



Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 12:58 AM JST

PDB ID : 8ISJ / pdb_00008isj
EMDB ID : EMD-35692
Title : Pr conformer of Arabidopsis thaliana phytochrome A - AtphyA-Pr
Authors : Zhang, Y.; Ma, C.; Zhao, J.; Gao, N.; Wang, J.
Deposited on : 2023-03-20
Resolution : 3.00 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

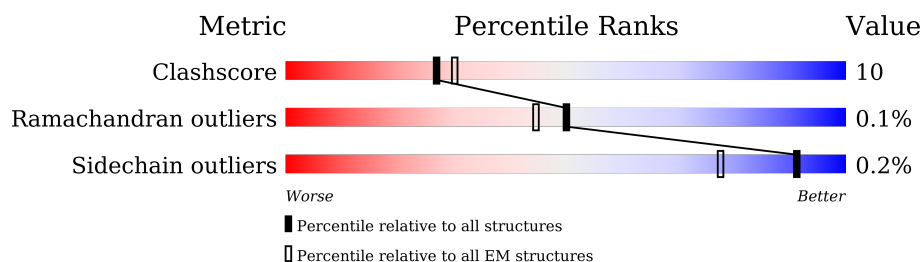
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

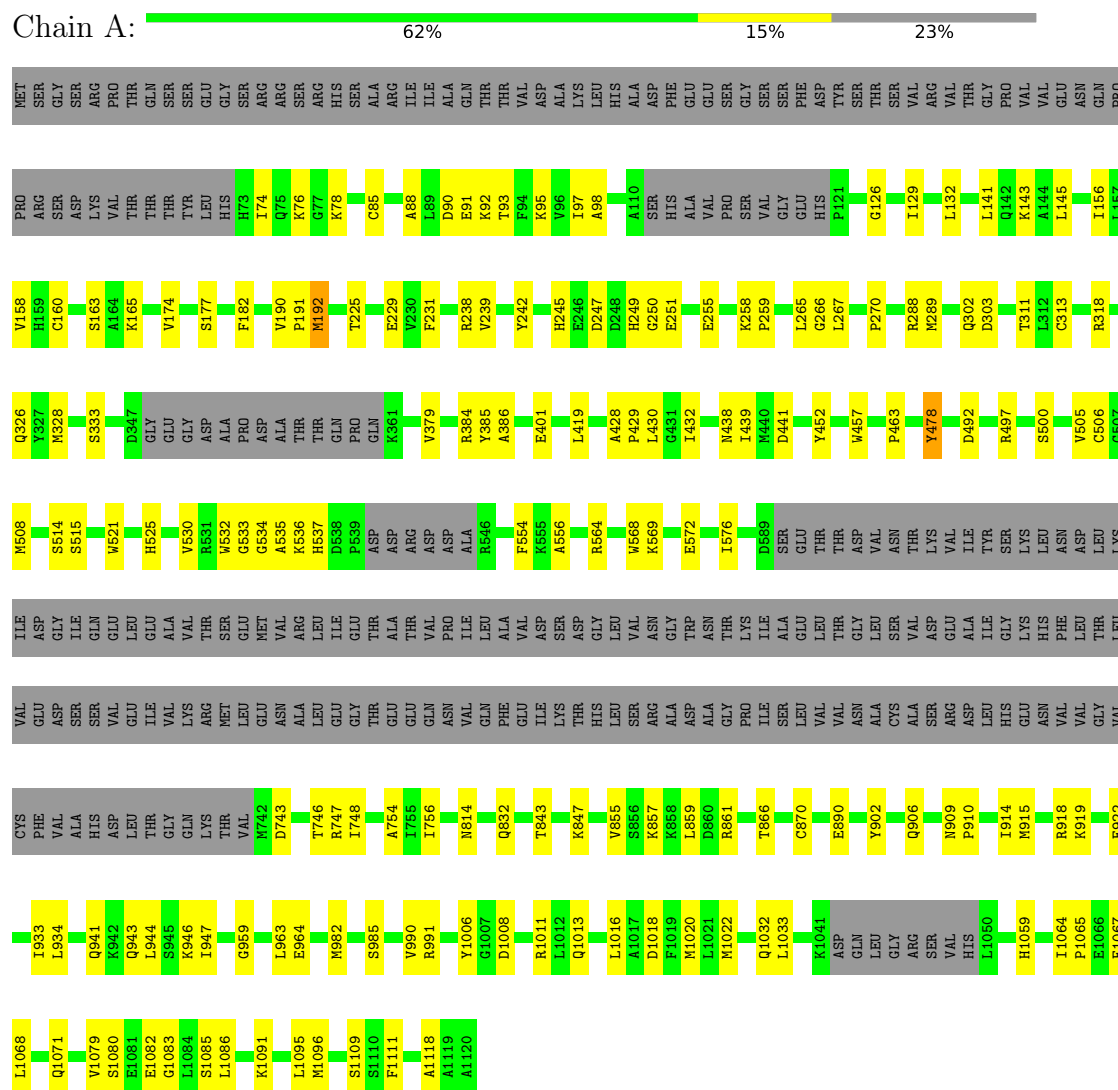
The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	1120	<div> <div style="width: 62%; background-color: green;"></div> <div style="width: 15%; background-color: yellow;"></div> <div style="width: 23%; background-color: grey;"></div> <div>62%15%23%</div> </div>
1	B	1120	<div> <div style="width: 58%; background-color: green;"></div> <div style="width: 18%; background-color: yellow;"></div> <div style="width: 23%; background-color: grey;"></div> <div>58%18%23%</div> </div>

