



Full wwPDB EM Validation Report ⓘ

Jan 14, 2024 – 12:06 AM JST

PDB ID : 8JUL
EMDB ID : EMD-36661
Title : Cryo-EM structure of SIDT1 in complex with phosphatidic acid
Authors : Sun, C.R.; Xu, D.; Li, Q.; Zhou, C.Z.; Chen, Y.
Deposited on : 2023-06-26
Resolution : 2.92 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 : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

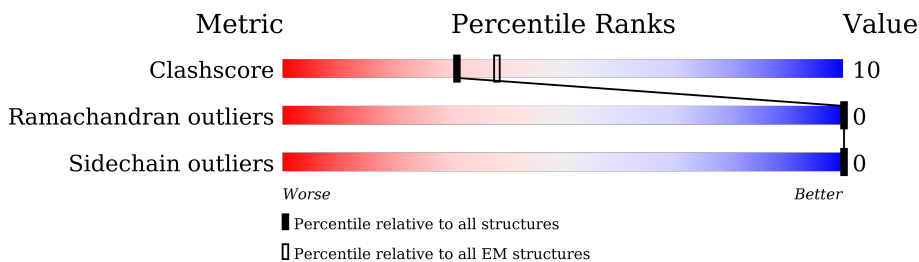
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY



The reported resolution of this entry is 2.92 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	827	 58% 17% 25%
1	B	827	 60% 15% 25%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 9690 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.

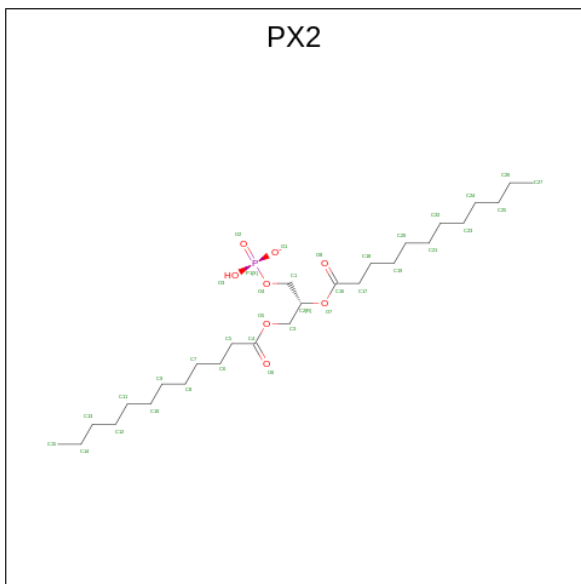
- Molecule 1 is a protein called SID1 transmembrane family member 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	623	Total 4807	C 3142	N 782	O 857	S 26	0	0
1	B	623	Total 4807	C 3142	N 782	O 857	S 26	0	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
2	A	1	Total Zn 1 1	0
2	B	1	Total Zn 1 1	0

- Molecule 3 is 1,2-DILAUROYL-SN-GLYCERO-3-PHOSPHATE (three-letter code: PX2) (formula: C₂₇H₅₂O₈P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
3	A	1	Total	C	O	P	0
			36	27	8	1	
3	B	1	Total	C	O	P	0
			36	27	8	1	

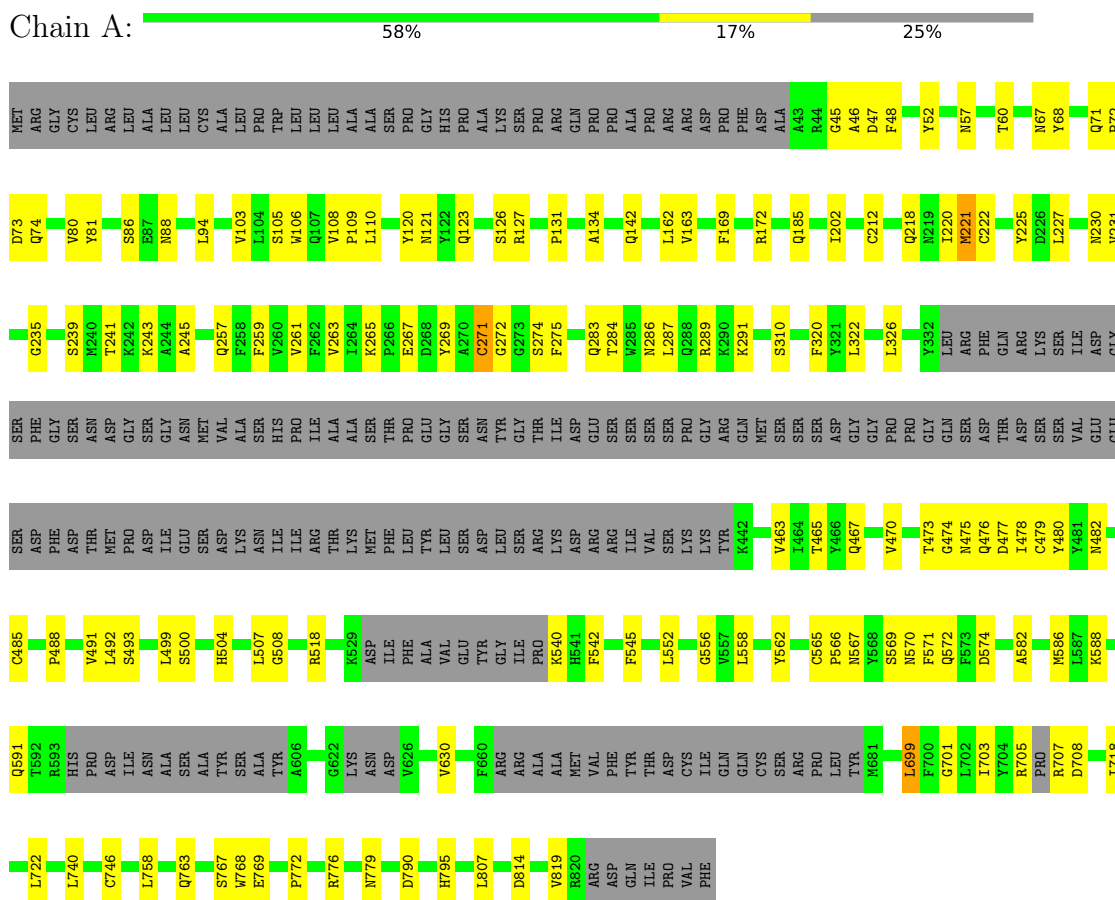
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	O	0
			1	1	
4	B	1	Total	O	0
			1	1	

