:O	1:D:114:THR:N	2.43	0.52
1:D:91:TYR:HB3	2:D:301:ATP:N6	2.25	0.51
1:C:21:ALA:HA	1:C:25:GLY:HA3	1.91	0.51
1:C:160:ILE:CD1	3:C:303:FEG:H8A	2.39	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:188:THR:OG1	1:D:191:VAL:HG13	2.10	0.51
1:D:119:THR:HG23	1:D:169:ILE:CG1	2.40	0.51
1:A:98:ARG:HH22	1:C:90:GLU:HG2	1.73	0.51
1:D:158:ASN:HB3	1:D:162:ALA:CB	2.32	0.51
1:C:137:GLY:O	1:C:177:THR:N	2.39	0.51
1:B:49:GLN:HG3	1:B:91:TYR:OH	2.10	0.51
1:D:135:THR:HG23	1:D:136:MET:HB2	1.92	0.50
1:C:109:ILE:CD1	1:C:114:THR:HB	2.41	0.50
1:C:165:GLN:C	1:C:168:GLY:H	2.15	0.50
2:C:302:ATP:H3'	2:C:302:ATP:O2B	2.11	0.50
1:C:19:VAL:HG12	2:C:302:ATP:C2	2.47	0.50
1:A:42:ARG:HH22	1:C:79:ASP:CG	2.15	0.50
1:C:123:ARG:NH2	1:C:167:GLU:HB3	2.23	0.50
1:D:139:PHE:CD1	1:D:179:LYS:O	2.64	0.49
1:B:145:ASP:HA	1:B:194:ARG:HH22	1.78	0.49
1:C:9:LYS:O	1:C:9:LYS:HG2	2.12	0.49
1:C:122:ILE:O	1:C:126:GLN:HG3	2.13	0.49
1:D:139:PHE:HD1	1:D:179:LYS:O	1.96	0.49
1:A:98:ARG:HD2	1:C:89:PRO:O	2.13	0.49
1:C:15:GLU:HB2	1:C:42:ARG:HD2	1.95	0.49
1:D:119:THR:HG21	1:D:167:GLU:HG2	1.95	0.49
1:A:97:LEU:HA	1:A:100:ILE:CD1	2.44	0.48
2:A:301:ATP:H3'	2:A:301:ATP:O3A	2.12	0.48
1:C:138:VAL:HG23	1:C:138:VAL:O	2.14	0.48
1:B:145:ASP:OD1	1:B:146:VAL:N	2.46	0.48
1:A:122:ILE:O	1:A:126:GLN:HG3	2.14	0.48
1:B:115:LEU:HD21	1:B:160:ILE:HG12	1.96	0.48
1:D:158:ASN:HB2	1:D:162:ALA:HB3	1.95	0.48
1:D:152:ASP:O	1:D:153:GLU:HG3	2.14	0.48
1:A:175:VAL:HG12	1:A:176:GLY:N	2.29	0.48
1:C:136:MET:CG	1:C:136:MET:O	2.62	0.48
1:A:42:ARG:NH2	1:C:79:ASP:OD1	2.47	0.48
1:C:110:ALA:CB	3:C:303:FEG:C5	2.92	0.48
1:C:110:ALA:HB3	2:C:302:ATP:H5'1	1.95	0.47
1:D:115:LEU:HB2	1:D:116:PRO:HD3	1.95	0.47
1:C:159:PRO:HG2	3:C:303:FEG:C5A	2.43	0.47
1:A:181:ILE:HD11	3:A:302:FEG:H2S	1.97	0.47
1:C:40:PRO:O	1:C:83:ARG:HD3	2.15	0.47
1:C:138:VAL:CG2	3:C:303:FEG:H3MA	2.45	0.47
1:D:151:ILE:O	1:D:152:ASP:HB2	2.14	0.47
1:C:178:GLY:CA	1:C:180:LEU:CD1	2.82	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:151:ILE:CG2	1:D:164:LEU:HD22	2.39	0.47
1:C:180:LEU:H	1:C:180:LEU:CD1	2.17	0.47
1:C:35:ILE:HB	1:C:83:ARG:HH22	1.80	0.47
1:C:53:ALA:O	1:C:59:ARG:NH1	2.45	0.46
1:C:134:SER:OG	1:C:172:HIS:NE2	2.47	0.46
1:B:79:ASP:OD2	1:D:13:HIS:CD2	2.68	0.46
1:D:137:GLY:O	1:D:176:GLY:HA3	2.15	0.46
1:D:182:ARG:HG3	1:D:182:ARG:O	2.16	0.46
1:C:110:ALA:HB1	3:C:303:FEG:C5	2.45	0.46
1:D:51:VAL:HG13	1:D:55:ASP:HB2	1.98	0.45
1:D:151:ILE:CD1	1:D:164:LEU:CD2	2.87	0.45
1:D:158:ASN:HB2	1:D:162:ALA:CB	2.47	0.45
3:A:302:FEG:H7	3:A:302:FEG:H5M	1.69	0.45
1:C:136:MET:O	1:C:136:MET:HG3	2.17	0.45
1:B:79:ASP:OD1	1:D:41:GLU:HG2	2.17	0.45
1:B:114:THR:O	1:B:117:ILE:HG22	2.16	0.45
1:D:47:ASP:O	1:D:89:PRO:HA	2.17	0.45
1:A:47:ASP:O	1:A:89:PRO:HA	2.17	0.45
1:A:142:GLY:N	1:A:144:GLU:OE2	2.40	0.45
1:C:110:ALA:HB1	3:C:303:FEG:C6	2.47	0.44
1:B:36:HIS:ND1	1:B:37:ARG:N	2.66	0.44
1:C:110:ALA:HB2	3:C:303:FEG:C4	2.48	0.44
1:C:11:VAL:HG12	1:C:12:PRO:O	2.18	0.44
1:C:149:VAL:HG23	1:C:150:ASP:N	2.33	0.44
1:D:119:THR:HG23	1:D:169:ILE:HG13	1.99	0.44
1:D:10:LYS:HE3	1:D:37:ARG:O	2.17	0.44
1:A:123:ARG:NH2	1:A:167:GLU:O	2.50	0.44
1:C:19:VAL:HB	1:C:107:VAL:HG22	1.98	0.44
1:B:136:MET:HA	1:B:160:ILE:HD13	2.00	0.43
1:D:115:LEU:H	1:D:116:PRO:CD	2.30	0.43
1:D:190:HIS:CE1	1:D:194:ARG:HD2	2.53	0.43
1:D:157:GLU:O	1:D:158:ASN:ND2	2.40	0.43
1:A:13:HIS:HB3	4:A:305:SO4:O4	2.18	0.43
1:A:141:ILE:HG22	1:A:186:PRO:HD2	1.99	0.43
1:B:146:VAL:O	1:B:146:VAL:CG2	2.63	0.43
1:C:158:ASN:CG	1:C:179:LYS:HD2	2.38	0.43
1:A:182:ARG:HG2	3:A:302:FEG:O6A	2.18	0.43
1:D:180:LEU:HG	1:D:181:ILE:H	1.82	0.43
1:C:136:MET:O	1:C:178:GLY:O	2.37	0.43
1:C:178:GLY:HA3	1:C:180:LEU:HD11	1.95	0.43
1:D:136:MET:HB3	1:D:160:ILE:HD12	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:125:ALA:HB1	1:D:130:ALA:HB3	2.00	0.43
1:B:79:ASP:O	1:B:81:PHE:N	2.52	0.42
1:D:151:ILE:CD1	1:D:164:LEU:HD21	2.48	0.42
1:C:13:HIS:O	1:C:40:PRO:HA	2.20	0.42
1:A:151:ILE:HB	1:A:172:HIS:HB3	2.02	0.42
1:B:35:ILE:HD13	1:B:204:LEU:HD21	2.01	0.42
1:C:15:GLU:CB	1:C:42:ARG:HH11	2.24	0.42
1:D:146:VAL:O	1:D:146:VAL:HG13	2.19	0.42
1:B:23:ARG:NH1	2:B:301:ATP:O2B	2.53	0.42
1:C:115:LEU:HA	1:C:115:LEU:HD23	1.73	0.42
1:C:128:ARG:HG3	1:C:128:ARG:NH1	2.32	0.42
1:D:119:THR:HG23	1:D:169:ILE:HG12	2.02	0.42
1:C:35:ILE:HD13	1:C:204:LEU:HD21	2.02	0.41
1:B:158:ASN:HA	1:B:159:PRO:HD3	1.82	0.41
1:C:178:GLY:C	1:C:180:LEU:CD1	2.89	0.41
1:B:207:LEU:HD12	1:B:207:LEU:HA	1.55	0.41
1:B:39:GLY:HA3	1:B:83:ARG:HH12	1.84	0.41
1:C:177:THR:HB	1:C:178:GLY:CA	2.51	0.41
1:D:135:THR:HG23	1:D:136:MET:CB	2.50	0.41
3:C:303:FEG:H7A	3:C:303:FEG:H5M	1.90	0.41
1:B:207:LEU:O	1:B:210:ALA:HB3	2.21	0.41
1:C:158:ASN:HA	1:C:159:PRO:HD3	2.00	0.41
1:B:18:LEU:HD12	1:B:45:VAL:HG12	2.03	0.41
1:D:169:ILE:HD13	1:D:169:ILE:HA	1.94	0.40