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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: Phytochrome A



H1059	K946	D770	GLN	VAL	M548	K453	T311	S163	PRO
I1064	D949	E771	ASN	PRO	H549	L459	L312	A164	ARG
L1069	L953	K789	GLN	ILE	P550	G460	G314	K165	SER
M1072	H965	E792	PHE	ALA	R551	T461	R318	P166	ASP
S1080	H966	M797	GLU	VAL	F554	S464	H321	F167	LYS
G1083	H967	L798	ILE	ASP	T563	E465	Y327	Y178	THR
L1084	A976	F803	LYS	SER	R564	H467	M331	I178	THR
S1085	T978	N814	HIS	GLY	S565	L468	E470	LEU	TYR
L1086	S977	N827	LEU	VAL	P567	Q469	A335	LEU	LEU
Q1101	S979	N831	ARG	ASN	E572	L475	D347	HIS	HIS
R1104	Q980	S836	ALA	GLY	I576	M480	GLY	K76	
F1111	Y981	C851	ASP	TRP	K588	D481	GLY	C85	
I1112	Y982	L852	PRO	THR	ASP	S482	GLY	A88	
I1113	S985	V855	ILE	ILE	SER	L485	ALA	L89	
L1117	K988	C870	SER	ALA	THR	D488	ASP	D90	
A1118	S989	L874	GLU	GLU	THR	S489	PRO	T93	
A1119	V990	A875	VAL	LEU	THR	L490	ALA	K95	
ALA	Y1006	Q880	VAL	GLY	THR	P495	THR	V96	
	G1007	L897	ASN	LEU	ASN	A498	GLN	I97	
	Q1013	L900	CYS	SER	LYS	L501	PRO	A98	
	Q1014	K895	ALA	VAL	ILE	S504	GLN	Y99	
	Q1015	R896	ARG	ALA	ALA	V505	GLN	S100	
	L1016	L897	ASP	ILE	TYR	C506	K361	E101	
	F1019	M915	LEU	GLY	SER	R512	N373	N102	
	M1020	F916	HIS	LYS	LYS	I513	R377	L106	
	L1021	K919	GLU	GLU	LEU	D617	F378	M109	
	M1022	M920	ASN	VAL	LEU	M518	V379	A110	
	M1025	I921	VAL	THR	ASP	I519	R384	M109	
	F1026	L926	CYS	LEU	LYS	D617	L390	SER	
	L1033	E929	PHE	VAL	ILE	M518	E403	HIS	
	S1036	Q930	ALA	SER	ILE	I519	E403	ALA	
	R1040	I933	HIS	SER	GLN	R523	Q407	VAL	
LYS	LYS	L934	ASP	VAL	LEU	S524	M408	VAL	
ASP	ASP	Q943	LEU	GLU	GLU	H525	V409	GLY	
GLN	GLN		THR	ILE	ALA	G533	I413	GLY	
LEU	LEU		LYS	ARG	VAL	H537	M423	GLU	
GLY	GLY		THR	MET	THR	D538	R426	GLU	
ARG	ARG		VAL	LEU	GLU	P539	M283	GLU	
SER	SER		M742	GLU	NET	ASP	K284	GLU	
VAL	VAL		D743	VAL	VAL	ASP	I432	GLU	
HIS	HIS		K744	ALA	ARG	ARG	P437	GLU	
L1050	L1050		F745	LEU	LEU	ILE	M438	GLU	
A1051	A1051		Y752	GLY	GLY	THR	K444	ALA	
T1055	T1055		I755	THR	ALA	ALA	R546	ALA	
R1056	R1056			GLU	THR	THR	R547	ALA	
				GLU	THR	THR		THR	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	774153	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: O6E

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	0.20	0/6852	0.41	4/9245 (0.0%)
1	B	0.21	0/6840	0.41	0/9232
All	All	0.21	0/13692	0.41	4/18477 (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
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	385	TYR	N-CA-C	-7.95	104.47	114.56
1	A	401	GLU	N-CA-C	-6.01	105.13	112.88
1	A	192	MET	CB-CA-C	-5.62	109.58	117.23
1	A	386	ALA	N-CA-C	-5.14	107.01	113.28

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	384	ARG	Sidechain
1	B	384	ARG	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	6730	0	6826	121	0
1	B	6717	0	6810	150	0
2	A	43	0	0	0	0
2	B	43	0	0	0	0
All	All	13533	0	13636	264	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 10.

All (264) 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:B:855:VAL:HG13	1:B:870:CYS:SG	1.52	1.50
1:B:855:VAL:CG1	1:B:870:CYS:SG	2.43	1.05
1:B:855:VAL:HG13	1:B:870:CYS:HG	1.28	0.97
1:A:439:ILE:HG23	1:A:521:TRP:CZ2	2.11	0.86
1:B:926:LEU:HB3	1:B:930:GLN:HE21	1.49	0.77
1:B:965:MET:HE1	1:B:1007:GLY:HA2	1.64	0.77
1:B:525:HIS:HB2	1:B:563:THR:HG23	1.70	0.74
1:A:832:GLN:HB2	1:A:857:LYS:HD3	1.71	0.72
1:A:533:GLY:HA2	1:A:556:ALA:HA	1.70	0.71
1:B:423:MET:HG2	1:B:432:ILE:HG22	1.73	0.70
1:B:257:THR:HG22	1:B:259:PRO:HD2	1.74	0.70
1:B:88:ALA:HB3	1:B:98:ALA:HB3	1.74	0.68
1:B:283:MET:HE3	1:B:283:MET:HA	1.75	0.68
1:B:965:MET:CE	1:B:1007:GLY:HA2	2.23	0.68
1:B:88:ALA:C	1:B:89:LEU:HD12	2.20	0.67
1:A:463:PRO:HD3	1:A:505:VAL:HG11	1.76	0.67
1:B:311:THR:HG1	1:B:313:CYS:HG	1.43	0.66
1:B:228:GLN:NE2	1:B:232:GLU:OE2	2.28	0.66
1:B:76:LYS:HD3	1:B:311:THR:HA	1.79	0.65
1:B:285:ASN:HD21	1:B:314:GLY:HA2	1.62	0.64
1:B:943:GLN:OE1	1:B:1013:GLN:NE2	2.31	0.64
1:B:1051:ALA:HB3	1:B:1117:LEU:O	1.98	0.63
1:A:943:GLN:OE1	1:A:1013:GLN:NE2	2.31	0.63

