

Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Sep 9, 2019 – 09:36 AM EDT

PDB ID : 6OF2
EMDB ID: : EMD-20040
Title : Precursor ribosomal RNA processing complex, State 2.
Authors : Pillon, M.C.; Hsu, A.L.; Krahn, J.M.; Williams, J.G.; Goslen, K.H.; Sobhany, M.; Borgnia, M.J.; Stanley, R.E.
Deposited on : 2019-03-28
Resolution : 2.90 Å(reported)

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report
for a publicly released PDB/EMDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

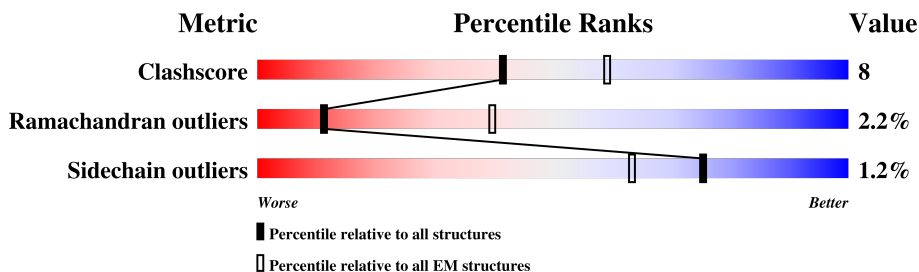
MolProbity : 4.02b-467
Mogul : 1.8.0 (224370), CSD as540be (2019)
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : 2.4

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 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)	EM structures (#Entries)
Clashscore	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	391	
1	D	391	
2	B	640	
2	E	640	

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 11062 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Ribonuclease.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	183	1451	928	258	259	6	0	0
1	D	183	1451	928	258	259	6	0	0

There are 56 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-27	MET	-	initiating methionine	UNP G0SGE9
A	-26	SER	-	expression tag	UNP G0SGE9
A	-25	TYR	-	expression tag	UNP G0SGE9
A	-24	TYR	-	expression tag	UNP G0SGE9
A	-23	HIS	-	expression tag	UNP G0SGE9
A	-22	HIS	-	expression tag	UNP G0SGE9
A	-21	HIS	-	expression tag	UNP G0SGE9
A	-20	HIS	-	expression tag	UNP G0SGE9
A	-19	HIS	-	expression tag	UNP G0SGE9
A	-18	HIS	-	expression tag	UNP G0SGE9
A	-17	ASP	-	expression tag	UNP G0SGE9
A	-16	TYR	-	expression tag	UNP G0SGE9
A	-15	ASP	-	expression tag	UNP G0SGE9
A	-14	ILE	-	expression tag	UNP G0SGE9
A	-13	PRO	-	expression tag	UNP G0SGE9
A	-12	THR	-	expression tag	UNP G0SGE9
A	-11	THR	-	expression tag	UNP G0SGE9
A	-10	GLU	-	expression tag	UNP G0SGE9
A	-9	ASN	-	expression tag	UNP G0SGE9
A	-8	LEU	-	expression tag	UNP G0SGE9
A	-7	TYR	-	expression tag	UNP G0SGE9
A	-6	PHE	-	expression tag	UNP G0SGE9
A	-5	GLN	-	expression tag	UNP G0SGE9
A	-4	GLY	-	expression tag	UNP G0SGE9
A	-3	ALA	-	expression tag	UNP G0SGE9
A	-2	MET	-	expression tag	UNP G0SGE9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP G0SGE9
A	0	SER	-	expression tag	UNP G0SGE9
D	-27	MET	-	initiating methionine	UNP G0SGE9
D	-26	SER	-	expression tag	UNP G0SGE9
D	-25	TYR	-	expression tag	UNP G0SGE9
D	-24	TYR	-	expression tag	UNP G0SGE9
D	-23	HIS	-	expression tag	UNP G0SGE9
D	-22	HIS	-	expression tag	UNP G0SGE9
D	-21	HIS	-	expression tag	UNP G0SGE9
D	-20	HIS	-	expression tag	UNP G0SGE9
D	-19	HIS	-	expression tag	UNP G0SGE9
D	-18	HIS	-	expression tag	UNP G0SGE9
D	-17	ASP	-	expression tag	UNP G0SGE9
D	-16	TYR	-	expression tag	UNP G0SGE9
D	-15	ASP	-	expression tag	UNP G0SGE9
D	-14	ILE	-	expression tag	UNP G0SGE9
D	-13	PRO	-	expression tag	UNP G0SGE9
D	-12	THR	-	expression tag	UNP G0SGE9
D	-11	THR	-	expression tag	UNP G0SGE9
D	-10	GLU	-	expression tag	UNP G0SGE9
D	-9	ASN	-	expression tag	UNP G0SGE9
D	-8	LEU	-	expression tag	UNP G0SGE9
D	-7	TYR	-	expression tag	UNP G0SGE9
D	-6	PHE	-	expression tag	UNP G0SGE9
D	-5	GLN	-	expression tag	UNP G0SGE9
D	-4	GLY	-	expression tag	UNP G0SGE9
D	-3	ALA	-	expression tag	UNP G0SGE9
D	-2	MET	-	expression tag	UNP G0SGE9
D	-1	GLY	-	expression tag	UNP G0SGE9
D	0	SER	-	expression tag	UNP G0SGE9