There are no symmetry-related clashes.

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	203/218 (93%)	191 (94%)	12 (6%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	203/218 (93%)	189 (93%)	11 (5%)	3 (2%)	10	18
1	C	203/218 (93%)	185 (91%)	14 (7%)	4 (2%)	7	13
1	D	203/218 (93%)	181 (89%)	13 (6%)	9 (4%)	2	2
All	All	812/872 (93%)	746 (92%)	50 (6%)	16 (2%)	7	13

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	146	VAL
1	C	79	ASP
1	D	113	ASP
1	D	136	MET
1	D	155	ASP
1	D	158	ASN
1	D	186	PRO
1	C	149	VAL
1	C	151	ILE
1	D	144	GLU
1	B	79	ASP
1	D	156	PRO
1	C	210	ALA
1	D	157	GLU
1	B	80	GLY
1	D	115	LEU

5.3.2 Protein sidechains [i](#)

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	165/178 (93%)	162 (98%)	3 (2%)	59	75
1	B	165/178 (93%)	163 (99%)	2 (1%)	71	82
1	C	165/178 (93%)	155 (94%)	10 (6%)	18	33
1	D	165/178 (93%)	150 (91%)	15 (9%)	9	16

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	660/712 (93%)	630 (96%)	30 (4%)	27 46

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	LYS
1	A	182	ARG
1	A	194	ARG
1	B	9	LYS
1	B	83	ARG
1	C	9	LYS
1	C	64	LYS
1	C	82	SER
1	C	127	GLU
1	C	138	VAL
1	C	163	TYR
1	C	177	THR
1	C	180	LEU
1	C	183	ASP
1	C	211	GLN
1	D	7	GLU
1	D	37	ARG
1	D	97	LEU
1	D	123	ARG
1	D	128	ARG
1	D	134	SER
1	D	145	ASP
1	D	151	ILE
1	D	155	ASP
1	D	158	ASN
1	D	160	ILE
1	D	164	LEU
1	D	184	TRP
1	D	191	VAL
1	D	211	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	158	ASN
1	D	13	HIS

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Mol	Chain	Res	Type
1	D	158	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

16 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	C	301	-	4,4,4	0.52	0	6,6,6	0.55	0
3	FEG	B	302	-	34,40,40	2.10	5 (14%)	41,61,61	1.93	11 (26%)
4	SO4	C	305	-	4,4,4	0.74	0	6,6,6	0.75	0
2	ATP	C	302	-	28,33,33	0.94	0	34,52,52	1.37	3 (8%)
4	SO4	A	303	-	4,4,4	0.53	0	6,6,6	0.77	0
2	ATP	A	301	-	28,33,33	1.41	4 (14%)	34,52,52	1.33	2 (5%)
2	ATP	B	301	-	28,33,33	1.25	2 (7%)	34,52,52	2.14	7 (20%)
4	SO4	B	303	-	4,4,4	0.65	0	6,6,6	0.22	0
4	SO4	C	304	-	4,4,4	0.46	0	6,6,6	0.68	0
3	FEG	A	302	-	34,40,40	1.84	5 (14%)	41,61,61	1.92	12 (29%)
3	FEG	C	303	-	34,40,40	2.33	7 (20%)	41,61,61	2.01	14 (34%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	A	304	-	4,4,4	0.57	0	6,6,6	0.39	0
4	SO4	A	305	-	4,4,4	0.50	0	6,6,6	0.43	0
4	SO4	C	306	-	4,4,4	0.62	0	6,6,6	0.88	0
4	SO4	D	302	-	4,4,4	0.46	0	6,6,6	0.66	0
2	ATP	D	301	-	28,33,33	1.22	4 (14%)	34,52,52	1.83	5 (14%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FEG	B	302	-	-	6/15/35/35	0/4/4/4
2	ATP	C	302	-	-	10/18/38/38	0/3/3/3
2	ATP	A	301	-	-	5/18/38/38	0/3/3/3
2	ATP	B	301	-	-	6/18/38/38	0/3/3/3
3	FEG	A	302	-	-	5/15/35/35	0/4/4/4
3	FEG	C	303	-	-	3/15/35/35	0/4/4/4
2	ATP	D	301	-	-	6/18/38/38	0/3/3/3

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	303	FEG	C5-C6	9.61	1.48	1.39
3	B	302	FEG	C5-C6	8.87	1.48	1.39
3	A	302	FEG	C5-C6	7.06	1.46	1.39
3	C	303	FEG	C4-C3	4.78	1.48	1.39
3	C	303	FEG	C4-C5	4.57	1.47	1.39
2	B	301	ATP	PB-O3B	4.52	1.64	1.59
3	B	302	FEG	C4-C3	4.05	1.46	1.39
2	A	301	ATP	PA-O3A	3.83	1.63	1.59
3	B	302	FEG	C4-C5	3.65	1.46	1.39
3	A	302	FEG	O3P-C4	-3.36	1.35	1.40
3	C	303	FEG	C6A-N1A	-3.34	1.32	1.37
2	A	301	ATP	PB-O3B	3.29	1.63	1.59
3	A	302	FEG	C4-C3	3.27	1.45	1.39
3	A	302	FEG	C4-C5	3.17	1.45	1.39
2	D	301	ATP	PB-O3B	3.08	1.62	1.59
3	B	302	FEG	C2A-N3A	2.72	1.39	1.33
2	A	301	ATP	C2-N3	2.69	1.36	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302	FEG	O3P-C4	-2.67	1.36	1.40
3	A	302	FEG	C2A-N3A	2.66	1.39	1.33
2	A	301	ATP	PB-O3A	2.49	1.62	1.59
2	D	301	ATP	O4'-C1'	2.42	1.44	1.40
2	D	301	ATP	C2-N3	2.36	1.35	1.32
2	D	301	ATP	PA-O3A	2.33	1.62	1.59
3	C	303	FEG	C2A-N1A	-2.31	1.32	1.37
3	C	303	FEG	O4S-C1S	2.19	1.43	1.40
2	B	301	ATP	C2-N3	2.19	1.35	1.32
3	C	303	FEG	O3P-C4	-2.13	1.37	1.40