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:288:ARG:NH2	1:B:318:ARG:O	2.32	0.62
1:B:501:LEU:HB3	1:B:505:VAL:HG21	1.81	0.62
1:A:1065:PRO:HD2	1:A:1068:LEU:HD12	1.80	0.61
1:B:311:THR:OG1	1:B:313:CYS:SG	2.57	0.61
1:A:1079:VAL:O	1:A:1080:SER:OG	2.17	0.61
1:A:439:ILE:HG23	1:A:521:TRP:HZ2	1.61	0.61
1:B:426:ARG:HH22	1:B:437:PRO:HG2	1.65	0.61
1:B:132:LEU:H	1:B:132:LEU:HD23	1.67	0.60
1:B:100:SER:OG	1:B:102:ASN:OD1	2.20	0.60
1:B:268:HIS:O	1:B:533:GLY:N	2.30	0.60
1:B:309:ASP:OD1	1:B:309:ASP:N	2.34	0.60
1:B:1064:ILE:O	1:B:1104:ARG:NH2	2.30	0.59
1:A:439:ILE:CG2	1:A:521:TRP:CZ2	2.85	0.58
1:B:978:THR:HG23	1:B:1020:MET:HE1	1.84	0.58
1:B:172:HIS:NE2	1:B:181:ASP:OD2	2.30	0.58
1:A:985:SER:OG	1:A:990:VAL:O	2.22	0.58
1:A:910:PRO:O	1:A:914:ILE:HG13	2.03	0.58
1:B:466:PHE:O	1:B:470:GLU:HG2	2.04	0.58
1:A:918:ARG:NE	1:A:922:GLU:OE2	2.35	0.57
1:A:1018:ASP:O	1:A:1022:MET:HG2	2.04	0.57
1:A:242:TYR:CZ	1:A:250:GLY:HA3	2.40	0.57
1:B:444:LYS:HG3	1:B:523:ARG:HH21	1.69	0.57
1:A:88:ALA:HB3	1:A:98:ALA:HB3	1.87	0.57
1:B:109:MET:O	1:B:165:LYS:NZ	2.38	0.57
1:B:480:MET:HE2	1:B:480:MET:N	2.20	0.57
1:B:855:VAL:HG22	1:B:870:CYS:SG	2.45	0.57
1:B:1016:LEU:HD21	1:B:1055:ILE:HD13	1.87	0.56
1:B:162:THR:HG22	1:B:163:SER:H	1.70	0.56
1:A:289:MET:HE1	1:A:379:VAL:H	1.69	0.56
1:B:89:LEU:HD12	1:B:89:LEU:N	2.19	0.56
1:A:78:LYS:NZ	1:A:302:GLN:OE1	2.31	0.56
1:B:1022:MET:HE3	1:B:1086:LEU:HD21	1.86	0.56
1:B:1055:ILE:HB	1:B:1113:ILE:HB	1.86	0.56
1:A:1006:TYR:HB3	1:A:1118:ALA:HB3	1.87	0.56
1:A:991:ARG:HD2	1:A:1032:GLN:HE22	1.71	0.56
1:A:532:TRP:HE1	1:A:536:LYS:HA	1.71	0.56
1:A:918:ARG:HD3	1:A:941:GLN:HE22	1.70	0.56
1:B:498:ALA:HA	1:B:501:LEU:HD12	1.88	0.55
1:A:1016:LEU:O	1:A:1020:MET:HE3	2.06	0.55
1:B:919:LYS:HD2	1:B:919:LYS:C	2.32	0.55
1:B:921:ILE:HG22	1:B:934:LEU:HD11	1.87	0.55