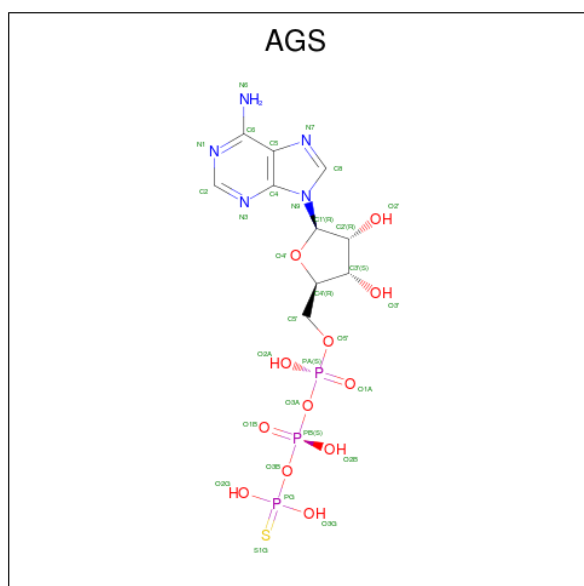
- Molecule 2 is a protein called CLP1_P domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	528	Total	C	N	O	S	0	0
			4048	2586	702	739	21		
2	E	528	Total	C	N	O	S	0	0
			4048	2586	702	739	21		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	109	MET	-	initiating methionine	UNP G0S263
E	109	MET	-	initiating methionine	UNP G0S263

- Molecule 3 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (three-letter code: AGS) (formula: C₁₀H₁₆N₅O₁₂P₃S) (labeled as "Ligand of Interest" by author).



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

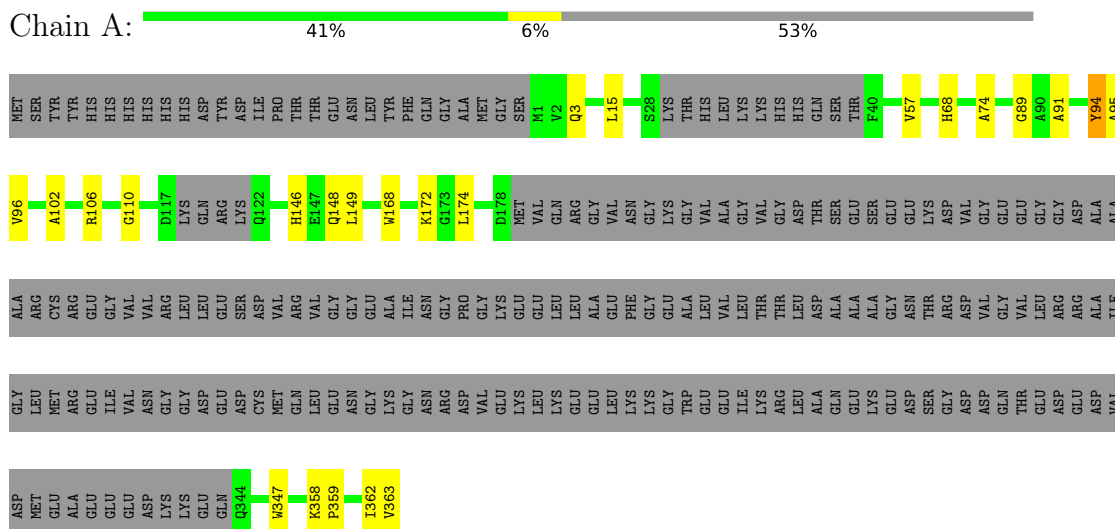
- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
4	B	1	Total	Mg	0
			1	1	
4	E	1	Total	Mg	0
			1	1	