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	ATP	O4'-C1'-N9	9.01	120.70	108.75
2	D	301	ATP	C4'-O4'-C1'	-5.98	104.45	109.92
3	A	302	FEG	O6A-C6A-C5A	-5.60	113.22	124.32
2	D	301	ATP	O4'-C1'-N9	5.25	115.70	108.75
2	C	302	ATP	N3-C2-N1	-4.94	121.96	128.67
2	B	301	ATP	C4'-O4'-C1'	-4.66	105.65	109.92
3	A	302	FEG	O6A-C6A-N1A	4.59	126.06	120.62
3	B	302	FEG	O3P-C4-C3	4.39	123.77	118.08
3	C	303	FEG	C2-N1-C6	4.28	126.26	116.42
3	B	302	FEG	O6A-C6A-C5A	-4.17	116.05	124.32
3	C	303	FEG	C5-C6-N1	-4.15	119.50	123.84
2	A	301	ATP	N3-C2-N1	-3.99	123.25	128.67
2	D	301	ATP	N3-C2-N1	-3.92	123.35	128.67
3	B	302	FEG	C5A-C6A-N1A	3.88	121.48	114.07
2	A	301	ATP	O4'-C1'-N9	3.77	113.74	108.75
3	C	303	FEG	C5-C4-C3	-3.77	116.28	122.58
3	C	303	FEG	O3P-C4-C3	3.71	122.89	118.08
3	A	302	FEG	C5A-C6A-N1A	3.48	120.71	114.07
3	B	302	FEG	C2-N1-C6	3.47	124.39	116.42
3	A	302	FEG	C2-N1-C6	3.45	124.35	116.42
3	B	302	FEG	C4S-O4S-C1S	-3.42	106.79	109.92
2	B	301	ATP	N3-C2-N1	-3.41	124.05	128.67
3	C	303	FEG	C4S-O4S-C1S	3.34	112.98	109.92
3	A	302	FEG	C8A-N7A-C5A	3.27	108.12	102.55
3	C	303	FEG	C5A-C6A-N1A	3.07	119.93	114.07
3	B	302	FEG	C5-C4-C3	-3.03	117.51	122.58
3	B	302	FEG	C7-C6-N1	2.90	122.48	116.23
3	C	303	FEG	C4-C5-C6	2.84	119.80	116.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	302	FEG	C5-C6-N1	-2.83	120.89	123.84
3	C	303	FEG	C2A-N1A-C6A	-2.82	119.94	125.11
3	A	302	FEG	C2A-N1A-C6A	-2.67	120.22	125.11
3	B	302	FEG	C2A-N1A-C6A	-2.65	120.25	125.11
3	C	303	FEG	O6A-C6A-N1A	-2.48	117.68	120.62
3	C	303	FEG	O4S-C1S-N9A	-2.45	105.49	108.75
3	A	302	FEG	C4S-O4S-C1S	2.43	112.15	109.92
2	D	301	ATP	C1'-N9-C4	-2.43	122.38	126.64
2	B	301	ATP	C4-C5-N7	-2.41	106.79	109.34
3	A	302	FEG	C7-C6-N1	2.36	121.31	116.23
3	A	302	FEG	C5-C4-C3	-2.33	118.68	122.58
3	A	302	FEG	C5S-C4S-C3S	-2.27	107.05	115.21
3	B	302	FEG	C8A-N7A-C5A	2.26	106.39	102.55
2	B	301	ATP	O3A-PA-O1A	-2.25	103.92	110.70
3	C	303	FEG	C8A-N7A-C5A	2.25	106.38	102.55
3	B	302	FEG	O2P-P1-O3P	2.25	112.21	104.94
2	D	301	ATP	O3G-PG-O2G	2.20	116.07	107.80
3	A	302	FEG	O3P-C4-C3	2.20	120.94	118.08
2	C	302	ATP	O3G-PG-O2G	2.16	115.91	107.80
2	B	301	ATP	O2A-PA-O1A	2.13	122.36	112.44
2	B	301	ATP	O4'-C4'-C5'	2.13	116.15	109.33
3	C	303	FEG	O3P-C4-C5	2.10	120.80	118.08
2	C	302	ATP	C2'-C3'-C4'	2.07	106.62	102.61
3	A	302	FEG	C5-C6-N1	-2.07	121.67	123.84
3	C	303	FEG	C5M-C5-C6	-2.07	120.92	122.70
3	C	303	FEG	O2P-P1-O3P	2.04	111.53	104.94

There are no chirality outliers.

All (41) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	302	ATP	PB-O3B-PG-O3G
2	C	302	ATP	C5'-O5'-PA-O2A
2	C	302	ATP	C5'-O5'-PA-O3A
2	D	301	ATP	PB-O3A-PA-O5'
2	D	301	ATP	C5'-O5'-PA-O1A
2	D	301	ATP	C5'-O5'-PA-O2A
2	D	301	ATP	C5'-O5'-PA-O3A
3	A	302	FEG	C5S-O5S-P1-O3P
3	A	302	FEG	C5S-O5S-P1-O1P
3	A	302	FEG	C5S-O5S-P1-O2P
3	A	302	FEG	O4S-C4S-C5S-O5S

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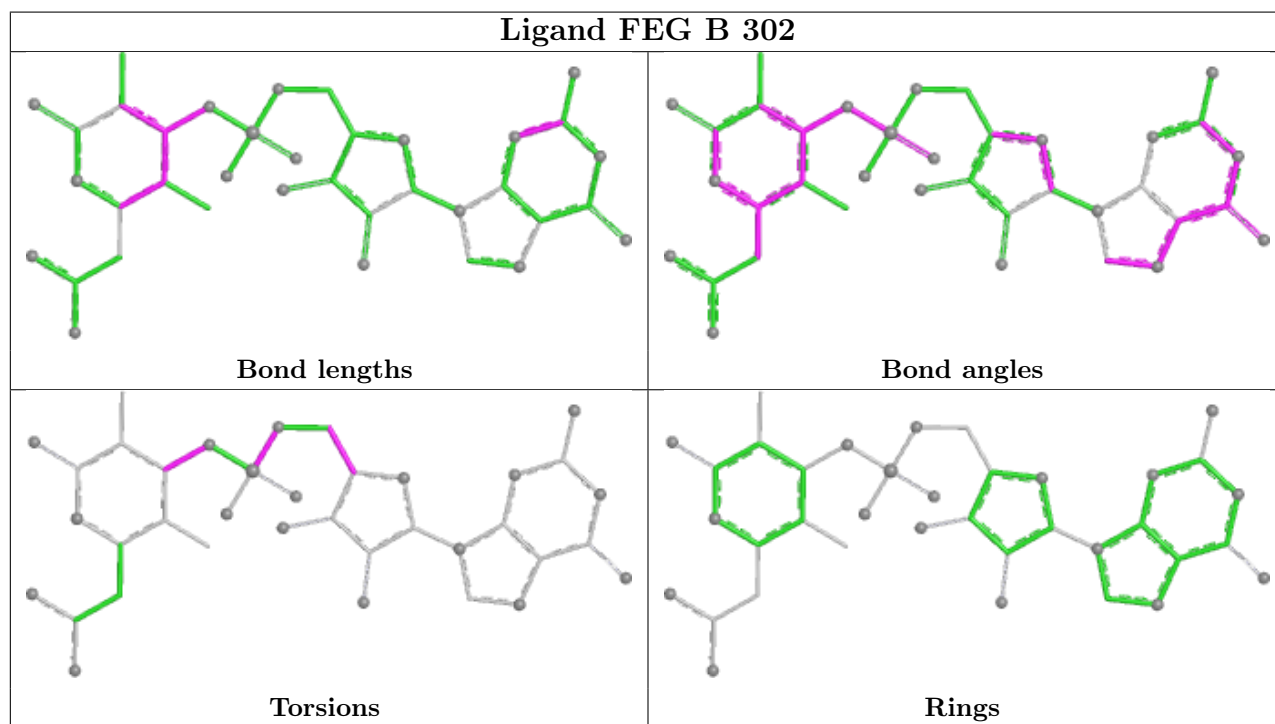
Mol	Chain	Res	Type	Atoms
3	C	303	FEG	C5S-O5S-P1-O1P
3	A	302	FEG	C3S-C4S-C5S-O5S
2	B	301	ATP	O4'-C4'-C5'-O5'
2	B	301	ATP	C3'-C4'-C5'-O5'
2	D	301	ATP	O4'-C4'-C5'-O5'
2	C	302	ATP	C3'-C4'-C5'-O5'
2	C	302	ATP	O4'-C4'-C5'-O5'
3	B	302	FEG	O4S-C4S-C5S-O5S
2	D	301	ATP	C3'-C4'-C5'-O5'
3	B	302	FEG	C3S-C4S-C5S-O5S
2	A	301	ATP	O4'-C4'-C5'-O5'
2	A	301	ATP	C3'-C4'-C5'-O5'
2	B	301	ATP	PB-O3A-PA-O1A
2	C	302	ATP	PB-O3A-PA-O2A
3	C	303	FEG	N1-C6-C7-C8
2	C	302	ATP	C5'-O5'-PA-O1A
3	B	302	FEG	C5S-O5S-P1-O3P
3	B	302	FEG	C5S-O5S-P1-O1P
3	B	302	FEG	C5S-O5S-P1-O2P
2	B	301	ATP	PB-O3A-PA-O2A
2	C	302	ATP	PB-O3B-PG-O1G
3	B	302	FEG	C3-C4-O3P-P1
3	C	303	FEG	C5-C6-C7-C8
2	C	302	ATP	C4'-C5'-O5'-PA
2	A	301	ATP	PA-O3A-PB-O2B
2	B	301	ATP	PG-O3B-PB-O1B
2	A	301	ATP	C4'-C5'-O5'-PA
2	A	301	ATP	PB-O3A-PA-O2A
2	B	301	ATP	PG-O3B-PB-O2B
2	C	302	ATP	PB-O3A-PA-O1A