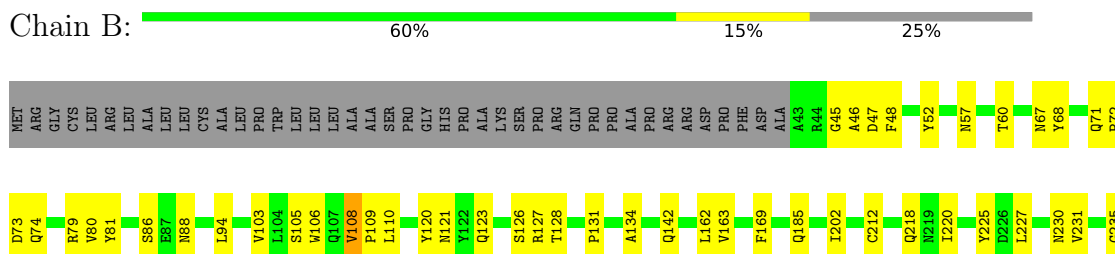
3 Residue-property plots

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: SID1 transmembrane family member 1



- Molecule 1: SID1 transmembrane family member 1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	535389	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k 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: PX2, ZN

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	0.53	0/4921	0.70	16/6694 (0.2%)
1	B	0.51	0/4921	0.65	12/6694 (0.2%)
All	All	0.52	0/9842	0.67	28/13388 (0.2%)

