



Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 02:42 AM JST

PDB ID : 9J52 / pdb_00009j52
EMDB ID : EMD-61140
Title : CryoEM structure of human XPR1 in complex with phosphate in state B
Authors : Zhang, W.H.; Chen, Y.K.; Guan, Z.Y.; Liu, Z.
Deposited on : 2024-08-11
Resolution : 3.10 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

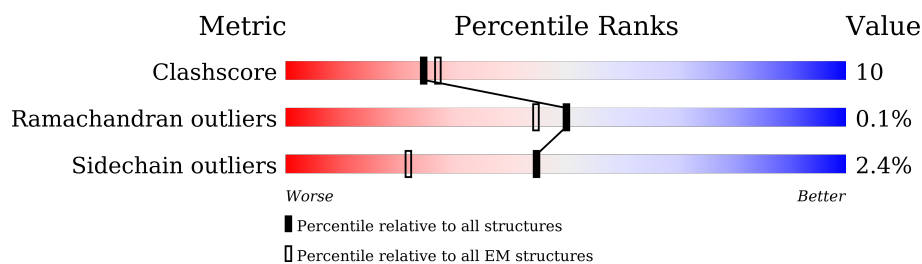
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 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	720	
1	B	720	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	PO4	A	803	-	-	X	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6593 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 Solute carrier family 53 member 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	382	Total	C	N	O	S	0	0
			3186	2143	510	518	15		
1	B	382	Total	C	N	O	S	0	0
			3186	2143	510	518	15		

There are 48 discrepancies between the modelled and reference sequences:

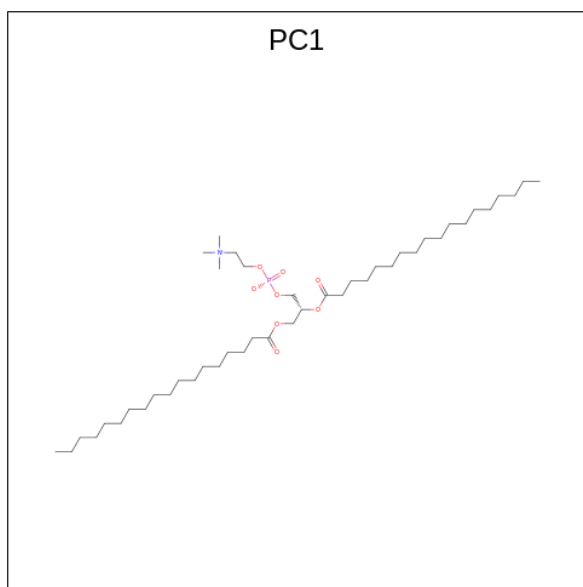
Chain	Residue	Modelled	Actual	Comment	Reference
A	697	LEU	-	expression tag	UNP Q9UBH6
A	698	GLU	-	expression tag	UNP Q9UBH6
A	699	ASP	-	expression tag	UNP Q9UBH6
A	700	TYR	-	expression tag	UNP Q9UBH6
A	701	LYS	-	expression tag	UNP Q9UBH6
A	702	ASP	-	expression tag	UNP Q9UBH6
A	703	HIS	-	expression tag	UNP Q9UBH6
A	704	ASP	-	expression tag	UNP Q9UBH6
A	705	GLY	-	expression tag	UNP Q9UBH6
A	706	ASP	-	expression tag	UNP Q9UBH6
A	707	TYR	-	expression tag	UNP Q9UBH6
A	708	LYS	-	expression tag	UNP Q9UBH6
A	709	ASP	-	expression tag	UNP Q9UBH6
A	710	HIS	-	expression tag	UNP Q9UBH6
A	711	ASP	-	expression tag	UNP Q9UBH6
A	712	ILE	-	expression tag	UNP Q9UBH6
A	713	ASP	-	expression tag	UNP Q9UBH6
A	714	TYR	-	expression tag	UNP Q9UBH6
A	715	LYS	-	expression tag	UNP Q9UBH6
A	716	ASP	-	expression tag	UNP Q9UBH6
A	717	ASP	-	expression tag	UNP Q9UBH6
A	718	ASP	-	expression tag	UNP Q9UBH6
A	719	ASP	-	expression tag	UNP Q9UBH6
A	720	LYS	-	expression tag	UNP Q9UBH6
B	697	LEU	-	expression tag	UNP Q9UBH6
B	698	GLU	-	expression tag	UNP Q9UBH6