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:564:ARG:HB2	1:A:564:ARG:HH11	1.71	0.55
1:B:482:SER:HB3	1:B:745:PHE:HA	1.89	0.55
1:A:1018:ASP:OD2	1:A:1085:SER:OG	2.24	0.55
1:B:1033:LEU:HD13	1:B:1059:HIS:HB3	1.89	0.55
1:A:160:CYS:SG	1:A:163:SER:OG	2.59	0.55
1:B:537:HIS:CD2	1:B:539:PRO:HD3	2.42	0.55
1:B:335:ALA:HB3	1:B:373:ASN:HB3	1.89	0.54
1:A:922:GLU:HG3	1:A:934:LEU:HD11	1.88	0.54
1:B:258:LYS:HG2	1:B:259:PRO:HD3	1.88	0.54
1:B:1019:PHE:HA	1:B:1022:MET:SD	2.47	0.54
1:A:95:LYS:HB3	1:A:126:GLY:HA2	1.90	0.54
1:B:929:GLU:HG3	1:B:930:GLN:OE1	2.07	0.54
1:A:143:LYS:HD2	1:A:143:LYS:O	2.08	0.54
1:A:160:CYS:SG	1:A:165:LYS:N	2.78	0.53
1:A:918:ARG:HD3	1:A:941:GLN:NE2	2.23	0.53
1:B:438:ASN:OD1	1:B:438:ASN:N	2.40	0.53
1:A:1064:ILE:HD12	1:A:1111:PHE:CZ	2.44	0.53
1:B:495:PHE:HB3	1:B:498:ALA:HB2	1.91	0.53
1:B:814:ASN:N	1:B:814:ASN:OD1	2.42	0.53
1:B:875:ALA:O	1:B:880:GLN:NE2	2.42	0.53
1:A:492:ASP:OD2	1:A:564:ARG:NH2	2.38	0.53
1:A:1071:GLN:HG2	1:A:1079:VAL:HA	1.91	0.53
1:A:270:PRO:HA	1:A:537:HIS:HB2	1.91	0.53
1:A:190:VAL:HG13	1:A:191:PRO:HD3	1.91	0.53
1:B:770:ASP:OD1	1:B:771:GLU:N	2.37	0.52
1:A:532:TRP:HZ2	1:A:537:HIS:HB3	1.73	0.52
1:B:289:MET:HE1	1:B:379:VAL:H	1.74	0.52
1:B:1019:PHE:CD1	1:B:1022:MET:HE1	2.44	0.52
1:A:982:MET:HA	1:A:985:SER:HB3	1.90	0.52
1:A:225:THR:O	1:A:229:GLU:HG2	2.09	0.52
1:A:530:VAL:HG12	1:A:532:TRP:HB2	1.90	0.52
1:B:1019:PHE:HD1	1:B:1022:MET:HE1	1.74	0.52
1:B:229:GLU:OE1	1:B:229:GLU:HA	2.09	0.51
1:B:89:LEU:HG	1:B:96:VAL:HA	1.92	0.51
1:B:168:TYR:O	1:B:182:PHE:HA	2.10	0.51
1:A:439:ILE:CG2	1:A:521:TRP:CE2	2.94	0.50
1:A:439:ILE:HG22	1:A:521:TRP:NE1	2.26	0.50
1:B:489:SER:HB2	1:B:564:ARG:HA	1.93	0.50
1:B:930:GLN:OE1	1:B:930:GLN:N	2.32	0.50
1:B:73:HIS:HB2	1:B:321:HIS:HD2	1.75	0.50
1:B:1006:TYR:HB2	1:B:1118:ALA:HB3	1.92	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:85:CYS:SG	1:A:182:PHE:HB2	2.51	0.50
1:B:985:SER:OG	1:B:990:VAL:O	2.30	0.50
1:A:748:ILE:O	1:A:748:ILE:HG13	2.12	0.50
1:A:1064:ILE:CD1	1:A:1111:PHE:HZ	2.25	0.50
1:B:438:ASN:HD22	1:B:459:LEU:HD11	1.77	0.50
1:A:160:CYS:HG	1:A:163:SER:HG	1.47	0.50
1:A:438:ASN:OD1	1:A:438:ASN:N	2.45	0.50
1:A:814:ASN:OD1	1:A:814:ASN:N	2.45	0.49
1:B:548:MET:HE1	1:B:551:ARG:HD3	1.93	0.49
1:B:978:THR:HG22	1:B:982:MET:SD	2.53	0.49
1:B:1101:GLN:HB2	1:B:1112:ILE:HB	1.94	0.49
1:B:549:HIS:HB3	1:B:550:PRO:HD2	1.95	0.49
1:B:373:ASN:HD22	1:B:377:ARG:HB2	1.78	0.49
1:A:568:TRP:O	1:A:747:ARG:NH2	2.42	0.49
1:A:943:GLN:O	1:A:947:ILE:HG22	2.12	0.49
1:A:982:MET:HE2	1:B:916:PHE:HE2	1.76	0.49
1:B:910:PRO:O	1:B:914:ILE:HG12	2.11	0.49
1:A:141:LEU:O	1:A:145:LEU:HD12	2.13	0.49
1:B:90:ASP:HB2	1:B:93:THR:HG22	1.95	0.48
1:A:1083:GLY:HA2	1:A:1086:LEU:HD12	1.94	0.48
1:B:89:LEU:N	1:B:89:LEU:CD1	2.76	0.48
1:A:748:ILE:HG22	1:A:754:ALA:HA	1.95	0.48
1:A:267:LEU:HD23	1:A:533:GLY:HA3	1.95	0.48
1:A:915:MET:SD	1:A:941:GLN:NE2	2.87	0.48
1:B:161:ARG:NH2	1:B:162:THR:OG1	2.46	0.48
1:B:988:LYS:NZ	1:B:1025:ASN:O	2.46	0.48
1:A:933:ILE:HG21	1:B:920:MET:HB2	1.95	0.48