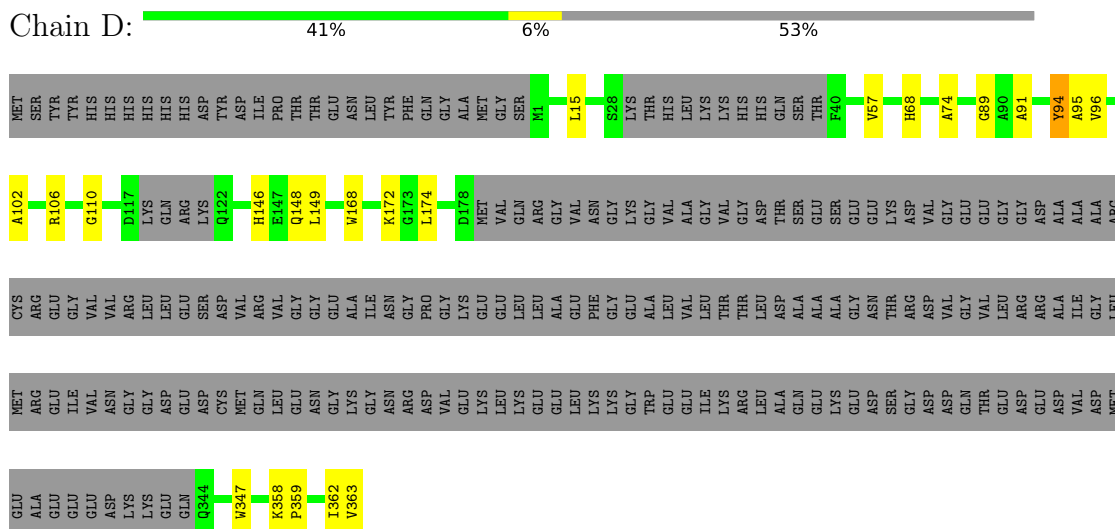
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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. 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. 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: Ribonuclease



- Molecule 1: Ribonuclease



- Molecule 2: CLP1_P domain-containing protein



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of particles used	70561	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor

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: MG, AGS

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 >2	RMSZ	# Z >2
1	A	0.35	0/1490	0.44	0/2021
1	D	0.35	0/1490	0.44	0/2021
2	B	0.32	0/4158	0.55	1/5683 (0.0%)
2	E	0.32	0/4158	0.55	1/5683 (0.0%)
All	All	0.33	0/11296	0.53	2/15408 (0.0%)