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 (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	705	ARG	CB-CA-C	-16.24	77.93	110.40
1	A	272	GLY	N-CA-C	13.15	145.97	113.10
1	B	272	GLY	N-CA-C	12.85	145.22	113.10
1	A	271	CYS	CB-CA-C	12.08	134.56	110.40
1	B	271	CYS	CB-CA-C	11.54	133.49	110.40
1	B	701	GLY	N-CA-C	-10.42	87.06	113.10
1	B	271	CYS	N-CA-C	-9.42	85.56	111.00
1	B	700	PHE	N-CA-C	8.83	134.83	111.00
1	A	708	ASP	N-CA-C	-8.58	87.83	111.00
1	A	703	ILE	N-CA-C	-8.44	88.20	111.00
1	A	701	GLY	N-CA-C	-8.28	92.40	113.10
1	B	45	GLY	N-CA-C	-8.00	93.11	113.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	46	ALA	N-CA-CB	7.98	121.28	110.10
1	A	271	CYS	N-CA-C	-7.93	89.59	111.00
1	A	708	ASP	N-CA-CB	7.71	124.47	110.60
1	A	221	MET	N-CA-C	-7.18	91.60	111.00
1	B	702	LEU	N-CA-C	-7.18	91.60	111.00
1	A	45	GLY	N-CA-C	-7.05	95.48	113.10
1	A	46	ALA	N-CA-CB	6.67	119.43	110.10
1	B	108	VAL	C-N-CD	-6.54	106.22	120.60
1	A	222	CYS	N-CA-C	6.34	128.12	111.00
1	A	699	LEU	N-CA-C	6.24	127.85	111.00
1	B	698	ALA	N-CA-C	-6.04	94.70	111.00
1	A	703	ILE	CB-CA-C	5.88	123.35	111.60
1	A	769	GLU	CB-CA-C	5.72	121.84	110.40
1	B	700	PHE	CB-CA-C	-5.65	99.09	110.40
1	A	705	ARG	N-CA-C	5.44	125.69	111.00
1	B	275	PHE	CB-CA-C	5.09	120.59	110.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	108	VAL	Peptide
1	B	108	VAL	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	4807	0	4580	96	0
1	B	4807	0	4580	91	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	36	0	51	5	0
3	B	36	0	51	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
All	All	9690	0	9262	184	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 (184) 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:700:PHE:CB	1:B:704:TYR:H	1.69	1.06
1:B:700:PHE:CB	1:B:704:TYR:N	2.36	0.88
1:B:571:PHE:O	1:B:572:GLN:HG2	1.77	0.84
1:A:225:TYR:HB3	1:A:230:ASN:HB3	1.60	0.84
1:A:571:PHE:O	1:A:572:GLN:HG2	1.78	0.83
1:B:225:TYR:HB3	1:B:230:ASN:HB3	1.60	0.83
1:A:105:SER:HG	1:B:105:SER:HG	1.22	0.80
1:B:265:LYS:O	1:B:289:ARG:NH2	2.16	0.79
1:A:265:LYS:O	1:A:289:ARG:NH2	2.16	0.78
1:A:707:ARG:HH22	1:A:767:SER:HA	1.51	0.76
1:B:67:ASN:OD1	1:B:142:GLN:NE2	2.20	0.75
1:A:67:ASN:OD1	1:A:142:GLN:NE2	2.20	0.74
1:B:478:ILE:O	1:B:567:ASN:ND2	2.21	0.74
1:A:478:ILE:O	1:A:567:ASN:ND2	2.21	0.72
1:B:473:THR:HG22	1:B:475:ASN:H	1.55	0.72
1:A:473:THR:HG22	1:A:475:ASN:H	1.55	0.71
1:B:241:THR:O	1:B:291:LYS:NZ	2.28	0.66
1:A:630:VAL:HA	1:A:699:LEU:O	1.96	0.66
1:A:241:THR:O	1:A:291:LYS:NZ	2.28	0.65
1:A:707:ARG:NH2	1:A:767:SER:HA	2.12	0.64
1:B:477:ASP:HB3	1:B:772:PRO:HG2	1.80	0.63
1:A:477:ASP:HB3	1:A:772:PRO:HG2	1.80	0.62
1:B:582:ALA:O	1:B:586:MET:HG2	1.99	0.62
1:A:718:ILE:HD11	3:A:902:PX2:H8	1.82	0.62
1:A:582:ALA:O	1:A:586:MET:HG2	1.99	0.62
1:B:700:PHE:H	1:B:703:ILE:HA	1.66	0.61
1:A:239:SER:O	1:A:776:ARG:NH2	2.35	0.60
1:A:220:ILE:HD13	1:A:257:GLN:HE21	1.67	0.60
1:B:239:SER:O	1:B:776:ARG:NH2	2.35	0.59
1:B:700:PHE:CB	1:B:704:TYR:CA	2.81	0.59
1:A:71:GLN:OE1	1:A:74:GLN:NE2	2.36	0.59
1:B:220:ILE:HD13	1:B:257:GLN:HE21	1.67	0.59
1:B:71:GLN:OE1	1:B:74:GLN:NE2	2.36	0.58
1:A:127:ARG:HH12	1:A:227:LEU:HD21	1.69	0.58
1:B:127:ARG:HH12	1:B:227:LEU:HD21	1.69	0.57
1:A:120:TYR:OH	1:A:267:GLU:OE2	2.18	0.57
1:B:57:ASN:OD1	1:B:60:THR:OG1	2.22	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:88:ASN:O	1:B:109:PRO:HG2	2.05	0.57