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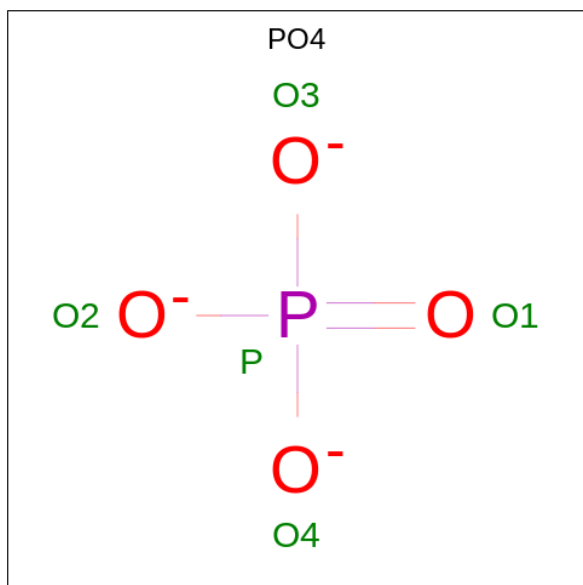
Chain	Residue	Modelled	Actual	Comment	Reference
B	699	ASP	-	expression tag	UNP Q9UBH6
B	700	TYR	-	expression tag	UNP Q9UBH6
B	701	LYS	-	expression tag	UNP Q9UBH6
B	702	ASP	-	expression tag	UNP Q9UBH6
B	703	HIS	-	expression tag	UNP Q9UBH6
B	704	ASP	-	expression tag	UNP Q9UBH6
B	705	GLY	-	expression tag	UNP Q9UBH6
B	706	ASP	-	expression tag	UNP Q9UBH6
B	707	TYR	-	expression tag	UNP Q9UBH6
B	708	LYS	-	expression tag	UNP Q9UBH6
B	709	ASP	-	expression tag	UNP Q9UBH6
B	710	HIS	-	expression tag	UNP Q9UBH6
B	711	ASP	-	expression tag	UNP Q9UBH6
B	712	ILE	-	expression tag	UNP Q9UBH6
B	713	ASP	-	expression tag	UNP Q9UBH6
B	714	TYR	-	expression tag	UNP Q9UBH6
B	715	LYS	-	expression tag	UNP Q9UBH6
B	716	ASP	-	expression tag	UNP Q9UBH6
B	717	ASP	-	expression tag	UNP Q9UBH6
B	718	ASP	-	expression tag	UNP Q9UBH6
B	719	ASP	-	expression tag	UNP Q9UBH6
B	720	LYS	-	expression tag	UNP Q9UBH6

- Molecule 2 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (CCD ID: PC1) (formula: $C_{44}H_{88}NO_8P$).



Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	N	O	P	0
			54	44	1	8	1	
2	A	1	Total	C	N	O	P	0
			54	44	1	8	1	
2	B	1	Total	C	N	O	P	0
			54	44	1	8	1	
2	B	1	Total	C	N	O	P	0
			54	44	1	8	1	

- Molecule 3 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).