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
2	B	0	1
2	E	0	1
All	All	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	455	PRO	N-CA-CB	6.10	110.62	103.30
2	B	455	PRO	N-CA-CB	6.06	110.58	103.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	295	ARG	Peptide
2	E	295	ARG	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	1451	0	1402	16	0
1	D	1451	0	1402	15	0
2	B	4048	0	4024	75	0
2	E	4048	0	4024	78	0
3	B	31	0	12	1	0
3	E	31	0	12	1	0
4	B	1	0	0	0	0
4	E	1	0	0	0	0
All	All	11062	0	10876	175	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (175) 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)
2:E:160:THR:H	2:E:287:THR:HG21	1.38	0.87
2:B:160:THR:H	2:B:287:THR:HG21	1.38	0.85
1:D:91:ALA:HB1	1:D:95:ALA:HB3	1.59	0.83
1:A:91:ALA:HB1	1:A:95:ALA:HB3	1.59	0.82
2:B:222:GLN:NE2	2:B:229:ASP:OD2	2.17	0.77
1:A:106:ARG:NH1	1:D:146:HIS:O	2.17	0.77
2:E:222:GLN:NE2	2:E:229:ASP:OD2	2.17	0.76
2:E:165:ASP:OD1	2:E:289:ARG:NH2	2.22	0.72
2:B:165:ASP:OD1	2:B:289:ARG:NH2	2.22	0.72
2:E:116:PRO:HG2	2:E:224:ILE:O	1.91	0.71
2:B:239:LEU:HA	3:B:801:AGS:H2	1.70	0.71
2:E:239:LEU:HA	3:E:801:AGS:H2	1.70	0.71
2:B:116:PRO:HG2	2:B:224:ILE:O	1.91	0.70
2:B:115:GLN:HB2	2:B:116:PRO:HD3	1.74	0.70
1:A:146:HIS:O	1:D:106:ARG:NH1	2.25	0.70
2:E:115:GLN:HB2	2:E:116:PRO:HD3	1.74	0.69
2:E:257:ARG:HH11	2:E:257:ARG:HB3	1.57	0.69
2:B:272:SER:OG	2:B:424:MET:O	2.11	0.69
2:B:257:ARG:HB3	2:B:257:ARG:HH11	1.57	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:272:SER:OG	2:E:424:MET:O	2.11	0.67
2:B:113:SER:HG	2:B:226:THR:HG1	1.42	0.66
1:A:363:VAL:HG11	2:B:639:SER:HB3	1.77	0.65
2:E:633:VAL:HG13	2:E:651:THR:HG22	1.81	0.63
2:B:633:VAL:HG13	2:B:651:THR:HG22	1.81	0.63
2:E:512:ARG:NE	2:E:646:GLU:OE1	2.32	0.62
2:B:512:ARG:NE	2:B:646:GLU:OE1	2.32	0.62
2:E:633:VAL:HG11	2:E:649:LEU:HD22	1.82	0.62
2:B:277:PHE:HE2	2:B:422:LEU:HD13	1.66	0.61
2:B:567:ASP:OD1	2:B:568:THR:N	2.33	0.61
2:E:567:ASP:OD1	2:E:568:THR:N	2.33	0.61
2:B:633:VAL:HG11	2:B:649:LEU:HD22	1.82	0.60
2:E:277:PHE:HE2	2:E:422:LEU:HD13	1.66	0.60
2:B:355:ARG:HD2	2:B:381:TYR:CE1	2.39	0.58
2:E:355:ARG:HD2	2:E:381:TYR:CE1	2.39	0.57
2:B:265:PHE:CZ	2:B:397:THR:HG21	2.40	0.57
2:E:265:PHE:CZ	2:E:397:THR:HG21	2.40	0.56
2:B:524:VAL:HG22	2:B:526:GLY:H	1.71	0.56
2:E:419:THR:HG22	2:E:420:GLU:HG3	1.87	0.56
2:B:515:LEU:HD11	2:B:647:LEU:HG	1.88	0.56
2:E:636:ARG:HD2	2:E:650:LEU:HD23	1.88	0.56
2:E:515:LEU:HD11	2:E:647:LEU:HG	1.88	0.55
2:E:524:VAL:HG22	2:E:526:GLY:H	1.71	0.55
2:B:636:ARG:HD2	2:B:650:LEU:HD23	1.88	0.55
2:B:419:THR:HG22	2:B:420:GLU:HG3	1.88	0.55
2:B:548:MET:HE3	2:B:668:LEU:HB3	1.89	0.54
2:B:259:LYS:HB3	2:B:260:PRO:HD2	1.89	0.54
2:E:548:MET:HE3	2:E:668:LEU:HB3	1.90	0.54
2:E:259:LYS:HB3	2:E:260:PRO:HD2	1.89	0.54
1:A:102:ALA:HB2	1:D:102:ALA:HB2	1.90	0.53
1:A:358:LYS:O	2:B:636:ARG:NH2	2.41	0.53
2:B:289:ARG:HG2	2:B:294:SER:O	2.08	0.52
2:E:234:THR:OG1	2:E:235:SER:N	2.42	0.52
2:E:289:ARG:HG2	2:E:294:SER:O	2.08	0.52
2:E:440:CYS:SG	2:E:446:ILE:HB	2.50	0.52
1:A:68:HIS:NE2	1:A:110:GLY:HA3	2.26	0.51
2:B:440:CYS:SG	2:B:446:ILE:HB	2.50	0.51
2:E:173:PRO:HG2	2:E:330:PRO:HG2	1.93	0.51
2:B:234:THR:OG1	2:B:235:SER:N	2.42	0.51
2:E:555:LYS:HD2	2:E:626:TYR:HD2	1.76	0.51
2:E:248:LYS:HE3	2:E:252:LEU:HD21	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:555:LYS:HD2	2:B:626:TYR:HD2	1.76	0.51
2:B:248:LYS:HE3	2:B:252:LEU:HD21	1.92	0.50
1:D:68:HIS:NE2	1:D:110:GLY:HA3	2.26	0.50
2:B:169:TRP:NE1	2:B:496:PRO:HB3	2.27	0.50
2:B:173:PRO:HG2	2:B:330:PRO:HG2	1.92	0.50
2:E:169:TRP:NE1	2:E:496:PRO:HB3	2.27	0.50
2:E:195:PRO:HG2	2:E:196:THR:H	1.77	0.49
2:E:474:LEU:HA	2:E:477:MET:HE3	1.95	0.49
2:B:174:HIS:HE1	2:B:234:THR:O	1.96	0.48
2:E:400:TRP:HB3	2:E:405:GLY:HA3	1.95	0.48
2:B:115:GLN:CB	2:B:116:PRO:HD3	2.44	0.48
2:B:474:LEU:HA	2:B:477:MET:HE3	1.96	0.48
2:E:442:SER:C	2:E:444:SER:H	2.17	0.48
2:B:337:LEU:HD13	2:B:351:MET:HB3	1.96	0.47
2:E:513:VAL:CG2	2:E:647:LEU:HB2	2.44	0.47
2:E:174:HIS:HE1	2:E:234:THR:O	1.96	0.47
2:B:400:TRP:HB3	2:B:405:GLY:HA3	1.95	0.47
2:B:142:LEU:HD12	2:B:178:LEU:HD21	1.97	0.47
2:B:516:ALA:HB2	2:B:645:PRO:HD2	1.97	0.47
2:B:442:SER:C	2:B:444:SER:H	2.17	0.47
2:B:195:PRO:HG2	2:B:196:THR:H	1.77	0.47