1:B:571:PHE:O	1:B:572:GLN:CG	2.50	0.56
1:A:57:ASN:OD1	1:A:60:THR:OG1	2.22	0.56
1:A:110:LEU:O	1:A:121:ASN:HA	2.06	0.55
1:A:470:VAL:HG21	1:A:479:CYS:SG	2.46	0.55
1:A:88:ASN:O	1:A:109:PRO:HG2	2.07	0.55
1:B:110:LEU:O	1:B:121:ASN:HA	2.06	0.55
1:B:470:VAL:HG21	1:B:479:CYS:SG	2.46	0.55
1:A:202:ILE:O	1:A:245:ALA:HA	2.09	0.53
1:B:73:ASP:OD1	1:B:74:GLN:N	2.43	0.52
1:B:565:CYS:O	1:B:570:ASN:ND2	2.42	0.52
1:A:565:CYS:O	1:A:570:ASN:ND2	2.43	0.52
1:A:73:ASP:OD1	1:A:74:GLN:N	2.43	0.52
1:B:202:ILE:O	1:B:245:ALA:HA	2.09	0.52
1:B:463:VAL:HG12	1:B:570:ASN:HD21	1.75	0.52
1:A:463:VAL:HG12	1:A:570:ASN:HD21	1.75	0.51
1:A:500:SER:OG	1:A:795:HIS:HB2	2.10	0.51
1:A:571:PHE:O	1:A:572:GLN:CG	2.54	0.51
1:B:500:SER:OG	1:B:795:HIS:HB2	2.10	0.51
1:A:567:ASN:HB2	1:A:570:ASN:HB2	1.93	0.51
1:B:567:ASN:HB2	1:B:570:ASN:HB2	1.93	0.51
1:A:269:TYR:C	1:A:271:CYS:O	2.49	0.51
1:B:120:TYR:OH	1:B:267:GLU:OE2	2.18	0.51
1:A:94:LEU:HB3	1:B:103:VAL:HG21	1.93	0.51
1:A:540:LYS:HD2	1:A:545:PHE:HE2	1.76	0.51
1:B:540:LYS:HD2	1:B:545:PHE:HE2	1.76	0.50
1:A:47:ASP:OD1	1:A:47:ASP:N	2.45	0.50
1:A:103:VAL:HG21	1:B:94:LEU:HB3	1.95	0.49
1:B:218:GLN:NE2	1:B:261:VAL:HG21	2.28	0.49
1:A:218:GLN:NE2	1:A:261:VAL:HG21	2.28	0.49
1:A:763:GLN:HG3	1:A:790:ASP:HB3	1.95	0.49
1:B:763:GLN:HG3	1:B:790:ASP:HB3	1.95	0.49
1:A:127:ARG:NH1	1:A:227:LEU:HD21	2.28	0.49
1:A:558:LEU:HD13	1:A:574:ASP:HA	1.95	0.49
1:B:127:ARG:NH1	1:B:227:LEU:HD21	2.28	0.49
1:A:467:GLN:NE2	1:A:491:VAL:O	2.46	0.48
1:A:465:THR:HG21	1:B:569:SER:HB3	1.95	0.48
1:B:467:GLN:NE2	1:B:491:VAL:O	2.46	0.48
1:B:558:LEU:HD13	1:B:574:ASP:HA	1.95	0.48
1:A:131:PRO:HG3	1:A:169:PHE:CE2	2.49	0.48
1:B:220:ILE:HG13	1:B:220:ILE:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:482:ASN:OD1	1:A:485:CYS:N	2.46	0.47
1:B:48:PHE:CE2	1:B:68:TYR:HB3	2.50	0.47
1:B:269:TYR:C	1:B:271:CYS:O	2.53	0.47
1:B:131:PRO:HG3	1:B:169:PHE:CE2	2.49	0.47
1:A:48:PHE:CE2	1:A:68:TYR:HB3	2.50	0.47
1:B:482:ASN:OD1	1:B:485:CYS:N	2.46	0.47
1:A:106:TRP:CZ3	1:A:127:ARG:HD2	2.50	0.46
1:B:47:ASP:OD1	1:B:47:ASP:N	2.45	0.46
1:A:220:ILE:CD1	1:A:257:GLN:HE21	2.28	0.46
1:A:220:ILE:O	1:A:221:MET:SD	2.74	0.46
3:A:902:PX2:H49	3:A:902:PX2:H43	1.40	0.46
1:B:220:ILE:CD1	1:B:257:GLN:HE21	2.28	0.46
1:B:106:TRP:CZ3	1:B:127:ARG:HD2	2.50	0.46
1:A:269:TYR:CZ	1:A:274:SER:HB2	2.51	0.46
1:A:274:SER:O	1:A:275:PHE:HB2	2.16	0.46
1:A:569:SER:HB3	1:B:465:THR:HG21	1.97	0.46
1:B:269:TYR:CZ	1:B:274:SER:HB2	2.51	0.46
1:A:283:GLN:NE2	1:A:284:THR:HG23	2.31	0.45
1:B:283:GLN:NE2	1:B:284:THR:HG23	2.31	0.45
1:B:235:GLY:O	1:B:474:GLY:HA3	2.16	0.45
1:B:488:PRO:HB3	1:B:493:SER:HA	1.98	0.45
1:A:235:GLY:O	1:A:474:GLY:HA3	2.16	0.45
3:A:902:PX2:H13	3:A:902:PX2:H19	1.54	0.45
1:A:488:PRO:HB3	1:A:493:SER:HA	1.98	0.45
1:B:79:ARG:NH2	1:B:128:THR:OG1	2.44	0.45
1:A:310:SER:HA	1:A:499:LEU:HD21	1.99	0.44
1:B:225:TYR:CB	1:B:230:ASN:HB3	2.41	0.44
1:B:212:CYS:HB2	1:B:271:CYS:HB2	1.88	0.44
1:B:518:ARG:HE	1:B:518:ARG:HB2	1.67	0.44
1:A:86:SER:HB2	1:A:123:GLN:CD	2.38	0.44
1:A:819:VAL:HG12	1:A:819:VAL:O	2.17	0.44
1:A:212:CYS:HB2	1:A:271:CYS:HB2	1.88	0.44
1:B:274:SER:O	1:B:275:PHE:HB2	2.18	0.44
1:B:81:TYR:HD2	1:B:162:LEU:HD23	1.83	0.44
1:A:746:CYS:SG	1:A:807:LEU:HD23	2.58	0.43
1:B:72:PRO:HA	1:B:134:ALA:HB3	1.99	0.43