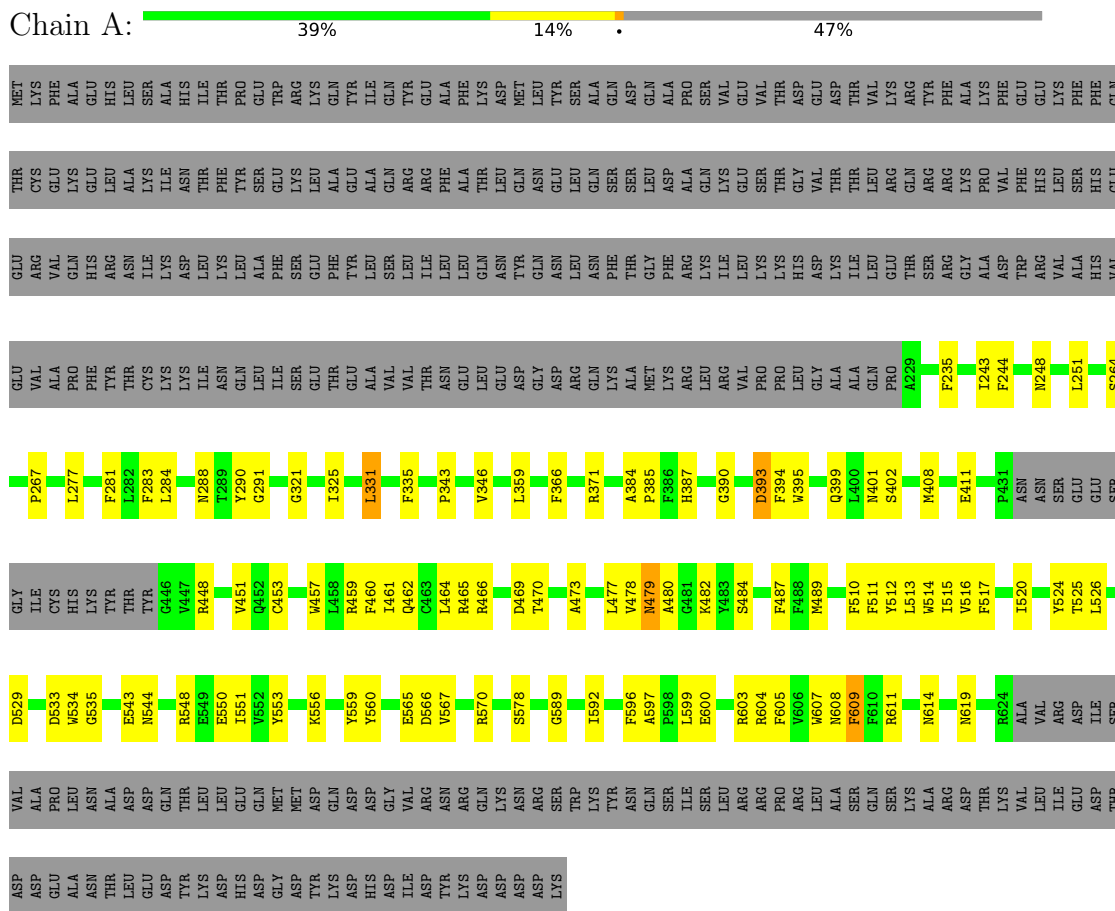


Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	O	P	0
			5	4	1	

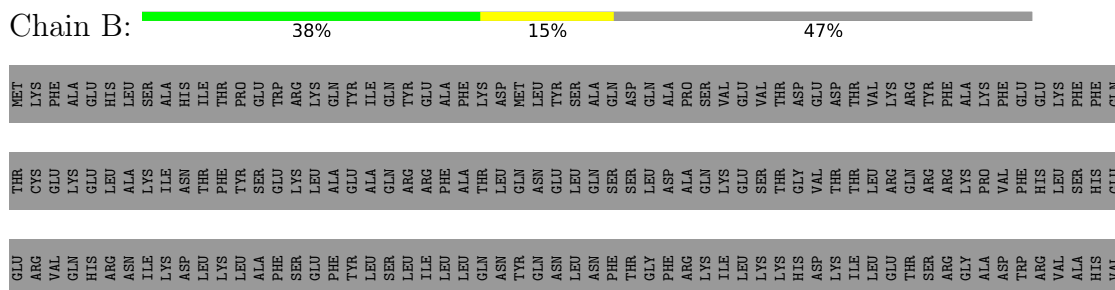
3 Residue-property plots

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: Solute carrier family 53 member 1



- Molecule 1: Solute carrier family 53 member 1



THR	THR	R624	T470	W395	R270	GLU
LYS	ASP	ALA	K471	Q399	VAL	VAL
VAL	THR	VAL	R472	S404	ALA	ALA
LEU	ASP	ARG	P475	M408	PRO	PRO
ILE	ASP	ASP	H476	D409	PHE	TYR
ASP	THR	ILE		I414	THR	THR
ASP	ASP	SER	K482	C415	CYS	
ASP	VAL	VAL	Y483	F416	LYS	LYS
ASP	ALA	ALA	S484	Y417	ILE	ILE
GLU	GLU	LEU	T485	S418	ASN	ASN
ALA	ALA	ASN	T486	L419	GLN	GLN
ASN	ASN	ALA	F487	E420	LEU	LEU
THR	THR	ALA	Y496	E420	ILE	ILE
LEU	ASP	ASP		L421	SER	SER
LEU	ASP	ASP	M508	K422	GLU	GLU
GLU	GLN	ASP		W423	GLY	ASP
ASP	THR	THR	F511	D424	ARG	ARG
LYS	LYS	LEU			GLN	GLN
ASP	ASP	LEU	D529		LYS	LYS
HIS	HIS	GLU			ALA	ALA
ASP	ASP	GLN	D533	L429	VAL	VAL
GLY	GLY	GLN	W534	L430	THR	THR
ASP	ASP	MET		P431	ASN	ASN
ASP	ASP	MET	R548	ASN	GLU	GLU
TYR	TYR	ASP		ASN	LEU	LEU
LYS	LYS	GLN		ASN	ASP	ASP
ASP	ASP	ASP	D566	SER	GLU	GLU
ASP	HIS	ASP		GLU	GLY	GLY
ASP	ASP	GLY		GLY	ASP	ASP
ILE	ILE	VAL	R570	SER	ASP	ASP
ASP	ASP	ARG	F571	GLY	ARG	ARG
TYR	TYR	ASN	A572	ILE	LYS	LYS
LYS	LYS	ARG	W573	CYS	ALA	ALA
ASP	ASP	GLN	T574	HIS	MET	MET
ASP	ASP	LYS	I575	LYS	LYS	LYS
ASP	ASP	ASN	Q576	TYR	THR	THR
ASP	ASP	ARG		THR	ARG	ARG
LYS	LYS	SER	L585	TYR	LEU	LEU
		TRP		TYR	ARG	ARG
		LYS	S588	V447	VAL	VAL
		TYR	G589	R448	PRO	PRO
		ASN	D590		LEU	LEU
		GLN		Q452	GLY	GLY
	SER	SER	V595	C453	ALA	ALA
	ILE	ILE	F596	I454	GLN	GLN
	SER	SER	A597	P455	ALA	ALA
	LEU	LEU	F598	A456	PRO	PRO
	ARG	ARG	L599	W457	ALA	ALA
	PRO	ARG	E600	I458	PRO	PRO
	ARG	PRO		R459	A229	A229
	LEU	ARG	R604	F460	G242	G242
	ALA	LEU	W607	I461	V246	V246
	SER	ALA	N608	Q462	K258	K258
	GLN	SER		C463	L259	L259
	LYS	SER	L612	L464	E260	E260
	ALA	LYS		R465	P267	P267
	ARG	ALA	N618	R466	D393	D393
	ASP	ARG	G621	T467	F394	F394
				D469		

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	141213	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)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (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: PO4, PC1

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	0.17	0/3292	0.31	0/4479
1	B	0.18	0/3292	0.34	0/4479
All	All	0.17	0/6584	0.33	0/8958