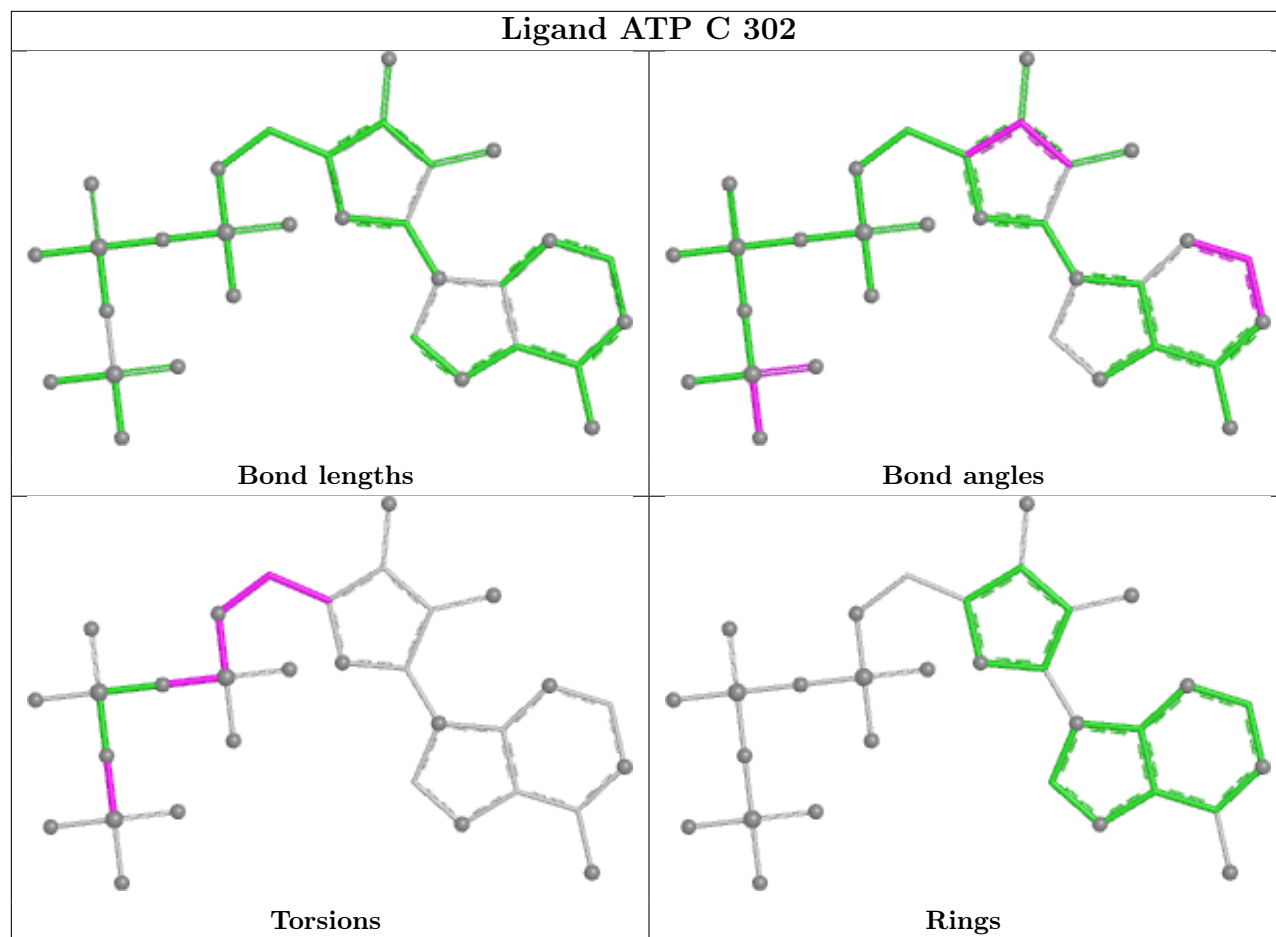
There are no ring outliers.

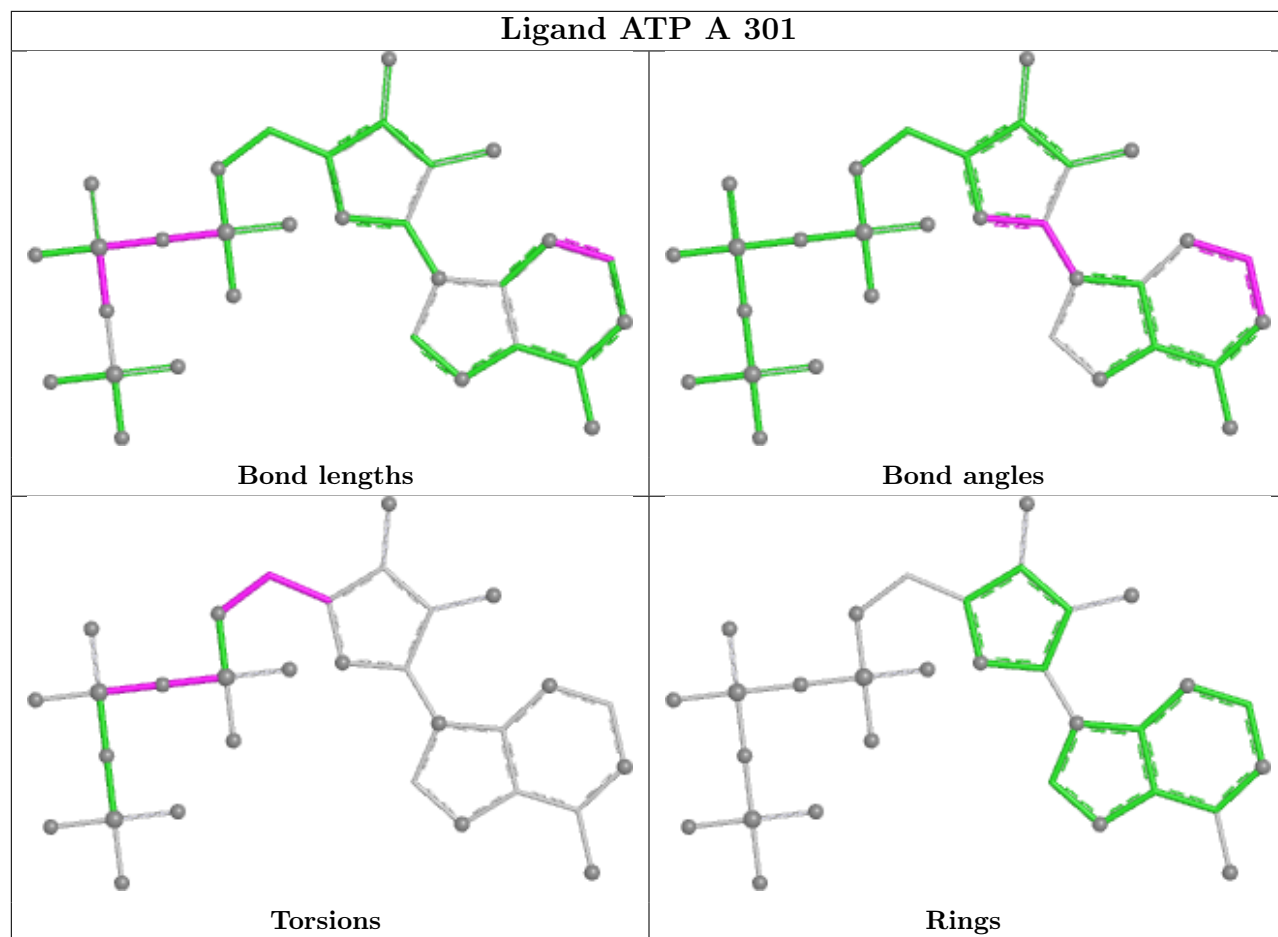
7 monomers are involved in 28 short contacts:

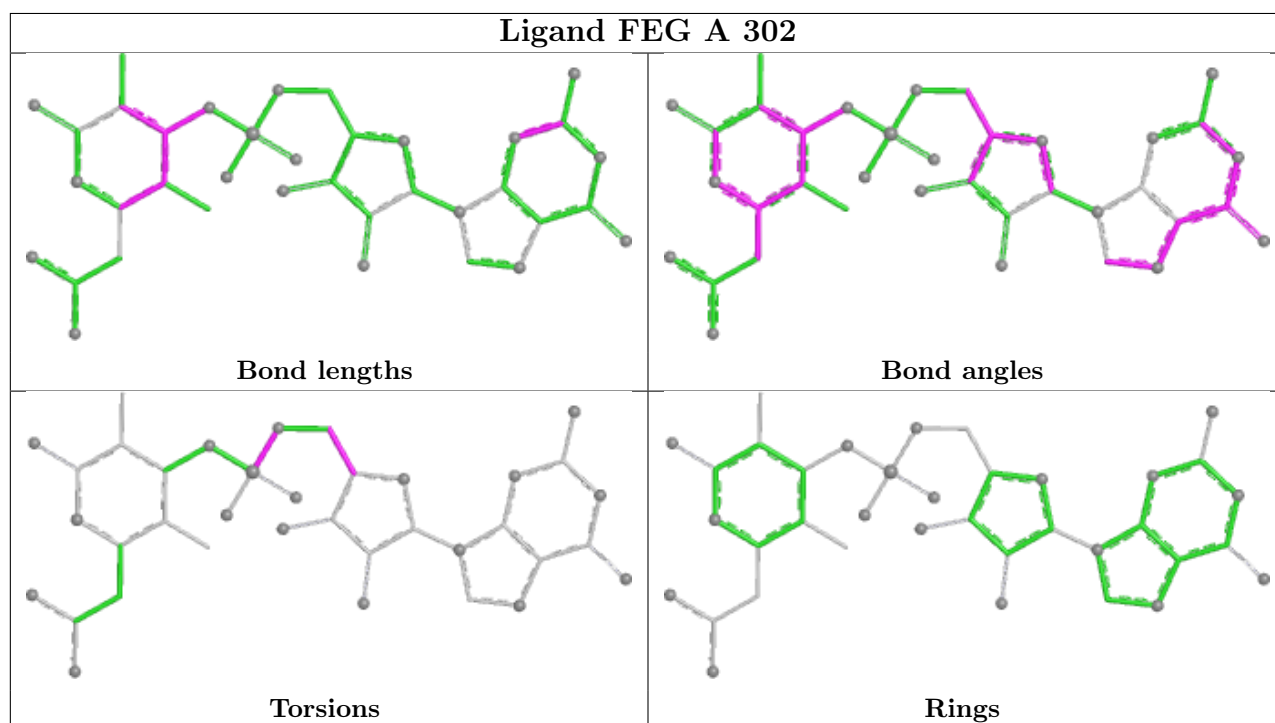
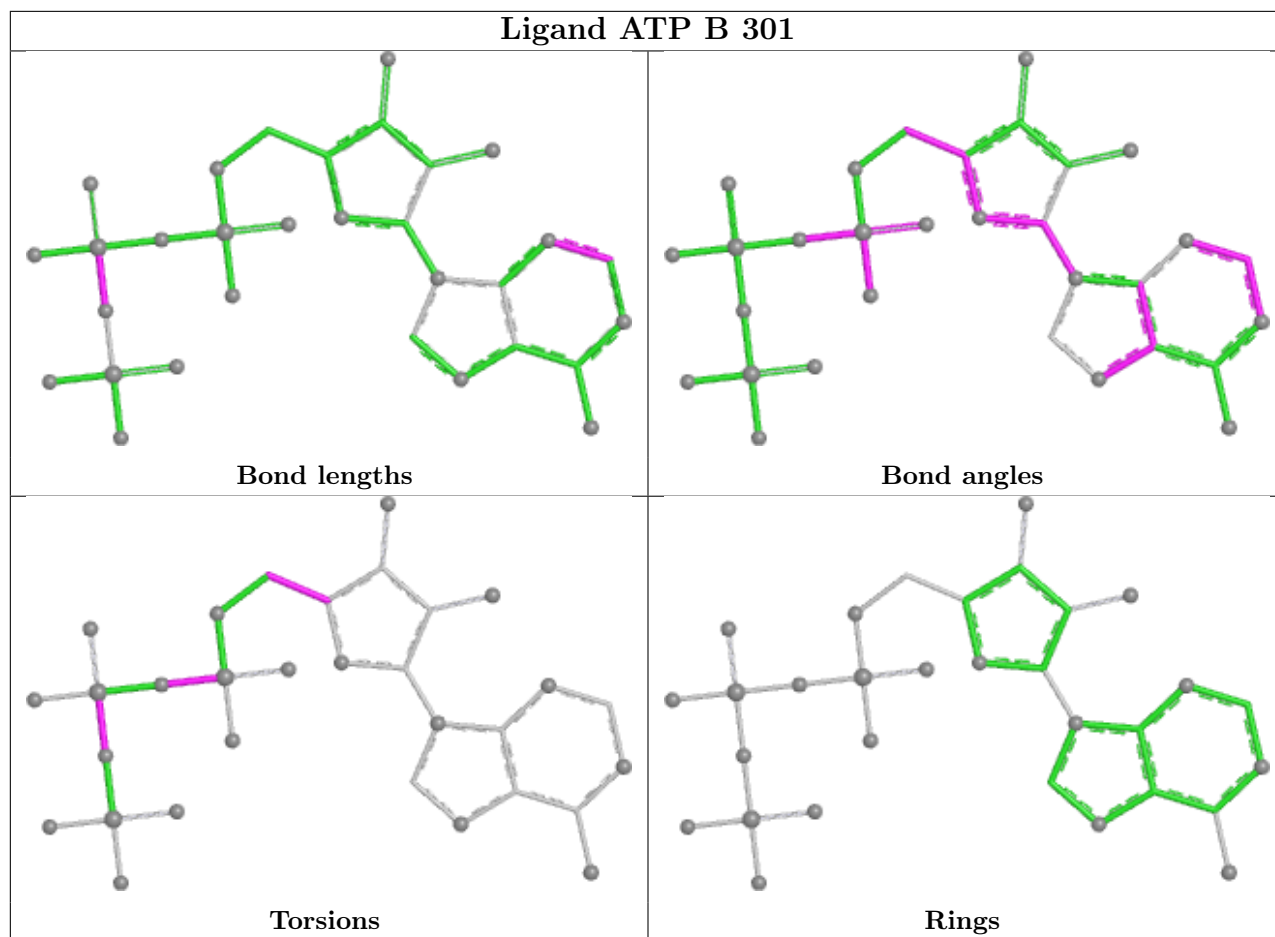
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	302	ATP	3	0
2	A	301	ATP	1	0
2	B	301	ATP	1	0
3	A	302	FEG	8	0
3	C	303	FEG	12	0
4	A	305	SO4	1	0
2	D	301	ATP	2	0