1:B:86:SER:HB2	1:B:123:GLN:CD	2.38	0.43
1:B:540:LYS:HD2	1:B:545:PHE:CE2	2.54	0.43
3:B:902:PX2:H31	3:B:902:PX2:H36	1.76	0.43
1:B:231:VAL:HG11	1:B:263:VAL:HG21	2.00	0.43
1:B:819:VAL:HG12	1:B:819:VAL:O	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:81:TYR:HD2	1:A:162:LEU:HD23	1.83	0.43
3:A:902:PX2:H22	3:A:902:PX2:H29	1.52	0.43
1:B:588:LYS:HD2	1:B:591:GLN:NE2	2.33	0.43
1:B:310:SER:HA	1:B:499:LEU:HD21	1.99	0.43
1:A:286:ASN:OD1	1:A:286:ASN:N	2.52	0.43
1:A:72:PRO:HA	1:A:134:ALA:HB3	1.99	0.43
1:A:80:VAL:HG13	1:A:163:VAL:HG22	2.01	0.43
1:A:94:LEU:HB3	1:B:103:VAL:CG2	2.48	0.43
1:A:103:VAL:CG2	1:B:94:LEU:HB3	2.49	0.43
1:A:540:LYS:HD2	1:A:545:PHE:CE2	2.53	0.43
1:B:703:ILE:O	1:B:704:TYR:C	2.56	0.43
1:A:243:LYS:HE2	1:A:243:LYS:HB2	1.85	0.43
1:B:732:LYS:HE3	1:B:732:LYS:HB3	1.83	0.43
1:A:231:VAL:HG11	1:A:263:VAL:HG21	2.00	0.42
1:A:220:ILE:O	1:A:220:ILE:HG13	2.19	0.42
1:A:81:TYR:CD2	1:A:162:LEU:HD23	2.54	0.42
1:A:476:GLN:O	1:A:776:ARG:NH1	2.52	0.42
1:A:225:TYR:CB	1:A:230:ASN:HB3	2.41	0.42
1:A:492:LEU:HD23	1:A:492:LEU:HA	1.79	0.42
1:A:588:LYS:HD2	1:A:591:GLN:NE2	2.33	0.42
1:B:746:CYS:SG	1:B:807:LEU:HD23	2.58	0.42
1:B:286:ASN:N	1:B:286:ASN:OD1	2.52	0.42
1:A:322:LEU:O	1:A:326:LEU:HD23	2.20	0.42
1:A:758:LEU:HD11	3:A:902:PX2:H44	2.01	0.42
1:B:476:GLN:O	1:B:776:ARG:NH1	2.52	0.42
1:A:110:LEU:HD12	1:A:110:LEU:HA	1.83	0.42
1:B:81:TYR:CD2	1:B:162:LEU:HD23	2.54	0.42
1:B:322:LEU:O	1:B:326:LEU:HD23	2.20	0.42
1:B:86:SER:HB2	1:B:123:GLN:NE2	2.34	0.42
1:A:562:TYR:CZ	1:A:566:PRO:HB3	2.56	0.41
1:B:47:ASP:OD1	1:B:52:TYR:OH	2.38	0.41
1:B:80:VAL:HG13	1:B:163:VAL:HG22	2.01	0.41
1:B:722:LEU:HD23	1:B:722:LEU:HA	1.85	0.41
1:A:86:SER:HB2	1:A:123:GLN:NE2	2.34	0.41
1:A:47:ASP:OD1	1:A:52:TYR:OH	2.38	0.41
1:B:283:GLN:O	1:B:287:LEU:HB2	2.21	0.41
1:A:740:LEU:HD13	1:A:814:ASP:HB2	2.03	0.41
1:B:518:ARG:HG2	1:B:542:PHE:CZ	2.56	0.41
1:A:172:ARG:HA	1:A:172:ARG:HD3	1.75	0.41
1:A:220:ILE:HA	1:A:259:PHE:CE2	2.56	0.41
1:B:48:PHE:HE2	1:B:68:TYR:HB3	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:558:LEU:HB3	1:B:574:ASP:HB3	2.02	0.41
1:A:48:PHE:HE2	1:A:68:TYR:HB3	1.86	0.41
1:A:283:GLN:O	1:A:287:LEU:HB2	2.20	0.41
1:A:504:HIS:HB2	1:A:556:GLY:HA3	2.03	0.41
1:A:540:LYS:HD3	1:A:540:LYS:HA	1.89	0.41
1:B:126:SER:HB2	1:B:185:GLN:HB3	2.03	0.41
1:B:562:TYR:CZ	1:B:566:PRO:HB3	2.55	0.41
1:A:518:ARG:HG2	1:A:542:PHE:CZ	2.56	0.41
1:B:504:HIS:HB2	1:B:556:GLY:HA3	2.03	0.41
1:A:722:LEU:HD23	1:A:722:LEU:HA	1.86	0.41
1:B:273:GLY:O	1:B:274:SER:OG	2.23	0.40
1:B:508:GLY:CA	1:B:552:LEU:HD23	2.51	0.40
1:A:320:PHE:CD2	1:A:507:LEU:HD11	2.57	0.40
1:A:482:ASN:ND2	1:A:779:ASN:HB2	2.37	0.40
1:A:518:ARG:HE	1:A:518:ARG:HB2	1.67	0.40
1:B:110:LEU:HD12	1:B:110:LEU:HA	1.85	0.40
1:B:320:PHE:CD2	1:B:507:LEU:HD11	2.57	0.40
1:A:126:SER:HB2	1:A:185:GLN:HB3	2.03	0.40
1:A:508:GLY:CA	1:A:552:LEU:HD23	2.51	0.40
1:A:758:LEU:HD23	1:A:758:LEU:HA	1.87	0.40
1:B:482:ASN:ND2	1:B:779:ASN:HB2	2.37	0.40
1:B:806:PHE:HZ	3:B:902:PX2:H11	1.86	0.40
1:A:269:TYR:CE1	1:A:274:SER:HB2	2.57	0.40
1:A:480:TYR:CE2	1:A:768:TRP:HA	2.57	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	609/827 (74%)	566 (93%)	43 (7%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	609/827 (74%)	563 (92%)	46 (8%)	0	100	100
All	All	1218/1654 (74%)	1129 (93%)	89 (7%)	0	100	100