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3186	0	3186	67	0
1	B	3186	0	3186	69	0
2	A	108	0	176	5	0
2	B	108	0	176	10	0
3	A	5	0	0	3	0
All	All	6593	0	6724	139	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 (139) 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:A:479:ASN:OD1	1:A:479:ASN:N	2.18	0.75
1:A:570:ARG:NH1	3:A:803:PO4:O2	2.20	0.74
1:B:576:GLN:HE22	1:B:597:ALA:HB2	1.51	0.74
1:A:529:ASP:OD2	1:A:570:ARG:NH2	2.22	0.73
1:A:604:ARG:O	1:A:608:ASN:ND2	2.23	0.71
1:B:229:ALA:N	1:B:314:GLN:OE1	2.24	0.70
1:B:408:MET:HE1	1:B:448:ARG:HG3	1.73	0.69
1:B:534:TRP:O	1:B:548:ARG:NH2	2.26	0.69
1:B:271:ILE:O	1:B:352:TYR:OH	2.10	0.69
1:B:273:ARG:NH2	1:B:409:ASP:OD1	2.26	0.66
1:B:604:ARG:O	1:B:608:ASN:ND2	2.28	0.66
1:B:416:PHE:HA	1:B:420:GLU:HB2	1.79	0.64
1:A:533:ASP:OD1	1:A:611:ARG:NH1	2.30	0.63
1:A:284:LEU:O	1:A:288:ASN:ND2	2.31	0.63
1:A:517:PHE:HA	1:A:520:ILE:HG22	1.81	0.62
1:A:251:LEU:HD21	1:A:331:LEU:HD13	1.81	0.62
1:A:408:MET:HE1	1:A:448:ARG:HB3	1.82	0.62
1:A:489:MET:SD	1:A:578:SER:OG	2.58	0.62
1:A:604:ARG:NH2	3:A:803:PO4:O3	2.34	0.60
1:B:482:LYS:O	1:B:485:THR:OG1	2.15	0.60
1:A:473:ALA:O	1:A:477:LEU:HB2	2.03	0.59
1:A:385:PRO:HD3	1:A:461:ILE:HD12	1.85	0.59
1:A:395:TRP:O	1:A:399:GLN:HG2	2.03	0.58
1:B:529:ASP:OD2	1:B:570:ARG:NH2	2.29	0.58
1:B:395:TRP:O	1:B:399:GLN:HG2	2.03	0.58
1:A:411:GLU:HG3	1:A:451:VAL:HG11	1.86	0.57
1:B:277:LEU:HD21	1:B:597:ALA:HB1	1.85	0.57
1:A:543:GLU:OE2	1:A:544:ASN:ND2	2.37	0.57
1:A:556:LYS:HG2	1:A:560:TYR:HE2	1.69	0.57
1:A:283:PHE:HZ	2:A:802:PC1:H391	1.69	0.57
1:A:264:SER:O	1:A:267:PRO:HD2	2.05	0.57
1:A:548:ARG:HG3	1:A:550:GLU:H	1.71	0.56
1:B:313:HIS:NE2	2:B:802:PC1:O14	2.26	0.54
1:A:482:LYS:HE2	1:A:525:THR:HA	1.89	0.53
1:A:600:GLU:OE2	1:A:603:ARG:NH2	2.35	0.53
1:B:393:ASP:N	1:B:393:ASP:OD1	2.39	0.52
1:B:446:GLY:O	1:B:448:ARG:N	2.42	0.52
1:A:566:ASP:O	1:A:570:ARG:N	2.42	0.52
2:B:802:PC1:H262	2:B:802:PC1:H372	1.90	0.52
1:A:281:PHE:HE1	1:A:399:GLN:HE21	1.57	0.52
1:B:258:LYS:HE3	1:B:336:PHE:HE1	1.73	0.51
1:B:534:TRP:HE1	1:B:607:TRP:CD1	2.28	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:354:PHE:O	1:B:358:PHE:N	2.39	0.51
1:B:280:GLU:HG3	2:B:802:PC1:H2I2	1.93	0.50
1:B:421:LEU:HD13	1:B:429:LEU:HD12	1.94	0.50
1:B:529:ASP:HA	1:B:533:ASP:HB2	1.94	0.50
1:A:321:GLY:O	1:A:325:ILE:HG12	2.12	0.50
1:B:279:ILE:HG22	2:B:802:PC1:H2E1	1.93	0.50
1:B:333:ALA:O	1:B:338:PRO:HD3	2.11	0.50
1:B:452:GLN:O	1:B:452:GLN:NE2	2.46	0.48
1:B:279:ILE:HD13	1:B:324:GLY:HA2	1.96	0.48
1:B:314:GLN:NE2	2:B:802:PC1:O12	2.47	0.47
1:B:466:ARG:O	1:B:470:THR:OG1	2.28	0.47
1:A:395:TRP:NE1	1:A:608:ASN:OD1	2.47	0.47
1:A:484:SER:HA	1:A:487:PHE:CD2	2.50	0.47
1:B:292:TRP:CZ2	1:B:612:LEU:HD12	2.50	0.47
1:B:357:PHE:HA	1:B:360:ILE:HG12	1.97	0.47
1:B:452:GLN:O	1:B:455:PRO:HD2	2.15	0.47
1:A:520:ILE:O	1:A:524:TYR:N	2.31	0.47
1:B:475:PRO:HG2	1:B:476:HIS:CE1	2.50	0.47
1:A:235:PHE:CE1	2:B:802:PC1:H242	2.50	0.46
1:A:510:PHE:HA	1:A:513:LEU:HB2	1.97	0.46
1:B:588:SER:OG	1:B:589:GLY:N	2.49	0.46
1:A:551:ILE:HD12	1:A:559:TYR:CZ	2.50	0.46
1:B:422:LYS:HG3	1:B:424:ASP:H	1.81	0.46
1:B:395:TRP:HZ3	2:B:801:PC1:H351	1.81	0.46
1:B:404:SER:HB3	1:B:455:PRO:HG2	1.97	0.46
1:B:468:ARG:O	1:B:471:LYS:NZ	2.41	0.46
1:A:534:TRP:HE1	1:A:607:TRP:CD1	2.33	0.46