2:B:513:VAL:CG2	2:B:647:LEU:HB2	2.45	0.47
2:E:433:VAL:HG12	2:E:437:ARG:HH12	1.80	0.47
2:B:433:VAL:HG12	2:B:437:ARG:HH12	1.81	0.46
1:D:359:PRO:HG2	1:D:362:ILE:HD12	1.98	0.46
2:E:337:LEU:HD13	2:E:351:MET:HB3	1.96	0.46
2:E:224:ILE:HG12	2:E:229:ASP:HB2	1.97	0.46
2:B:201:ARG:HG2	2:B:201:ARG:HH11	1.81	0.46
2:B:224:ILE:HG12	2:B:229:ASP:HB2	1.97	0.46
2:E:516:ALA:HB2	2:E:645:PRO:HD2	1.97	0.46
2:E:142:LEU:HD12	2:E:178:LEU:HD21	1.97	0.46
2:E:115:GLN:CB	2:E:116:PRO:HD3	2.44	0.45
2:B:169:TRP:CD1	2:B:496:PRO:HB3	2.52	0.45
2:B:636:ARG:HH11	2:B:636:ARG:HG3	1.82	0.45
2:E:201:ARG:HH11	2:E:201:ARG:HG2	1.81	0.45
1:A:359:PRO:HG2	1:A:362:ILE:HD12	1.98	0.45
2:E:169:TRP:CD1	2:E:496:PRO:HB3	2.52	0.45
2:E:548:MET:SD	2:E:670:ALA:HB2	2.56	0.45
1:A:347:TRP:CZ3	2:B:649:LEU:HD11	2.51	0.45
2:E:178:LEU:HD12	2:E:178:LEU:H	1.82	0.45
2:B:548:MET:SD	2:B:670:ALA:HB2	2.56	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:419:THR:O	2:E:447:PRO:HD2	2.18	0.44
2:B:539:VAL:HG21	2:B:613:LEU:CD1	2.47	0.44
1:D:149:LEU:HD12	1:D:149:LEU:H	1.82	0.44
2:E:355:ARG:NH2	2:E:554:GLU:OE2	2.41	0.44
2:E:636:ARG:HH11	2:E:636:ARG:HG3	1.82	0.44
2:B:156:ILE:HG12	2:B:181:LEU:HD13	2.00	0.44
2:B:178:LEU:H	2:B:178:LEU:HD12	1.82	0.44
2:B:269:PRO:HB3	2:B:401:ILE:HD13	1.99	0.44
2:B:287:THR:O	2:B:289:ARG:HG3	2.18	0.44
2:E:156:ILE:HG12	2:E:181:LEU:HD13	2.00	0.44
2:E:136:VAL:HA	2:E:183:THR:O	2.18	0.44
1:A:149:LEU:H	1:A:149:LEU:HD12	1.81	0.43
2:B:419:THR:O	2:B:447:PRO:HD2	2.18	0.43
2:E:539:VAL:HG21	2:E:613:LEU:CD1	2.47	0.43
2:E:269:PRO:HB3	2:E:401:ILE:HD13	2.00	0.43
2:E:252:LEU:HD22	2:E:420:GLU:OE1	2.18	0.43
2:B:136:VAL:HA	2:B:183:THR:O	2.18	0.43
2:E:133:THR:HB	2:E:137:GLU:OE1	2.19	0.43
1:A:3:GLN:H	1:A:3:GLN:HG2	1.67	0.42
2:B:125:ALA:O	2:B:128:ARG:HG2	2.19	0.42
2:B:148:LYS:HD2	2:B:167:VAL:HG22	2.01	0.42
2:E:201:ARG:NH2	2:E:215:ASN:OD1	2.52	0.42
2:E:148:LYS:HD2	2:E:167:VAL:HG22	2.01	0.42
2:B:133:THR:HB	2:B:137:GLU:OE1	2.19	0.42
2:B:360:ALA:HB1	2:B:671:GLY:HA3	2.01	0.42
2:E:131:LEU:O	2:E:131:LEU:HD12	2.19	0.42
2:B:131:LEU:O	2:B:131:LEU:HD12	2.19	0.42
2:B:611:LEU:O	2:B:613:LEU:N	2.53	0.42
2:E:201:ARG:NH1	2:E:201:ARG:HG2	2.34	0.42
2:E:198:GLN:HE22	2:E:202:GLU:HG3	1.84	0.42
2:B:532:HIS:ND1	2:B:533:GLN:O	2.41	0.42
1:D:363:VAL:HG11	2:E:639:SER:HB3	2.01	0.42
1:D:347:TRP:CZ3	2:E:649:LEU:HD11	2.55	0.42
2:B:201:ARG:HG2	2:B:201:ARG:NH1	2.34	0.42
2:B:252:LEU:HD22	2:B:420:GLU:OE1	2.18	0.42
2:E:287:THR:O	2:E:289:ARG:HG3	2.18	0.42
2:E:532:HIS:ND1	2:E:533:GLN:O	2.41	0.42
1:D:91:ALA:HB3	1:D:96:VAL:HG23	2.01	0.42
2:E:423:TYR:CE2	2:E:425:SER:HB3	2.55	0.42
1:A:91:ALA:HB3	1:A:96:VAL:HG23	2.01	0.42
2:B:256:THR:OG1	2:B:262:PRO:HG2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:198:GLN:HE22	2:B:202:GLU:HG3	1.85	0.42
2:B:423:TYR:CE2	2:B:425:SER:HB3	2.55	0.42
2:E:125:ALA:O	2:E:128:ARG:HG2	2.19	0.42
2:E:139:PHE:N	2:E:139:PHE:CD2	2.87	0.42
2:B:511:TRP:HB2	2:B:649:LEU:O	2.21	0.41
2:E:222:GLN:HB2	2:E:222:GLN:HE21	1.62	0.41
2:E:249:ILE:HG21	2:E:284:ARG:HD3	2.00	0.41
2:B:201:ARG:NH2	2:B:215:ASN:OD1	2.52	0.41
1:D:168:TRP:CZ3	1:D:172:LYS:HD2	2.55	0.41
1:D:358:LYS:O	2:E:636:ARG:NH2	2.52	0.41
2:B:249:ILE:HG21	2:B:284:ARG:HD3	2.00	0.41
2:E:171:HIS:C	2:E:173:PRO:HD3	2.41	0.41
2:E:611:LEU:O	2:E:613:LEU:N	2.53	0.41
1:A:57:VAL:HG11	1:A:74:ALA:HB2	2.02	0.41
2:B:171:HIS:C	2:B:173:PRO:HD3	2.40	0.41
1:A:168:TRP:CZ3	1:A:172:LYS:HD2	2.55	0.41
1:A:94:TYR:HA	1:A:94:TYR:HD1	1.75	0.41
2:E:360:ALA:HB1	2:E:671:GLY:HA3	2.01	0.41
2:E:511:TRP:HB2	2:E:649:LEU:O	2.21	0.41
2:E:311:GLU:O	2:E:312:PHE:HB2	2.21	0.41
1:D:15:LEU:HD21	1:D:174:LEU:HD13	2.03	0.41
1:D:57:VAL:HG11	1:D:74:ALA:HB2	2.02	0.41
1:A:15:LEU:HD21	1:A:174:LEU:HD13	2.03	0.41
2:E:256:THR:OG1	2:E:262:PRO:HG2	2.20	0.40
2:B:139:PHE:N	2:B:139:PHE:CD2	2.87	0.40
1:D:94:TYR:HA	1:D:94:TYR:HD1	1.75	0.40
2:E:287:THR:HA	2:E:297:TRP:CD1	2.56	0.40
2:E:363:THR:C	2:E:365:ALA:H	2.25	0.40
2:B:287:THR:HA	2:B:297:TRP:CD1	2.56	0.40
2:B:383:ARG:HA	2:B:383:ARG:HE	1.86	0.40
2:E:383:ARG:HE	2:E:383:ARG:HA	1.86	0.40
2:B:311:GLU:O	2:B:312:PHE:HB2	2.21	0.40
2:E:334:HIS:ND1	2:E:334:HIS:O	2.53	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 PDB entries followed by that with respect to all EM entries.