1:A:129:ILE:HG13	1:A:132:LEU:HD12	1.95	0.48
1:B:85:CYS:SG	1:B:182:PHE:HB2	2.54	0.48
1:A:231:PHE:HB2	1:A:239:VAL:HG21	1.96	0.48
1:A:530:VAL:HG11	1:A:532:TRP:HE3	1.79	0.47
1:B:258:LYS:CG	1:B:259:PRO:HD3	2.44	0.47
1:B:273:ASP:OD1	1:B:551:ARG:NH2	2.47	0.47
1:A:959:GLY:HA2	1:A:1091:LYS:NZ	2.30	0.47
1:B:513:ILE:HD11	1:B:519:ILE:HD11	1.97	0.47
1:B:210:ARG:NH1	1:B:229:GLU:OE2	2.47	0.47
1:B:967:GLU:HG2	1:B:1006:TYR:CE1	2.50	0.47
1:B:1069:LEU:HA	1:B:1072:MET:HG3	1.96	0.47
1:B:426:ARG:NH2	1:B:437:PRO:HG2	2.28	0.47
1:B:1056:ARG:NH2	1:B:1112:ILE:HG13	2.29	0.47
1:B:490:LEU:HD12	1:B:506:CYS:HA	1.97	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:976:ALA:O	1:B:980:GLN:HG3	2.15	0.46
1:A:497:ARG:O	1:A:500:SER:OG	2.33	0.46
1:B:123:LEU:HD11	1:B:132:LEU:HD13	1.97	0.46
1:B:153:LEU:H	1:B:153:LEU:HD23	1.81	0.46
1:A:1064:ILE:CD1	1:A:1111:PHE:CZ	2.99	0.46
1:B:836:LYS:HB3	1:B:852:LEU:HD23	1.96	0.46
1:A:432:ILE:HG22	1:A:439:ILE:HG13	1.98	0.46
1:A:902:TYR:CE2	1:B:953:LEU:HD13	2.50	0.46
1:A:1033:LEU:HD13	1:A:1059:HIS:HB3	1.98	0.46
1:B:173:ARG:HG2	1:B:178:ILE:HD12	1.97	0.46
1:B:1080:SER:O	1:B:1084:LEU:N	2.44	0.46
1:A:890:GLU:OE2	1:A:890:GLU:HA	2.15	0.45
1:A:238:ARG:NH1	1:A:255:GLU:OE2	2.47	0.45
1:A:843:THR:OG1	1:A:847:LYS:HB2	2.17	0.45
1:A:506:CYS:HB2	1:A:525:HIS:HB2	1.99	0.45
1:A:572:GLU:O	1:A:576:ILE:HG13	2.17	0.45
1:A:90:ASP:OD2	1:A:93:THR:OG1	2.33	0.45
1:A:982:MET:HE2	1:B:916:PHE:CE2	2.51	0.45
1:A:91:GLU:HG2	1:A:92:LYS:HE2	1.98	0.45
1:B:461:THR:HG21	1:B:504:SER:HB3	1.99	0.45
1:B:93:THR:HG23	1:B:95:LYS:H	1.82	0.45
1:B:798:LEU:HD11	1:B:803:PHE:CE2	2.51	0.45
1:B:1056:ARG:HH21	1:B:1111:PHE:C	2.25	0.45
1:A:326:GLN:OE1	1:A:326:GLN:HA	2.17	0.44
1:A:532:TRP:CZ2	1:A:537:HIS:HB3	2.51	0.44
1:A:861:ARG:H	1:A:861:ARG:HG3	1.55	0.44
1:A:915:MET:O	1:A:919:LYS:HD3	2.17	0.44
1:A:1095:LEU:C	1:A:1096:MET:HE2	2.42	0.44
1:A:452:TYR:HB3	1:A:457:TRP:CZ3	2.52	0.44
1:B:403:GLU:O	1:B:407:GLN:HG2	2.18	0.44
1:B:572:GLU:O	1:B:576:ILE:HD12	2.18	0.44
1:B:827:ASN:O	1:B:831:SER:N	2.35	0.44
1:A:564:ARG:HB2	1:A:564:ARG:NH1	2.32	0.44
1:B:270:PRO:HB2	1:B:272:THR:HG22	2.00	0.43
1:B:223:CYS:O	1:B:227:VAL:HG22	2.18	0.43
1:A:855:VAL:HG13	1:A:870:CYS:SG	2.58	0.43
1:B:409:VAL:O	1:B:413:ILE:HG13	2.17	0.43
1:B:512:ARG:HA	1:B:518:MET:HG2	2.01	0.43
1:B:1026:PHE:CD2	1:B:1064:ILE:HG12	2.53	0.43
1:B:166:PRO:HG2	1:B:185:VAL:HB	1.99	0.43
1:B:490:LEU:HB2	1:B:506:CYS:HA	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:980:GLN:OE1	1:B:1013:GLN:NE2	2.50	0.43
1:A:859:LEU:HD23	1:A:859:LEU:HA	1.85	0.43
1:A:944:LEU:HB2	1:B:910:PRO:HB2	1.99	0.43
1:A:1065:PRO:HB2	1:A:1067:PHE:CD1	2.53	0.43
1:B:798:LEU:HD11	1:B:803:PHE:CD2	2.53	0.43
1:A:174:VAL:HG23	1:A:177:SER:HB3	2.01	0.43
1:A:478:TYR:HD1	1:A:478:TYR:HA	1.68	0.43
1:A:190:VAL:CG1	1:A:191:PRO:HD3	2.49	0.43
1:A:534:GLY:HA2	1:A:554:PHE:HA	2.00	0.43
1:A:514:SER:OG	1:A:515:SER:N	2.50	0.42
1:B:855:VAL:CB	1:B:870:CYS:SG	3.07	0.42
1:B:930:GLN:HA	1:B:933:ILE:HD12	2.00	0.42
1:A:76:LYS:H	1:A:76:LYS:HG2	1.71	0.42
1:A:909:ASN:HB3	1:A:910:PRO:HD3	2.00	0.42
