



Full wwPDB EM Validation Report ⓘ

Jul 8, 2025 – 02:32 PM JST

PDB ID : 8KGI / pdb_00008kgi
EMDB ID : EMD-37222
Title : Molecular mechanism of prostaglandin transporter SLCO2A1
Authors : Li, Y.H.; Qu, Q.H.; Zhu, Z.N.; Chao, Y.L.; Zhou, Z.X.
Deposited on : 2023-08-19
Resolution : 3.20 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**
MolProbity : 4-5-2 with Phenix2.0rc1
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

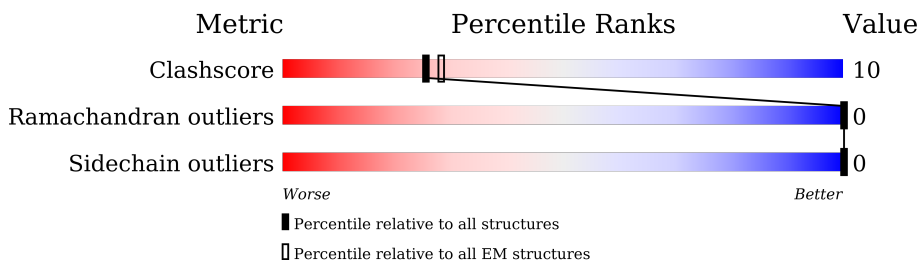
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.20 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	643	
1	B	643	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 5766 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.

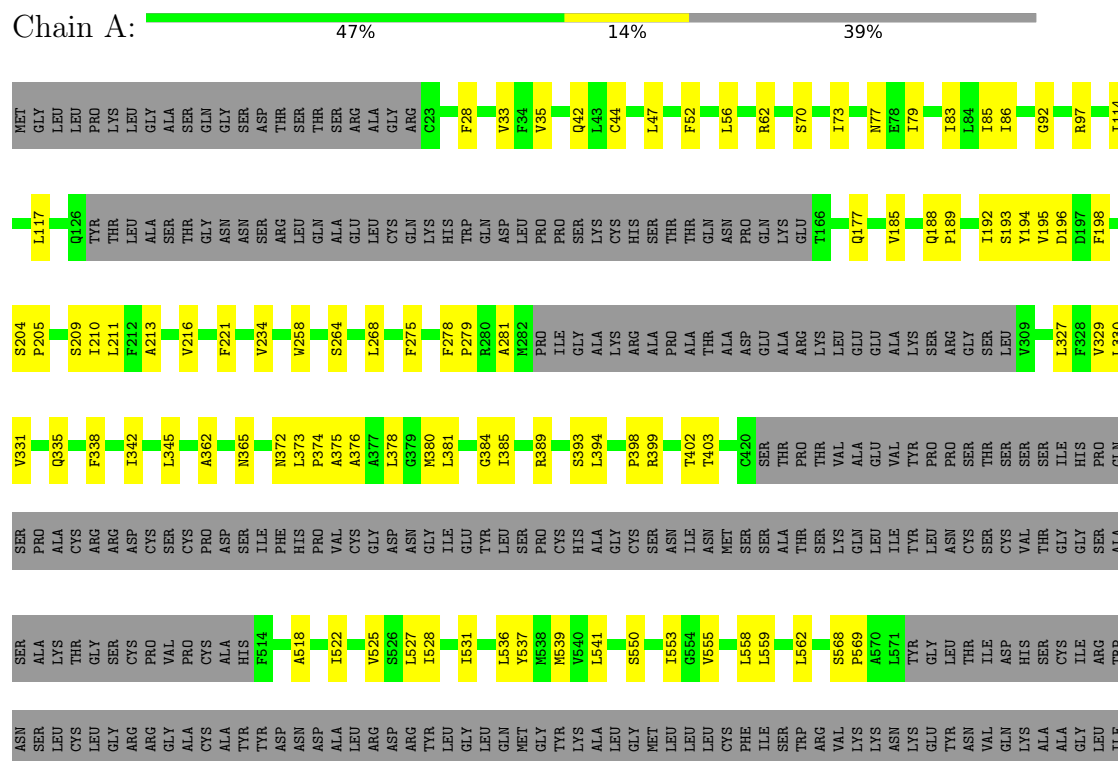
- Molecule 1 is a protein called Solute carrier organic anion transporter family member 2A1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	391	Total	C	N	O	S	0	0
			2883	1945	440	482	16		
1	B	391	Total	C	N	O	S	0	0
			2883	1945	440	482	16		

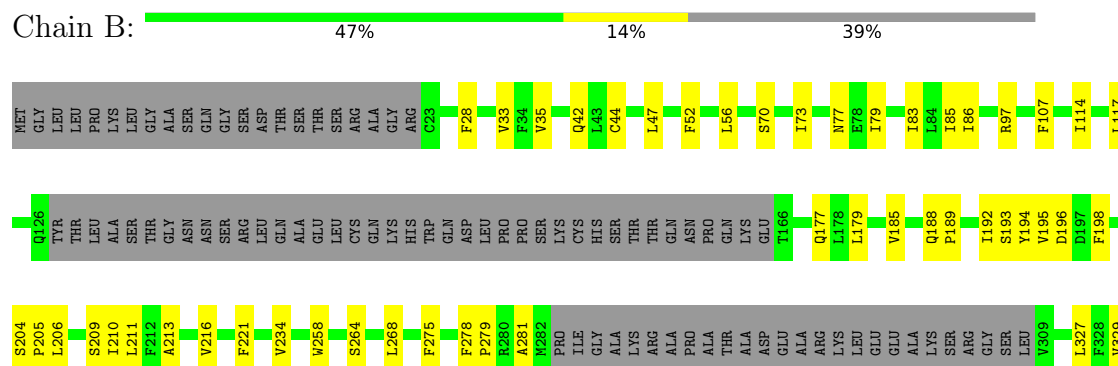
3 Residue-property plots

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 organic anion transporter family member 2A1