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	175/391 (45%)	154 (88%)	19 (11%)	2 (1%)	16	46
1	D	175/391 (45%)	154 (88%)	19 (11%)	2 (1%)	16	46
2	B	516/640 (81%)	400 (78%)	103 (20%)	13 (2%)	6	23
2	E	516/640 (81%)	400 (78%)	103 (20%)	13 (2%)	6	23
All	All	1382/2062 (67%)	1108 (80%)	244 (18%)	30 (2%)	11	27

All (30) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	116	PRO
2	B	176	HIS
2	B	195	PRO
2	B	294	SER
2	B	398	PRO
2	E	116	PRO
2	E	176	HIS
2	E	195	PRO
2	E	294	SER
2	E	398	PRO
1	A	148	GLN
2	B	444	SER
2	B	662	ARG
1	D	148	GLN
2	E	444	SER
2	E	662	ARG
1	A	89	GLY
2	B	118	ASN
2	B	227	SER
1	D	89	GLY
2	E	118	ASN
2	E	227	SER

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Mol	Chain	Res	Type
2	B	288	ASP
2	B	312	PHE
2	E	288	ASP
2	E	312	PHE
2	B	308	GLY
2	E	308	GLY
2	B	364	PRO
2	E	364	PRO

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 PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	144/316 (46%)	143 (99%)	1 (1%)	85	96
1	D	144/316 (46%)	143 (99%)	1 (1%)	85	96
2	B	446/542 (82%)	440 (99%)	6 (1%)	71	91
2	E	446/542 (82%)	440 (99%)	6 (1%)	71	91
All	All	1180/1716 (69%)	1166 (99%)	14 (1%)	75	92