1:A:1059:HIS:NE2	1:A:1109:SER:HB2	2.35	0.42
1:B:895:LYS:H	1:B:895:LYS:HG2	1.72	0.42
1:B:900:LEU:HD12	1:B:900:LEU:HA	1.91	0.42
1:B:262:GLU:OE1	1:B:262:GLU:N	2.48	0.42
1:B:331:MET:HE3	1:B:331:MET:HB3	1.91	0.42
1:A:258:LYS:HG3	1:A:259:PRO:HD2	2.02	0.42
1:B:797:MET:HE2	1:B:797:MET:HB2	1.83	0.42
1:A:245:HIS:NE2	1:A:251:GLU:OE1	2.47	0.42
1:A:532:TRP:NE1	1:A:535:ALA:O	2.52	0.42
1:B:130:ARG:HG3	1:B:138:ALA:HB1	2.02	0.42
1:B:211:LEU:HD12	1:B:390:LEU:HD11	2.02	0.42
1:B:566:LEU:HD13	1:B:567:PRO:HD2	2.02	0.42
1:B:1022:MET:HA	1:B:1025:ASN:HB2	2.02	0.42
1:A:439:ILE:CG2	1:A:521:TRP:NE1	2.83	0.42
1:B:327:TYR:CD1	1:B:327:TYR:C	2.97	0.42
1:A:247:ASP:OD1	1:A:249:HIS:ND1	2.38	0.42
1:A:866:THR:O	1:A:866:THR:OG1	2.30	0.42
1:B:979:SER:HA	1:B:982:MET:HE2	2.02	0.42
1:A:746:THR:HG22	1:A:756:ILE:HG12	2.02	0.42
1:B:475:LEU:HD21	1:B:485:LEU:HD21	2.01	0.42
1:A:857:LYS:HE2	1:A:859:LEU:HG	2.00	0.42
1:B:247:ASP:CG	1:B:249:HIS:HD1	2.26	0.42
1:B:789:LYS:HB2	1:B:792:GLU:HG2	2.02	0.42
1:B:752:TYR:HB2	1:B:755:ILE:HD11	2.01	0.42
1:A:532:TRP:NE1	1:A:536:LYS:HA	2.34	0.41
1:B:475:LEU:HD23	1:B:475:LEU:HA	1.82	0.41
1:B:488:ASP:HB2	1:B:564:ARG:O	2.20	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:926:LEU:HB3	1:B:930:GLN:NE2	2.26	0.41
1:B:946:LYS:HA	1:B:949:ASP:OD2	2.20	0.41
1:A:156:ILE:HG22	1:A:158:VAL:HG23	2.02	0.41
1:A:906:GLN:NE2	1:B:1014:GLN:OE1	2.54	0.41
1:A:963:LEU:HD22	1:A:1011:ARG:HG3	2.03	0.41
1:B:1036:SER:OG	1:B:1056:ARG:HB2	2.19	0.41
1:A:265:LEU:HD12	1:A:266:GLY:N	2.35	0.41
1:A:328:MET:HG2	1:A:333:SER:O	2.20	0.41
1:B:855:VAL:CG2	1:B:870:CYS:SG	3.09	0.41
1:B:897:LEU:H	1:B:897:LEU:HD23	1.84	0.41
1:B:1069:LEU:HB3	1:B:1072:MET:HE3	2.01	0.41
1:A:143:LYS:HD2	1:A:143:LYS:C	2.46	0.41
1:A:964:GLU:N	1:A:1008:ASP:OD2	2.49	0.41
1:B:242:TYR:CZ	1:B:250:GLY:HA3	2.56	0.41
1:B:464:SER:O	1:B:468:LEU:HD13	2.21	0.41
1:B:488:ASP:OD1	1:B:488:ASP:N	2.53	0.41
1:B:742:MET:HG2	1:B:743:ASP:H	1.84	0.41
1:B:851:CYS:HB3	1:B:874:LEU:HD23	2.03	0.41
1:A:90:ASP:OD1	1:A:90:ASP:N	2.53	0.41
1:A:419:LEU:HD11	1:A:441:ASP:HB3	2.03	0.41
1:A:508:MET:HE2	1:A:508:MET:HB3	1.97	0.41
1:B:965:MET:HE1	1:B:1007:GLY:CA	2.44	0.41
1:A:74:ILE:HG21	1:A:318:ARG:HH11	1.86	0.41
1:A:569:LYS:HB2	1:A:572:GLU:HG3	2.03	0.41
1:B:106:LEU:HD23	1:B:106:LEU:HA	1.88	0.41
1:B:453:LYS:N	1:B:517:ASP:OD2	2.42	0.41
1:B:1083:GLY:HA2	1:B:1086:LEU:HD12	2.02	0.41
1:A:429:PRO:C	1:A:430:LEU:HD12	2.47	0.40
1:A:97:ILE:O	1:A:303:ASP:HB2	2.21	0.40
1:A:288:ARG:HH21	1:A:318:ARG:CZ	2.34	0.40
1:A:915:MET:HE1	1:A:941:GLN:HB2	2.02	0.40
1:B:245:HIS:NE2	1:B:251:GLU:OE1	2.48	0.40
1:A:946:LYS:HD3	1:A:946:LYS:N	2.36	0.40
1:A:311:THR:HG22	1:A:313:CYS:H	1.85	0.40
1:A:743:ASP:OD1	1:A:743:ASP:N	2.55	0.40
1:A:1082:GLU:HG3	1:B:905:ARG:HH12	1.87	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	847/1120 (76%)	811 (96%)	35 (4%)	1 (0%)	48	81
1	B	845/1120 (75%)	796 (94%)	49 (6%)	0	100	100
All	All	1692/2240 (76%)	1607 (95%)	84 (5%)	1 (0%)	50	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	428	ALA