There are no Ramachandran outliers to report.

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	492/732 (67%)	492 (100%)	0	100	100
1	B	492/732 (67%)	492 (100%)	0	100	100
All	All	984/1464 (67%)	984 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	67	ASN
1	A	71	GLN
1	A	74	GLN
1	A	83	ASN
1	A	113	GLN
1	A	142	GLN
1	A	158	GLN
1	A	170	GLN
1	A	218	GLN
1	A	229	HIS
1	A	288	GLN
1	A	467	GLN
1	A	763	GLN
1	B	62	ASN
1	B	67	ASN
1	B	71	GLN

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Mol	Chain	Res	Type
1	B	74	GLN
1	B	83	ASN
1	B	113	GLN
1	B	123	GLN
1	B	142	GLN
1	B	158	GLN
1	B	170	GLN
1	B	218	GLN
1	B	229	HIS
1	B	288	GLN
1	B	467	GLN
1	B	763	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 monosaccharides 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	PX2	A	902	-	35,35,35	1.37	6 (17%)	39,40,40	1.44	3 (7%)
3	PX2	B	902	-	35,35,35	1.34	5 (14%)	39,40,40	1.29	3 (7%)

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	PX2	A	902	-	-	25/37/37/37	-
3	PX2	B	902	-	-	20/37/37/37	-

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	902	PX2	P1-O2	4.51	1.65	1.50
3	A	902	PX2	P1-O2	4.04	1.63	1.50
3	A	902	PX2	O5-C3	-2.89	1.38	1.45
3	B	902	PX2	O7-C2	-2.78	1.39	1.46
3	A	902	PX2	O7-C2	-2.77	1.39	1.46
3	A	902	PX2	P1-O3	-2.76	1.44	1.54
3	A	902	PX2	P1-O1	-2.72	1.44	1.54
3	B	902	PX2	O5-C3	-2.49	1.39	1.45
3	B	902	PX2	P1-O3	-2.37	1.45	1.54
3	A	902	PX2	O6-C4	-2.33	1.15	1.22
3	B	902	PX2	P1-O1	-2.33	1.45	1.54

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	902	PX2	O7-C16-C17	4.12	120.38	111.50
3	B	902	PX2	O7-C16-C17	3.60	119.25	111.50
3	A	902	PX2	O5-C4-C5	3.33	122.37	111.91
3	B	902	PX2	O5-C4-C5	3.00	121.32	111.91
3	B	902	PX2	O4-P1-O2	2.18	112.60	106.47
3	A	902	PX2	C18-C17-C16	-2.11	105.95	113.62

There are no chirality outliers.