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

Mol	Chain	Res	Type
1	A	94	TYR
2	B	201	ARG
2	B	222	GLN
2	B	257	ARG
2	B	640	LEU
2	B	648	HIS
2	B	680	TYR
1	D	94	TYR
2	E	201	ARG
2	E	222	GLN
2	E	257	ARG
2	E	640	LEU
2	E	648	HIS

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Mol	Chain	Res	Type
2	E	680	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	146	HIS
2	B	120	ASN
2	B	174	HIS
2	B	198	GLN
2	B	222	GLN
2	B	327	ASN
1	D	3	GLN
1	D	146	HIS
2	E	120	ASN
2	E	174	HIS
2	E	198	GLN
2	E	222	GLN
2	E	327	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 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
3	AGS	B	801	4	25,33,33	0.83	1 (4%)	24,52,52	1.30	2 (8%)
3	AGS	E	801	4	25,33,33	0.83	1 (4%)	24,52,52	1.30	2 (8%)

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	AGS	B	801	4	-	1/17/38/38	0/3/3/3
3	AGS	E	801	4	-	1/17/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	801	AGS	PG-S1G	2.28	1.94	1.90
3	B	801	AGS	PG-S1G	2.27	1.94	1.90

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	801	AGS	PA-O3A-PB	-4.46	118.40	132.57
3	E	801	AGS	PA-O3A-PB	-4.45	118.42	132.57
3	B	801	AGS	C5-C6-N6	2.22	123.87	120.38
3	E	801	AGS	C5-C6-N6	2.18	123.81	120.38

There are no chirality outliers.

All (2) torsion outliers are listed below:

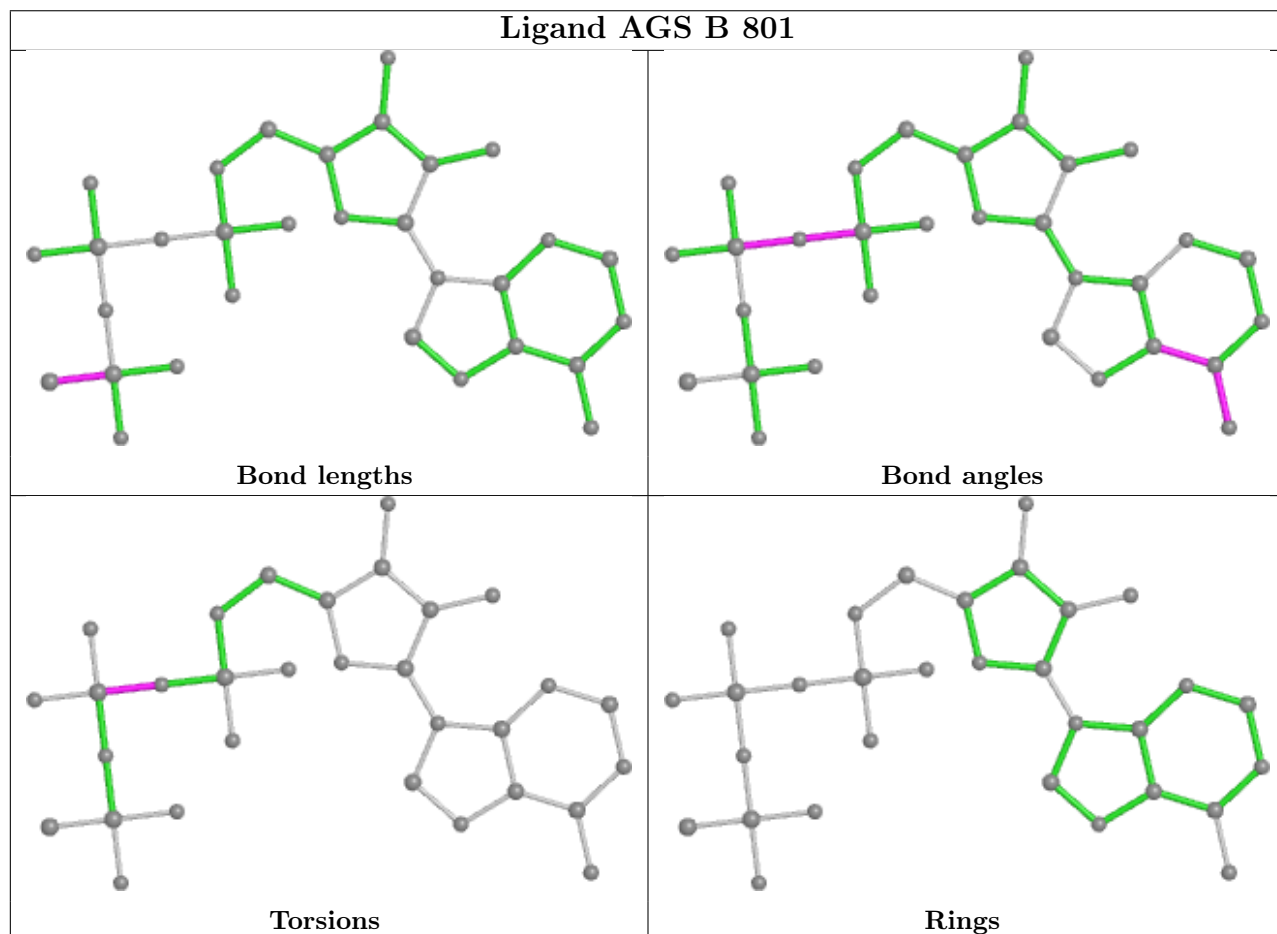
Mol	Chain	Res	Type	Atoms
3	E	801	AGS	PA-O3A-PB-O2B
3	B	801	AGS	PA-O3A-PB-O2B