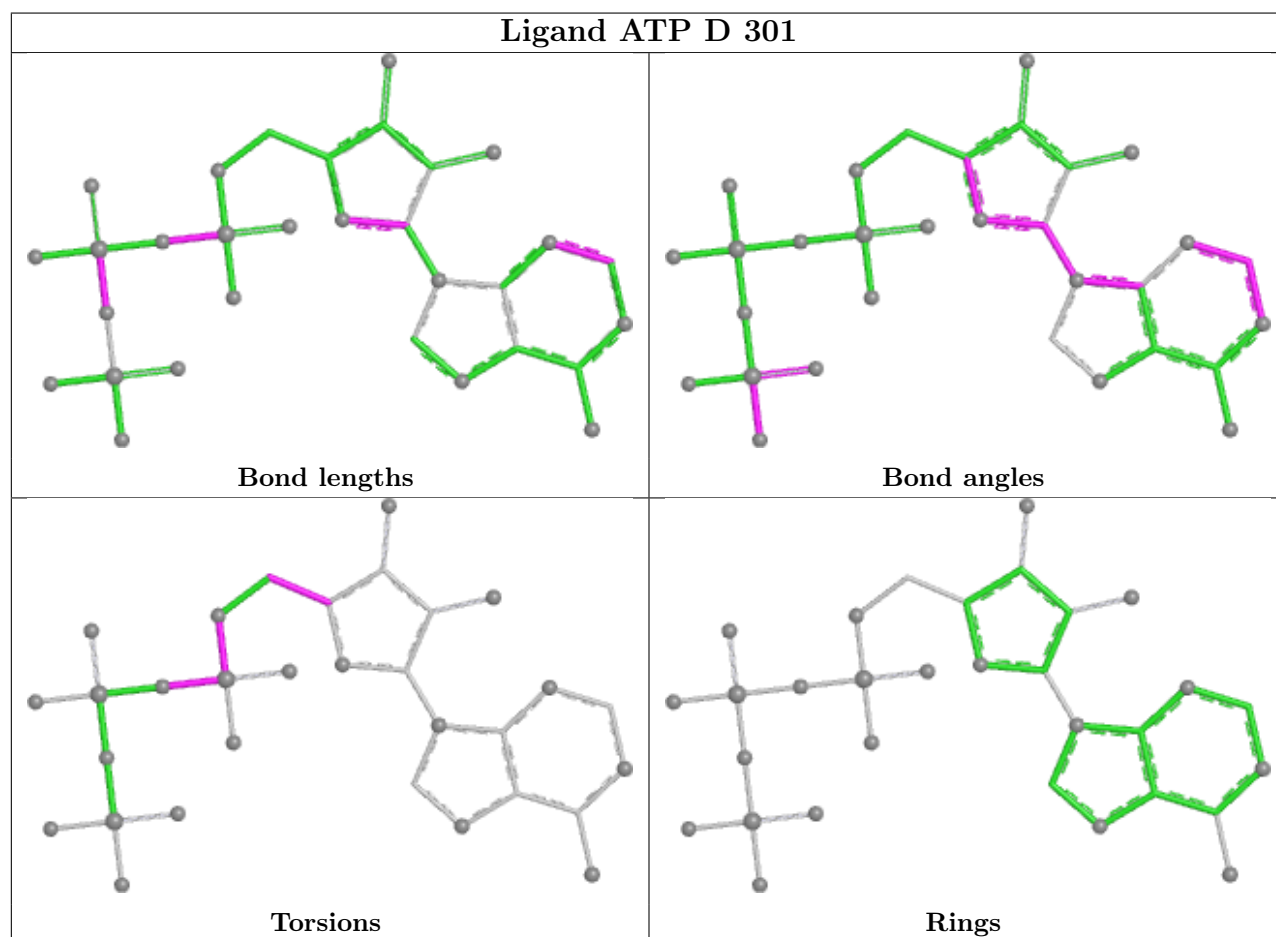
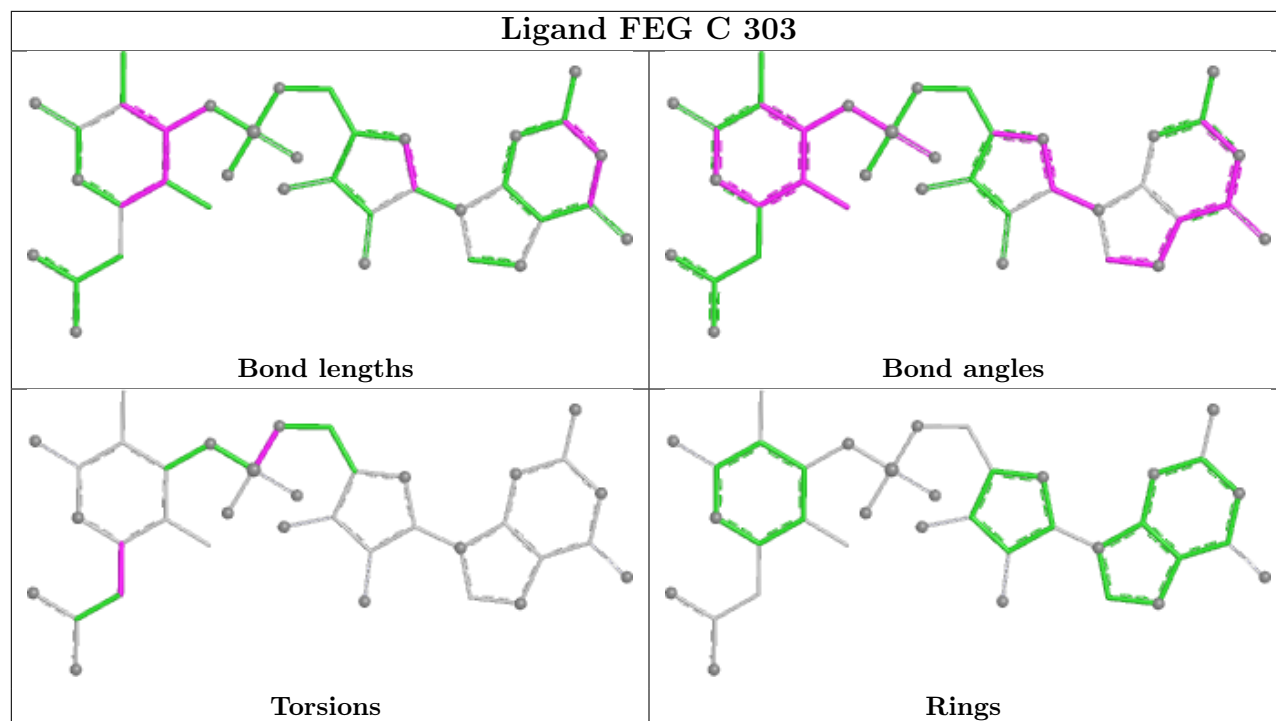
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











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	205/218 (94%)	-0.20	1 (0%) 91 94	36, 55, 70, 90	0
1	B	205/218 (94%)	-0.36	0 100 100	36, 52, 72, 96	0
1	C	205/218 (94%)	0.16	13 (6%) 20 24	41, 65, 87, 111	0
1	D	205/218 (94%)	0.11	8 (3%) 39 46	37, 66, 89, 108	0
All	All	820/872 (94%)	-0.07	22 (2%) 54 63	36, 59, 84, 111	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	160	ILE	4.4
1	C	166	ALA	4.2
1	C	121	ILE	4.0
1	C	100	ILE	3.6
1	D	127	GLU	3.6
1	D	162	ALA	3.5
1	C	164	LEU	3.5
1	D	159	PRO	3.5
1	C	179	LYS	2.9
1	D	95	ASP	2.9
1	C	159	PRO	2.8
1	C	116	PRO	2.7
1	C	157	GLU	2.5
1	C	119	THR	2.4
1	D	149	VAL	2.3
1	C	117	ILE	2.3
1	C	156	PRO	2.3
1	D	156	PRO	2.2
1	C	154	ALA	2.2
1	A	100	ILE	2.1
1	D	169	ILE	2.0
1	D	174	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