All (45) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	902	PX2	C1-O4-P1-O1
3	A	902	PX2	C1-O4-P1-O2
3	A	902	PX2	C1-O4-P1-O3
3	B	902	PX2	C1-O4-P1-O1
3	B	902	PX2	C1-O4-P1-O2

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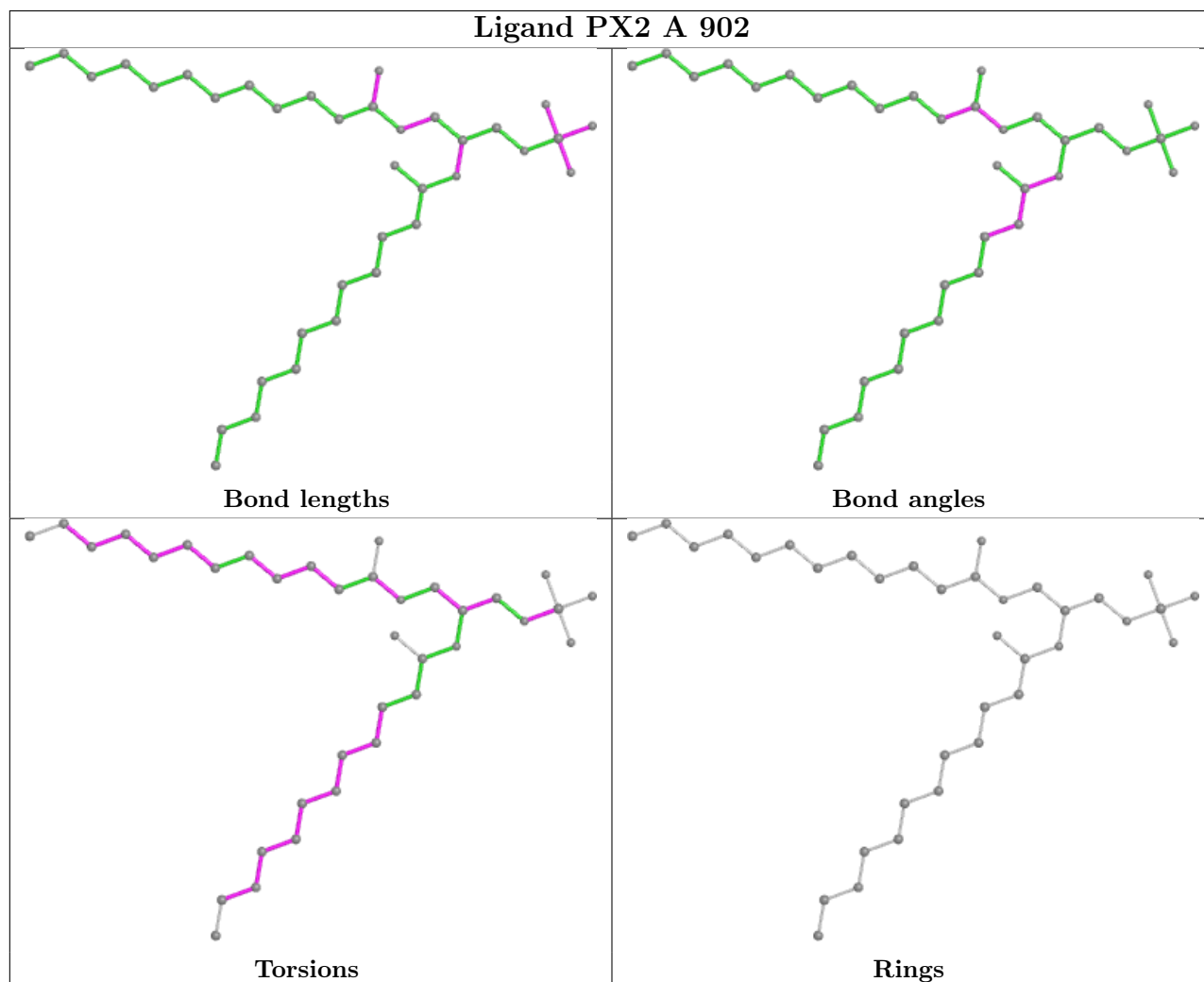
Mol	Chain	Res	Type	Atoms
3	B	902	PX2	C1-O4-P1-O3
3	B	902	PX2	O7-C2-C3-O5
3	A	902	PX2	C17-C18-C19-C20
3	A	902	PX2	C11-C10-C9-C8
3	B	902	PX2	C5-C6-C7-C8
3	A	902	PX2	O7-C2-C3-O5
3	A	902	PX2	C5-C4-O5-C3
3	A	902	PX2	O6-C4-O5-C3
3	A	902	PX2	C5-C6-C7-C8
3	A	902	PX2	C23-C24-C25-C26
3	A	902	PX2	C9-C10-C11-C12
3	B	902	PX2	C6-C7-C8-C9
3	A	902	PX2	C11-C12-C13-C14
3	B	902	PX2	C10-C11-C12-C13
3	A	902	PX2	C21-C22-C23-C24
3	A	902	PX2	C20-C21-C22-C23
3	A	902	PX2	C4-C5-C6-C7
3	B	902	PX2	C20-C21-C22-C23
3	B	902	PX2	C11-C12-C13-C14
3	B	902	PX2	C5-C4-O5-C3
3	A	902	PX2	C6-C7-C8-C9
3	A	902	PX2	O4-C1-C2-C3
3	B	902	PX2	O4-C1-C2-C3
3	B	902	PX2	C21-C22-C23-C24
3	A	902	PX2	C18-C19-C20-C21
3	A	902	PX2	C1-C2-C3-O5
3	B	902	PX2	C1-C2-C3-O5
3	A	902	PX2	C24-C25-C26-C27
3	B	902	PX2	O6-C4-O5-C3
3	A	902	PX2	C22-C23-C24-C25
3	B	902	PX2	C18-C19-C20-C21
3	B	902	PX2	C11-C10-C9-C8
3	B	902	PX2	C19-C20-C21-C22
3	A	902	PX2	O4-C1-C2-O7
3	B	902	PX2	O4-C1-C2-O7
3	A	902	PX2	C12-C13-C14-C15
3	B	902	PX2	C17-C18-C19-C20
3	A	902	PX2	C10-C11-C12-C13
3	A	902	PX2	C19-C20-C21-C22
3	B	902	PX2	C9-C10-C11-C12