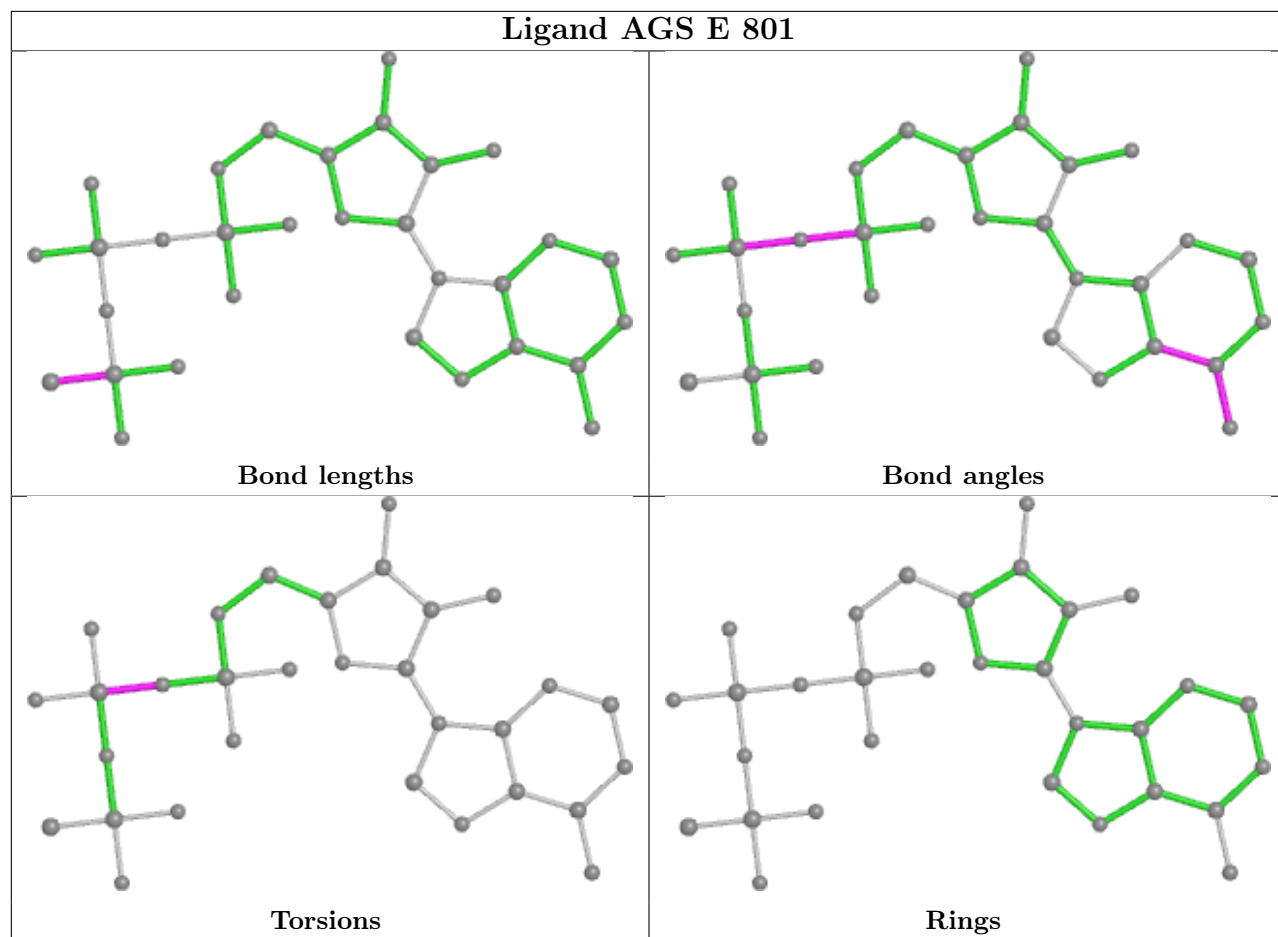
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	801	AGS	1	0
3	E	801	AGS	1	0

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