1:A:459:ARG:HH11	1:A:462:GLN:HB3	1.81	0.45
1:A:596:PHE:HD1	1:A:599:LEU:HD12	1.81	0.45
1:B:457:TRP:O	1:B:461:ILE:HG12	2.17	0.45
1:A:479:ASN:HA	1:A:482:LYS:HB3	1.97	0.45
1:A:385:PRO:HB2	1:A:465:ARG:HB2	1.98	0.45
1:A:478:VAL:O	1:A:524:TYR:OH	2.27	0.45
1:B:327:TRP:HD1	1:B:351:LEU:HD21	1.81	0.45
1:A:511:PHE:CE2	1:A:515:ILE:HD11	2.52	0.45
1:A:619:ASN:O	1:A:619:ASN:ND2	2.50	0.45
1:B:267:PRO:O	1:B:271:ILE:HG12	2.16	0.45
1:B:272:TYR:OH	1:B:330:SER:OG	2.32	0.45
1:A:482:LYS:NZ	3:A:803:PO4:O1	2.32	0.45
1:A:390:GLY:N	1:A:393:ASP:OD2	2.40	0.44
1:A:489:MET:SD	1:A:514:TRP:NE1	2.91	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:315:HIS:HD2	1:B:367:TYR:HE1	1.64	0.44
1:A:244:PHE:CE2	2:A:802:PC1:H2E2	2.52	0.44
1:B:462:GLN:C	1:B:464:LEU:H	2.24	0.44
1:A:607:TRP:CH2	1:A:611:ARG:HG2	2.53	0.44
1:B:423:TRP:CD1	1:B:423:TRP:H	2.34	0.44
1:B:566:ASP:OD1	1:B:570:ARG:HB2	2.18	0.43
1:B:571:PHE:O	1:B:574:THR:OG1	2.32	0.43
1:A:291:GLY:HA3	1:A:609:PHE:HE1	1.83	0.43
1:B:470:THR:HB	1:B:472:ARG:HG3	2.00	0.43
1:B:566:ASP:O	1:B:570:ARG:N	2.45	0.43
1:A:366:PHE:O	1:A:371:ARG:NE	2.30	0.43
1:B:290:TYR:CZ	2:B:802:PC1:H322	2.54	0.43
1:A:460:PHE:HE1	1:A:480:ALA:HB1	1.84	0.43
1:A:603:ARG:HH22	1:A:604:ARG:HH21	1.66	0.43
1:B:496:TYR:CE2	1:B:511:PHE:HB2	2.54	0.43
1:B:242:GLY:O	1:B:246:VAL:HG23	2.19	0.43
1:A:526:LEU:HD11	1:A:567:VAL:HG22	2.01	0.42
1:B:259:LEU:HD11	1:B:335:PHE:CE2	2.54	0.42
1:A:453:CYS:O	1:A:457:TRP:N	2.46	0.42
1:B:466:ARG:NH2	1:B:621:GLY:O	2.52	0.42
1:B:484:SER:HA	1:B:487:PHE:CD2	2.54	0.42
1:B:270:ARG:HH21	1:B:590:ASP:CG	2.28	0.42
1:A:535:GLY:HA3	1:A:614:ASN:ND2	2.35	0.42
1:A:277:LEU:HD11	1:A:597:ALA:HB1	2.01	0.42
1:A:460:PHE:CZ	1:A:464:LEU:HD11	2.54	0.42
1:B:315:HIS:O	1:B:319:ILE:HG13	2.20	0.42
1:B:573:TRP:HD1	1:B:600:GLU:CD	2.27	0.42
1:A:512:TYR:O	1:A:516:VAL:HG12	2.19	0.42
1:A:589:GLY:O	1:A:592:ILE:HG22	2.20	0.42
1:B:508:MET:HA	1:B:511:PHE:HB3	2.02	0.42
1:B:595:VAL:O	1:B:599:LEU:HD23	2.20	0.42
2:A:801:PC1:H153	2:A:801:PC1:H111	1.88	0.42
1:B:612:LEU:HD23	1:B:612:LEU:HA	1.62	0.41
1:A:402:SER:OG	1:A:604:ARG:NE	2.49	0.41
1:A:611:ARG:HA	1:A:611:ARG:HD2	1.86	0.41
1:B:457:TRP:HA	1:B:487:PHE:HZ	1.84	0.41
1:A:384:ALA:HB1	1:A:385:PRO:HD2	2.01	0.41
1:A:553:TYR:OH	1:A:609:PHE:O	2.24	0.41
1:B:459:ARG:HD3	1:B:483:TYR:CZ	2.56	0.41
1:A:465:ARG:NE	1:A:469:ASP:OD2	2.44	0.41
2:B:801:PC1:H371	2:B:801:PC1:H342	1.82	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:306:ASN:HB3	2:B:801:PC1:H142	2.03	0.41
1:A:288:ASN:HD21	1:A:605:PHE:HD1	1.68	0.41
1:A:290:TYR:CZ	2:A:802:PC1:H332	2.56	0.41
1:A:460:PHE:CE1	1:A:480:ALA:HB1	2.55	0.41
1:A:466:ARG:O	1:A:470:THR:OG1	2.23	0.41
1:B:453:CYS:O	1:B:457:TRP:N	2.49	0.41
1:B:465:ARG:NH1	1:B:469:ASP:OD2	2.54	0.41
1:A:243:ILE:HG22	1:A:325:ILE:HD12	2.03	0.41
1:A:359:LEU:HD13	2:A:801:PC1:H292	2.02	0.41
1:B:365:THR:O	1:B:371:ARG:NH2	2.54	0.41
1:B:272:TYR:CD2	1:B:331:LEU:HD13	2.57	0.40
1:B:570:ARG:HD3	1:B:570:ARG:HA	1.82	0.40
1:B:383:THR:O	1:B:387:HIS:HD2	2.04	0.40
1:A:343:PRO:O	1:A:346:VAL:HG22	2.22	0.40
1:B:414:ILE:O	1:B:418:SER:OG	2.24	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	378/720 (52%)	359 (95%)	19 (5%)	0	100	100
1	B	378/720 (52%)	347 (92%)	30 (8%)	1 (0%)	37	68
All	All	756/1440 (52%)	706 (93%)	49 (6%)	1 (0%)	50	79