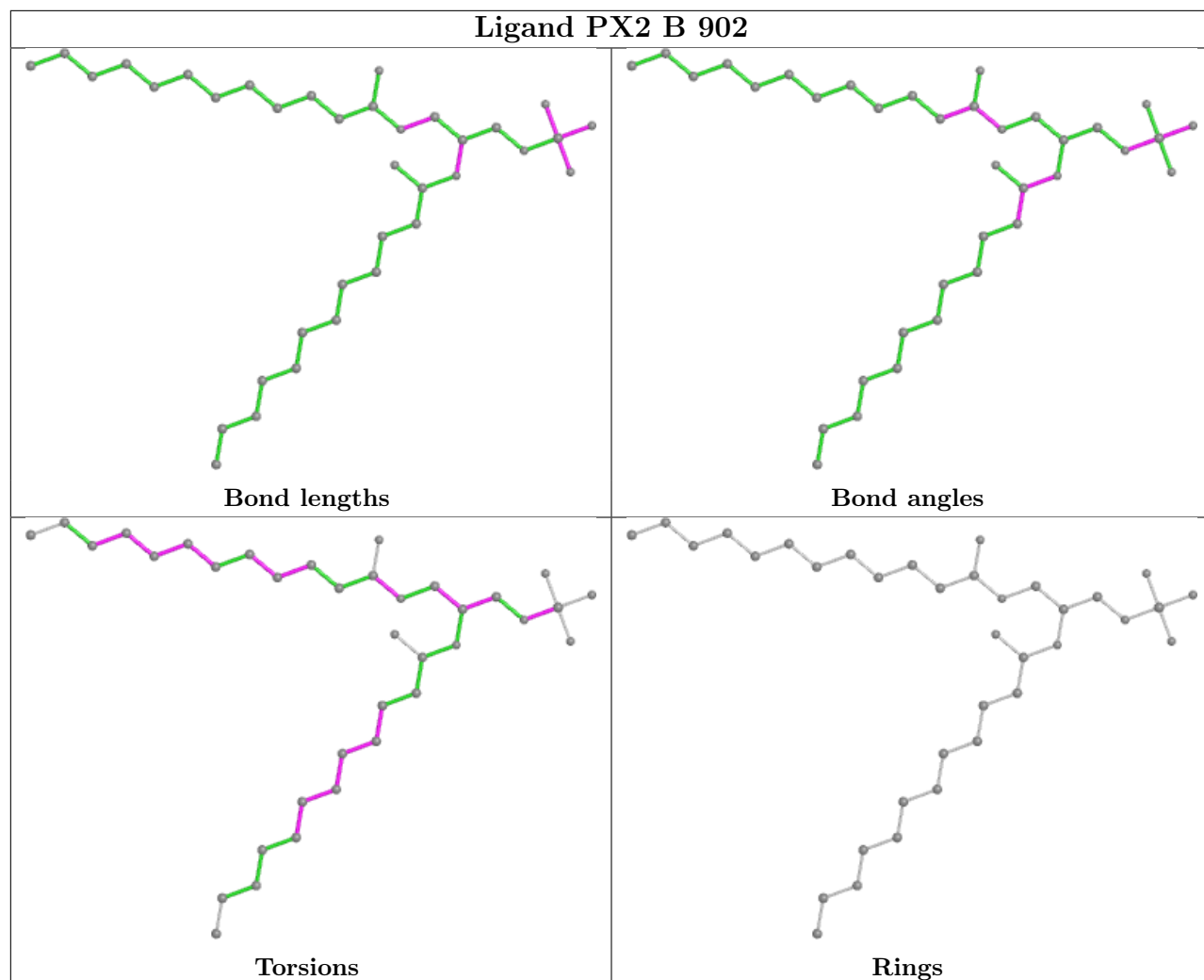
There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	902	PX2	5	0
3	B	902	PX2	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.