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	743/968 (77%)	741 (100%)	2 (0%)	91	96
1	B	742/968 (77%)	741 (100%)	1 (0%)	92	98
All	All	1485/1936 (77%)	1482 (100%)	3 (0%)	91	97

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	192	MET
1	A	478	TYR
1	B	554	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	102	ASN
1	A	469	GLN
1	A	479	HIS
1	A	832	GLN
1	A	873	GLN
1	A	880	GLN
1	A	941	GLN
1	A	943	GLN
1	A	980	GLN
1	A	1013	GLN
1	A	1014	GLN
1	A	1032	GLN
1	B	276	GLN
1	B	373	ASN
1	B	479	HIS
1	B	758	ASN
1	B	827	ASN
1	B	880	GLN
1	B	1013	GLN

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](#)

2 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	$\# Z > 2$
2	O6E	A	1201	1	42,46,46	1.01	3 (7%)	50,67,67	1.17	3 (6%)
2	O6E	B	1201	1	42,46,46	0.99	3 (7%)	50,67,67	1.26	4 (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
2	O6E	A	1201	1	-	7/25/74/74	0/4/4/4
2	O6E	B	1201	1	-	6/25/74/74	0/4/4/4

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1201	O6E	CAO-CAV	3.39	1.37	1.35
2	B	1201	O6E	CAO-CAV	3.15	1.37	1.35
2	B	1201	O6E	CAB-CBI	-2.96	1.39	1.47
2	A	1201	O6E	CAB-CBI	-2.93	1.39	1.47
2	A	1201	O6E	CBI-CBC	2.14	1.41	1.37
2	B	1201	O6E	CBI-CBC	2.12	1.41	1.37

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1201	O6E	CBO-CAO-CAV	5.12	134.92	128.81
2	A	1201	O6E	CBO-CAO-CAV	4.71	134.43	128.81
2	B	1201	O6E	CAW-CAP-CBL	3.61	136.91	128.08
2	A	1201	O6E	CAW-CAP-CBL	3.24	136.00	128.08
2	B	1201	O6E	CBD-CBJ-CBN	2.38	104.90	101.34
2	A	1201	O6E	CAO-CAV-NAE	-2.26	125.69	128.83
2	B	1201	O6E	CAO-CAV-NAE	-2.04	126.00	128.83

There are no chirality outliers.

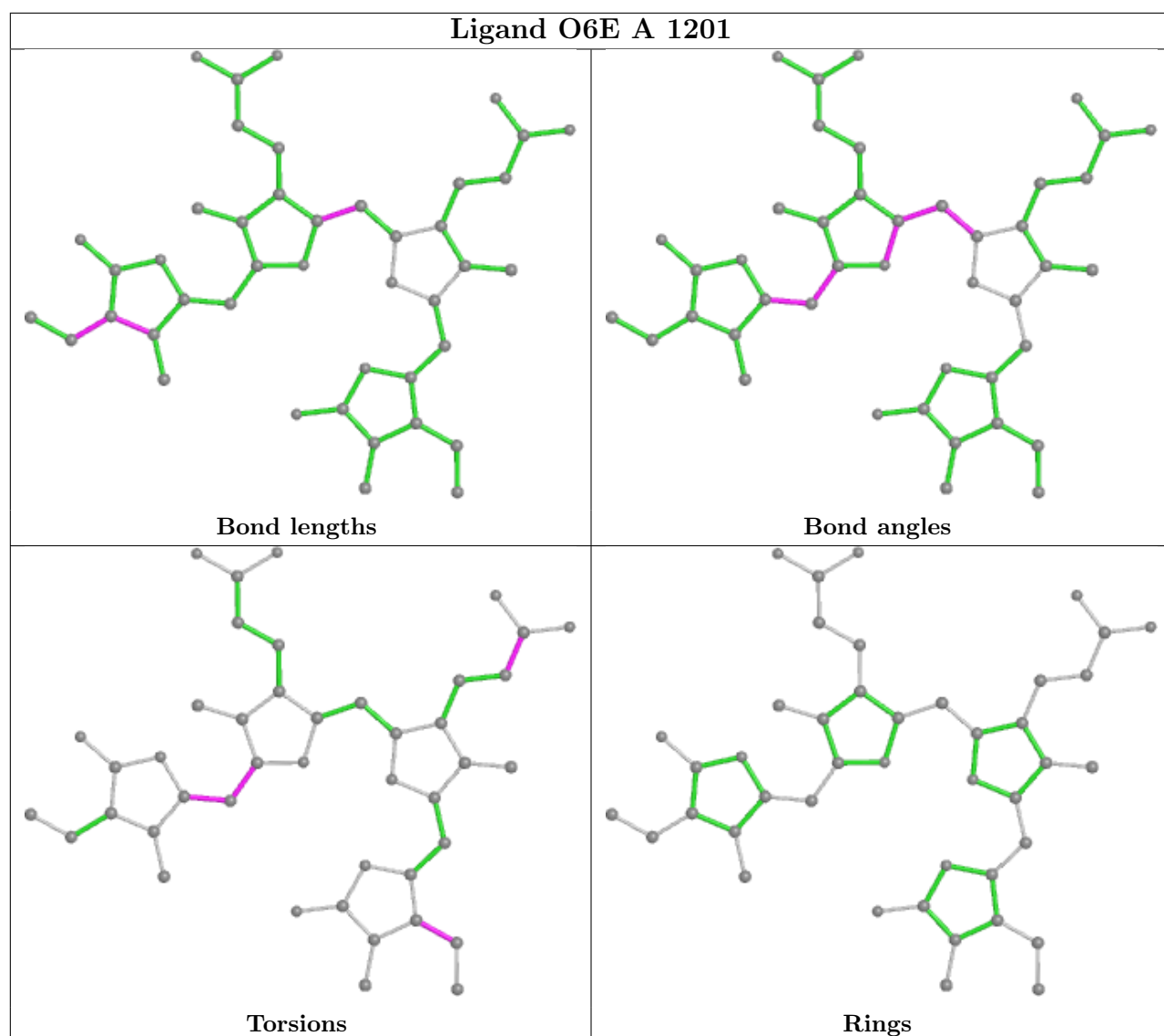
All (13) torsion outliers are listed below:

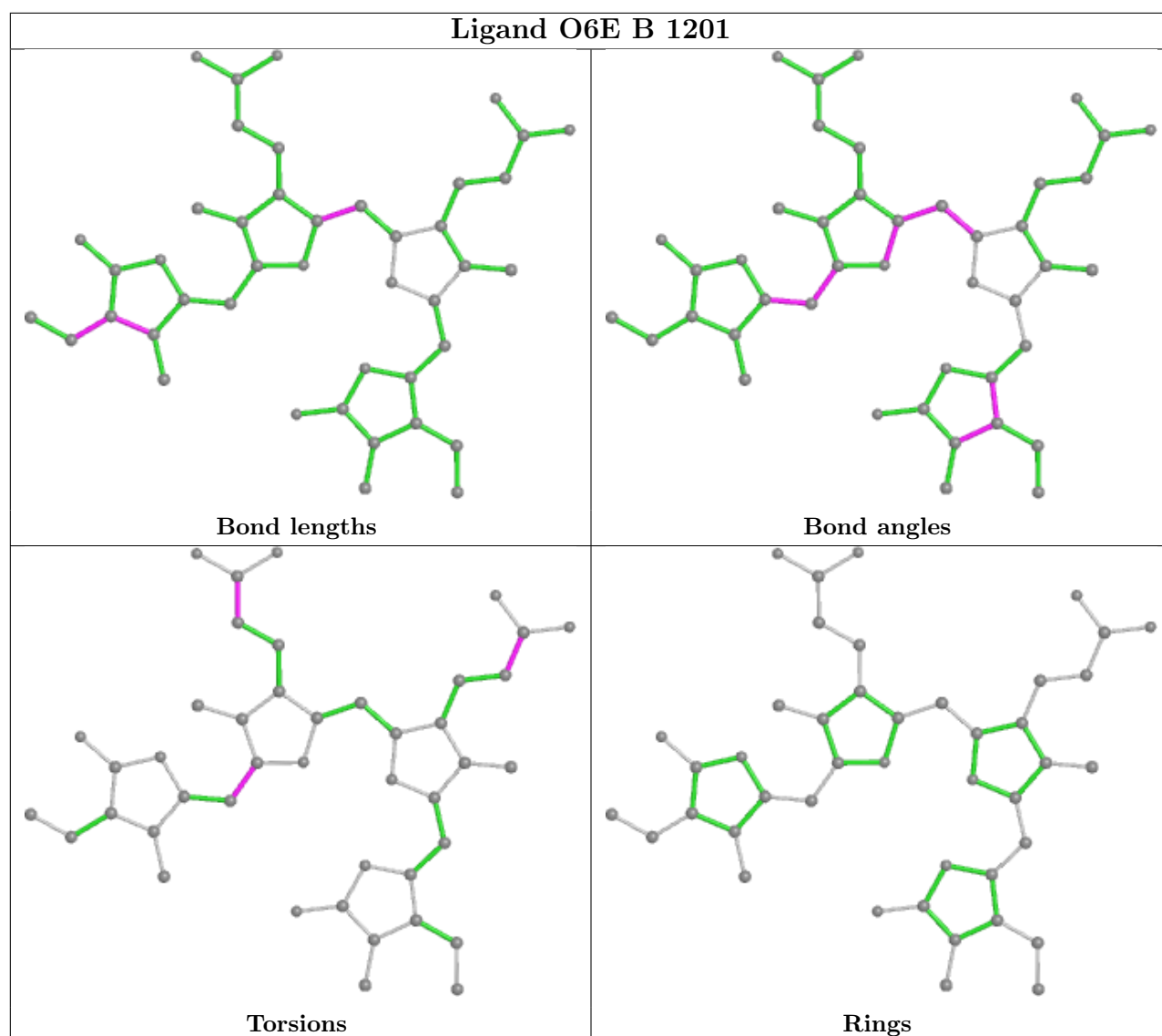
Mol	Chain	Res	Type	Atoms
2	A	1201	O6E	CAW-CAP-CBL-NAE
2	B	1201	O6E	CAW-CAP-CBL-NAE
2	A	1201	O6E	CAW-CAP-CBL-CBH
2	B	1201	O6E	CAW-CAP-CBL-CBH
2	A	1201	O6E	CAH-CAC-CBJ-CBN
2	A	1201	O6E	CAH-CAC-CBJ-CBD
2	A	1201	O6E	CAD-CAI-CAM-OBG
2	A	1201	O6E	CAD-CAI-CAM-OBA
2	B	1201	O6E	CAD-CAI-CAM-OBG
2	B	1201	O6E	CAD-CAI-CAM-OBA
2	B	1201	O6E	CAA-CAF-CAL-OAZ
2	B	1201	O6E	CAA-CAF-CAL-OBF
2	A	1201	O6E	CBL-CAP-CAW-NAJ

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.





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.