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	447	VAL

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	339/644 (53%)	329 (97%)	10 (3%)	37	65
1	B	339/644 (53%)	333 (98%)	6 (2%)	54	76
All	All	678/1288 (53%)	662 (98%)	16 (2%)	45	70

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	248	ASN
1	A	331	LEU
1	A	335	PHE
1	A	387	HIS
1	A	393	ASP
1	A	394	PHE
1	A	401	ASN
1	A	479	ASN
1	A	565	GLU
1	A	609	PHE
1	B	260	GLU
1	B	336	PHE
1	B	377	LEU
1	B	393	ASP
1	B	585	LEU
1	B	618	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	288	ASN
1	A	294	GLN
1	A	310	ASN
1	A	399	GLN
1	A	401	ASN
1	A	462	GLN

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Mol	Chain	Res	Type
1	A	544	ASN
1	A	616	HIS
1	B	315	HIS
1	B	387	HIS
1	B	399	GLN
1	B	401	ASN
1	B	462	GLN
1	B	576	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](#)

5 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	PC1	B	801	-	53,53,53	0.50	0	59,61,61	0.47	1 (1%)
2	PC1	A	801	-	53,53,53	0.48	0	59,61,61	0.51	1 (1%)
3	PO4	A	803	-	4,4,4	1.44	1 (25%)	6,6,6	0.43	0
2	PC1	A	802	-	53,53,53	0.51	0	59,61,61	0.50	1 (1%)
2	PC1	B	802	-	53,53,53	0.50	0	59,61,61	0.47	1 (1%)

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	PC1	A	802	-	-	23/57/57/57	-
2	PC1	B	801	-	-	22/57/57/57	-
2	PC1	A	801	-	-	16/57/57/57	-
2	PC1	B	802	-	-	28/57/57/57	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	803	PO4	P-O1	2.49	1.56	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	PC1	O12-P-O14	2.34	123.83	112.24
2	B	802	PC1	O12-P-O14	2.28	123.51	112.24
2	A	802	PC1	O12-P-O14	2.20	123.12	112.24
2	B	801	PC1	O12-P-O14	2.20	123.09	112.24

There are no chirality outliers.

All (89) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	PC1	C11-O13-P-O12
2	A	801	PC1	O13-C11-C12-N
2	B	801	PC1	C11-O13-P-O12
2	B	801	PC1	O13-C11-C12-N
2	B	802	PC1	C11-O13-P-O14
2	B	802	PC1	C1-O11-P-O14
2	A	801	PC1	C32-C31-O31-C3
2	A	801	PC1	O32-C31-O31-C3
2	B	801	PC1	O32-C31-O31-C3
2	B	801	PC1	C32-C31-O31-C3
2	A	801	PC1	C35-C36-C37-C38
2	B	801	PC1	C34-C35-C36-C37
2	A	802	PC1	C21-C22-C23-C24
2	B	802	PC1	C32-C31-O31-C3
2	B	802	PC1	C22-C21-O21-C2

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Mol	Chain	Res	Type	Atoms
2	A	801	PC1	C11-O13-P-O11
2	B	801	PC1	C11-O13-P-O11
2	B	802	PC1	C11-O13-P-O11
2	B	802	PC1	O22-C21-O21-C2
2	A	802	PC1	C32-C31-O31-C3
2	A	802	PC1	C35-C36-C37-C38
2	B	802	PC1	C3D-C3E-C3F-C3G
2	B	802	PC1	C34-C35-C36-C37
2	B	801	PC1	C23-C24-C25-C26
2	B	802	PC1	O32-C31-O31-C3
2	A	801	PC1	C2D-C2E-C2F-C2G
2	B	802	PC1	C2C-C2D-C2E-C2F
2	B	801	PC1	C31-C32-C33-C34
2	A	802	PC1	O32-C31-O31-C3
2	B	802	PC1	C3B-C3C-C3D-C3E
2	A	802	PC1	C2A-C2B-C2C-C2D
2	B	801	PC1	C2D-C2E-C2F-C2G
2	A	801	PC1	C31-C32-C33-C34
2	B	802	PC1	C28-C29-C2A-C2B
2	A	802	PC1	C22-C21-O21-C2
2	A	802	PC1	O22-C21-O21-C2
2	A	801	PC1	C2A-C2B-C2C-C2D
2	B	802	PC1	C39-C3A-C3B-C3C
2	B	801	PC1	C38-C39-C3A-C3B
2	B	802	PC1	C2-C1-O11-P
2	A	801	PC1	C3E-C3F-C3G-C3H
2	B	801	PC1	C3C-C3D-C3E-C3F
2	B	801	PC1	C26-C27-C28-C29
2	B	802	PC1	C1-C2-C3-O31
2	B	802	PC1	C25-C26-C27-C28
2	A	802	PC1	C1-O11-P-O13
2	B	802	PC1	O21-C2-C3-O31
2	B	801	PC1	C2C-C2D-C2E-C2F
2	A	802	PC1	C23-C24-C25-C26
2	A	802	PC1	C2-C1-O11-P
2	B	802	PC1	O31-C31-C32-C33
2	A	802	PC1	C28-C29-C2A-C2B
2	A	802	PC1	C25-C26-C27-C28
2	B	802	PC1	C26-C27-C28-C29
2	B	801	PC1	C11-O13-P-O14
2	B	802	PC1	C11-O13-P-O12
2	B	802	PC1	C3A-C3B-C3C-C3D