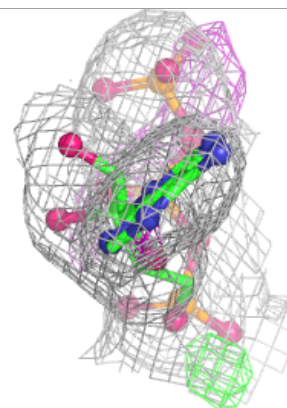
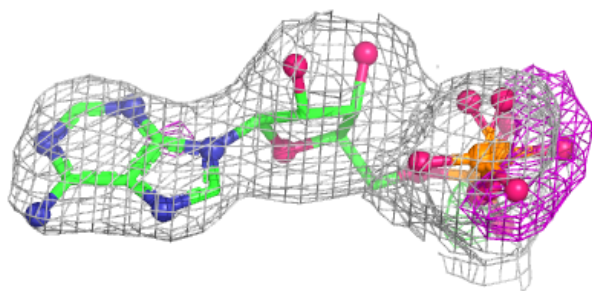
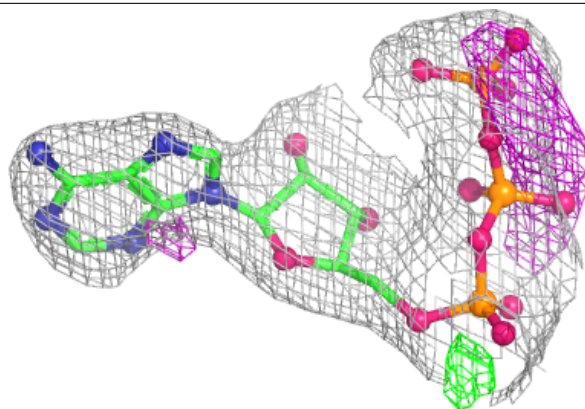
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	ATP	C	302	31/31	0.92	0.19	44,67,103,115	0
3	FEG	C	303	37/37	0.92	0.14	46,64,79,85	0
3	FEG	A	302	37/37	0.93	0.16	47,64,74,79	0
3	FEG	B	302	37/37	0.93	0.16	46,57,66,70	0
2	ATP	A	301	31/31	0.93	0.18	44,54,90,97	0
2	ATP	D	301	31/31	0.94	0.15	51,63,106,113	0
2	ATP	B	301	31/31	0.94	0.15	50,60,87,103	0
4	SO4	C	304	5/5	0.96	0.11	68,69,78,87	0
4	SO4	C	301	5/5	0.96	0.07	78,83,85,94	0
4	SO4	D	302	5/5	0.96	0.10	75,88,90,97	0
4	SO4	A	303	5/5	0.97	0.09	51,57,74,76	0
4	SO4	A	304	5/5	0.97	0.17	60,63,66,76	0
4	SO4	C	306	5/5	0.97	0.13	53,53,64,66	0
4	SO4	A	305	5/5	0.97	0.10	75,80,92,102	0
4	SO4	B	303	5/5	0.98	0.12	50,57,59,62	0
4	SO4	C	305	5/5	0.98	0.14	58,58,70,72	0

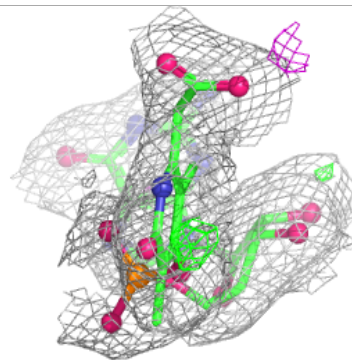
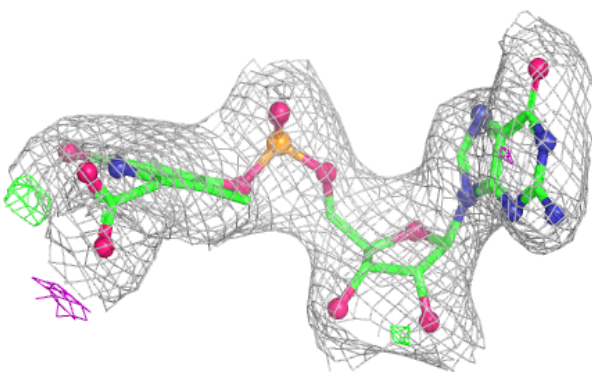
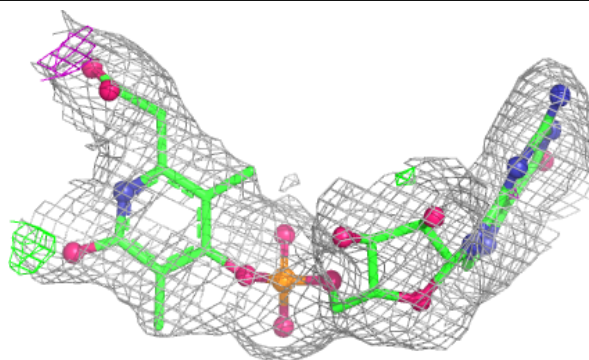
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP C 302:

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

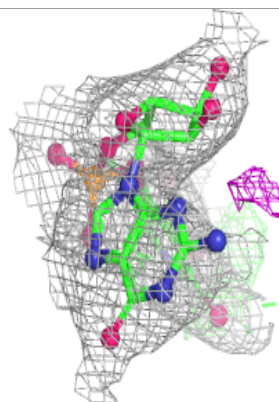
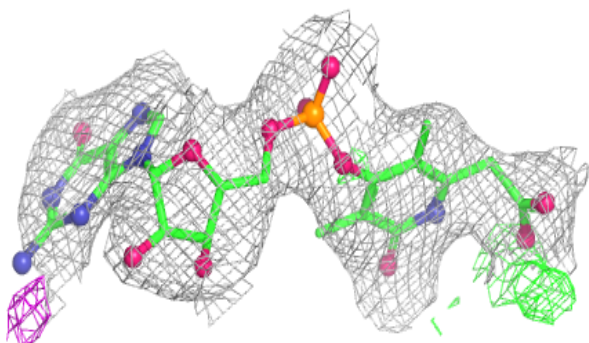
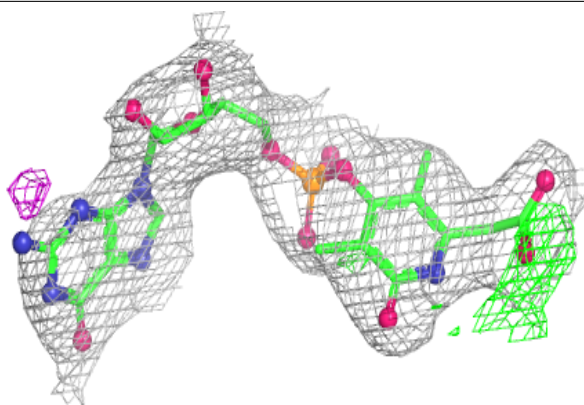
**Electron density around FEG C 303:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

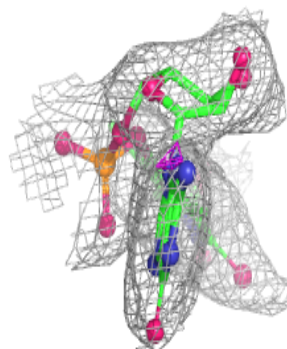
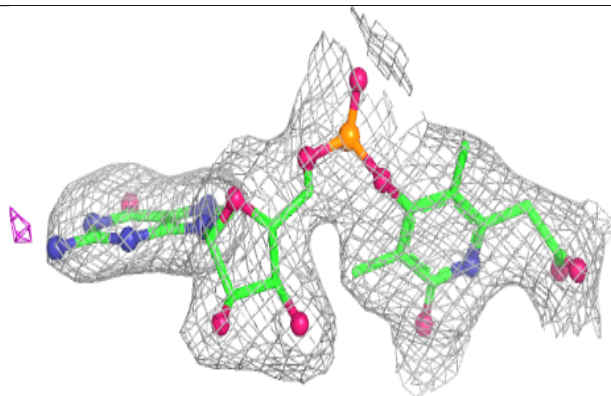
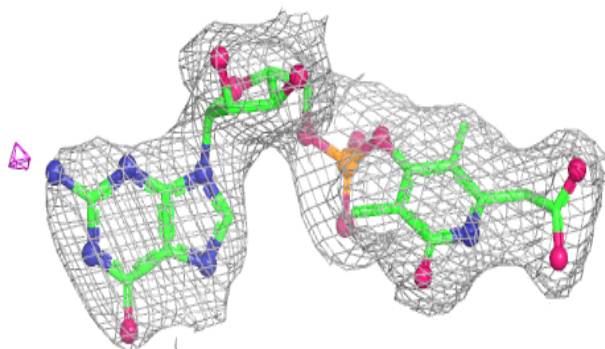