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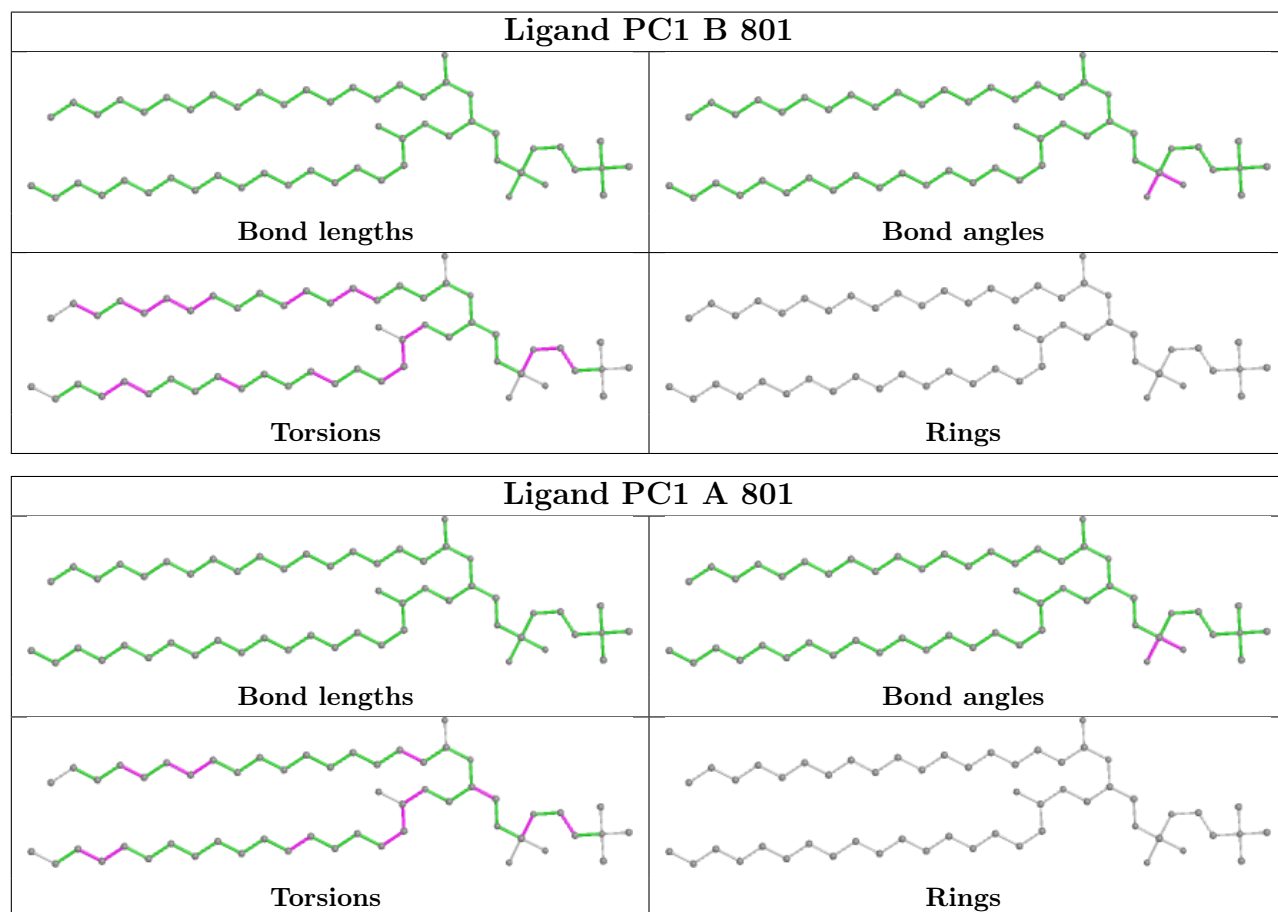
Mol	Chain	Res	Type	Atoms
2	A	802	PC1	O11-C1-C2-C3
2	B	801	PC1	C2B-C2C-C2D-C2E
2	B	802	PC1	C12-C11-O13-P
2	B	802	PC1	C35-C36-C37-C38
2	A	802	PC1	O11-C1-C2-O21
2	A	802	PC1	O13-C11-C12-N
2	B	802	PC1	O13-C11-C12-N
2	B	801	PC1	C2A-C2B-C2C-C2D
2	B	801	PC1	C24-C25-C26-C27
2	A	801	PC1	C3D-C3E-C3F-C3G
2	A	802	PC1	C37-C38-C39-C3A
2	A	801	PC1	C21-C22-C23-C24
2	B	802	PC1	C1-O11-P-O13
2	A	802	PC1	C3D-C3E-C3F-C3G
2	A	802	PC1	C24-C25-C26-C27
2	B	802	PC1	C2D-C2E-C2F-C2G
2	B	801	PC1	C3D-C3E-C3F-C3G
2	A	802	PC1	C39-C3A-C3B-C3C
2	A	801	PC1	C2B-C2C-C2D-C2E
2	B	801	PC1	O31-C31-C32-C33
2	A	801	PC1	O31-C31-C32-C33
2	B	802	PC1	O32-C31-C32-C33
2	A	801	PC1	O32-C31-C32-C33
2	B	802	PC1	C21-C22-C23-C24
2	B	801	PC1	C2F-C2G-C2H-C2I
2	A	802	PC1	C1-O11-P-O14
2	A	801	PC1	O11-C1-C2-C3
2	B	801	PC1	C12-C11-O13-P
2	A	802	PC1	O21-C21-C22-C23
2	A	802	PC1	C27-C28-C29-C2A
2	B	801	PC1	O32-C31-C32-C33
2	A	802	PC1	O22-C21-C22-C23