Electron density around FEG A 302:

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

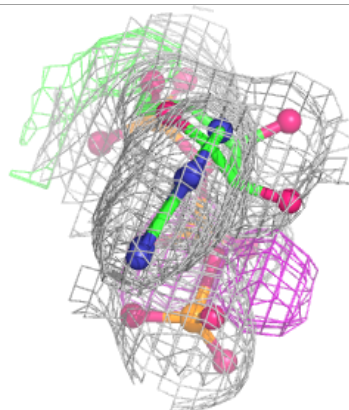
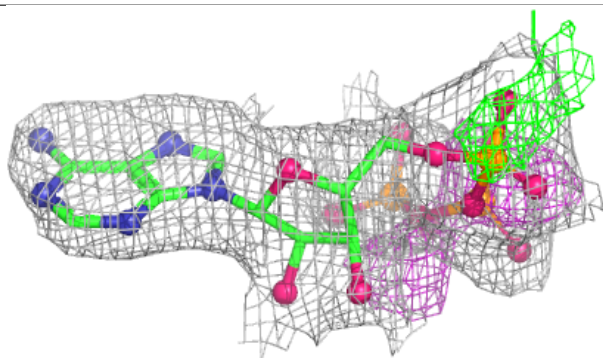
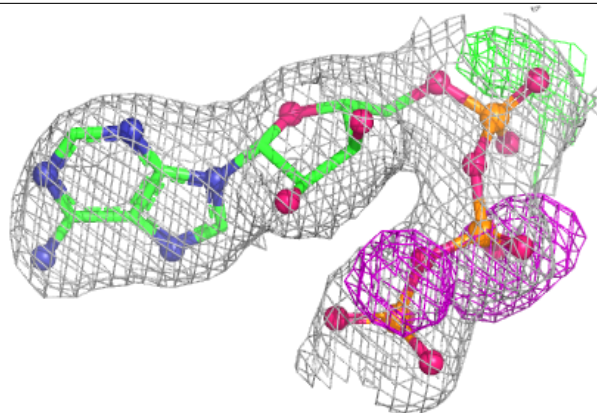
**Electron density around FEG B 302:**

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

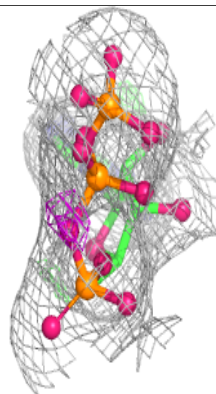
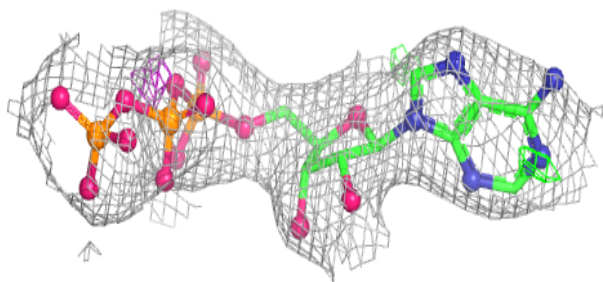
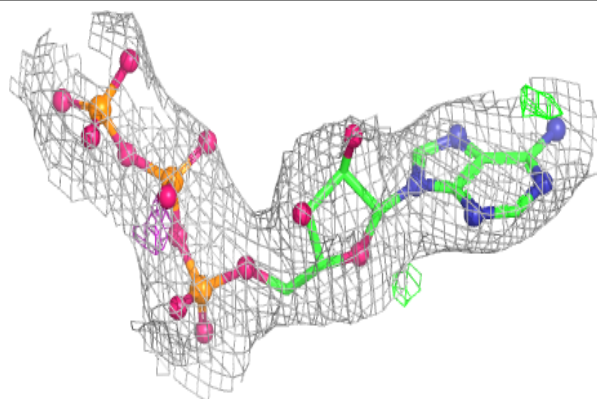


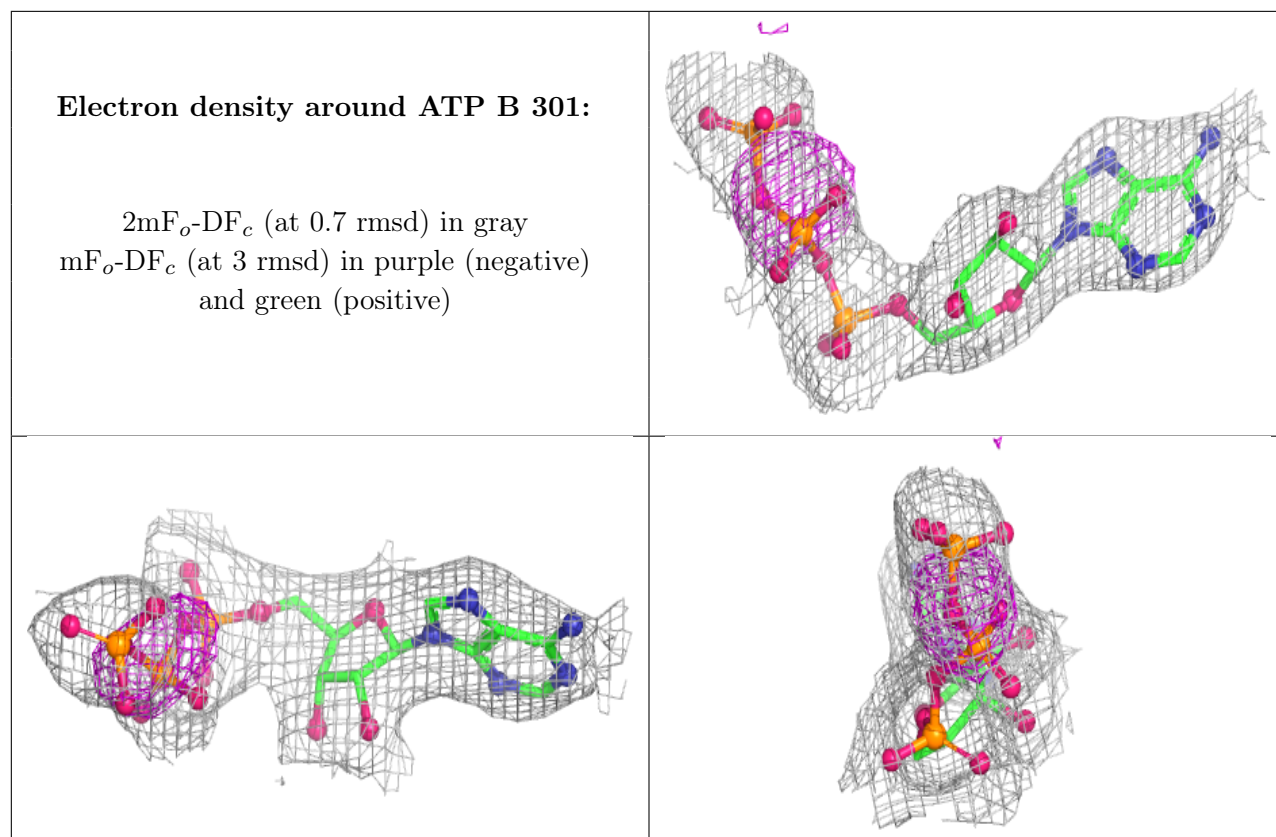
Electron density around ATP A 301:

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

**Electron density around ATP D 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 [i](#)

There are no such residues in this entry.