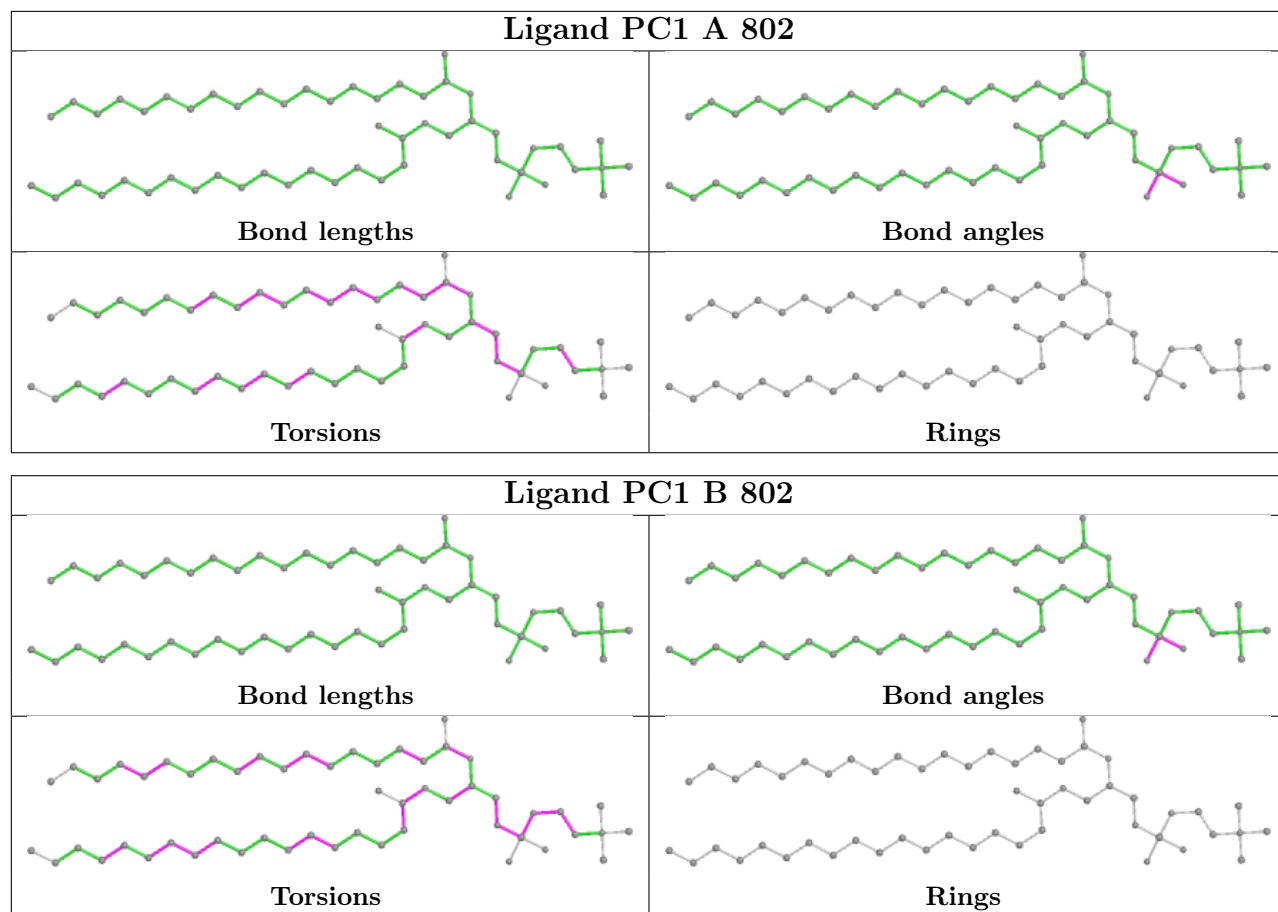
There are no ring outliers.

5 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	801	PC1	3	0
2	A	801	PC1	2	0
3	A	803	PO4	3	0
2	A	802	PC1	3	0
2	B	802	PC1	7	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.