- Molecule 1: Solute carrier organic anion transporter family member 2A1



GLY	ALA	PRO	L330
ARG	LYS	CYS	V331
ARG	THR	ALA	
GLY	GLY	ARG	Q335
ALA	SER	ARG	
CYS	CYS	ASP	F338
ALA	PRO	CYS	
TYR	VAL	SER	I342
TYR	PRO	CYS	
ASP	PRO	PRO	L345
ASN	ALA	ASP	A362
ASP	HIS	SER	
ALA	F514	ILE	N365
LEU		PHE	
ARG	A518	HIS	N372
ASP		PRO	L373
ARG	I622	VAL	P374
TYR	S523	CYS	A375
LEU	F524	GLY	
GLY	V525	ASP	A376
LEU	S526	ASN	A377
LEU	I527	GLY	L378
GLN	I528	ILE	
MET		TYR	L381
GLY	I531	TYR	
TYR		LEU	I385
LYS	L536	SER	
ALA	V537	PRO	R389
LEU		CYS	
GLY	H538	HIS	S393
MET	H539	ALA	L394
LEU	I540	ALA	
LEU	I541	GLY	
LEU		CYS	P398
CYS	I553	SER	R399
LEU	S554	ASN	
PHE	G554	ASN	
ILE	V555	ILE	T402
ILE		ASN	T403
SER		MET	
ARG	I559	SER	C420
THR		SER	
VAL	S568	SER	THR
LYS	P669	ALA	PRO
LYS	A570	THR	THR
ASN	I571	SER	VAL
LYS	TYR	LYS	ALA
GLY	GLY	GLN	GLY
TYR	LEU	LEU	VAL
ASN	THR	ILE	TYR
VAL	ILE	TYR	PRO
GLN	ASP	LEU	PRO
LYS	HIS	ASN	SER
ALA	SER	CYS	THR
ALA	CYS	SER	SER
GLY	ILE	CYS	SER
LEU	ARG	VAL	SER
ILE	TRP	THR	SER
	ASN	GLY	HIS
	SER	GLY	PRO
	LEU	SER	GLN
	LEU	CYS	SER
	LEU	ALA	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	101167	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.14	0/2958	0.35	0/4035
1	B	0.14	0/2958	0.35	0/4035
All	All	0.14	0/5916	0.35	0/8070

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	2883	0	2875	61	0
1	B	2883	0	2875	60	0
All	All	5766	0	5750	116	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 (116) 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:209:SER:OG	1:A:384:GLY:HA3	1.79	0.82
1:B:114:ILE:HA	1:B:117:LEU:HD23	1.66	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:385:ILE:HG21	1:B:385:ILE:HG21	1.66	0.76
1:A:114:ILE:HA	1:A:117:LEU:HD23	1.66	0.76
1:A:378:LEU:HD13	1:B:527:LEU:HD12	1.76	0.68
1:A:527:LEU:HD12	1:B:378:LEU:HD13	1.77	0.67
1:B:399:ARG:O	1:B:403:THR:HG23	1.99	0.64
1:A:188:GLN:O	1:A:192:ILE:HG12	1.99	0.62
1:A:399:ARG:O	1:A:403:THR:HG23	1.99	0.62
1:B:393:SER:OG	1:B:394:LEU:N	2.32	0.61
1:A:531:ILE:HD11	1:B:378:LEU:HD11	1.81	0.61
1:B:35:VAL:HG13	1:B:211:LEU:HD12	1.83	0.61
1:A:209:SER:OG	1:A:384:GLY:CA	2.49	0.60
1:A:378:LEU:HD11	1:B:531:ILE:HD11	1.82	0.60
1:B:97:ARG:NH1	1:B:193:SER:OG	2.35	0.60
1:A:97:ARG:NH1	1:A:193:SER:OG	2.34	0.58
1:B:42:GLN:NE2	1:B:188:GLN:OE1	2.36	0.58
1:A:42:GLN:NE2	1:A:188:GLN:OE1	2.37	0.58
1:A:35:VAL:HG13	1:A:211:LEU:HD12	1.85	0.57
1:B:209:SER:OG	1:B:381:LEU:HA	2.06	0.55
1:A:195:VAL:HG21	1:A:211:LEU:HD21	1.88	0.55
1:B:518:ALA:O	1:B:522:ILE:HG13	2.08	0.54
1:A:536:LEU:HA	1:A:539:MET:HE2	1.89	0.54
1:A:393:SER:OG	1:A:394:LEU:N	2.32	0.54
1:A:518:ALA:O	1:A:522:ILE:HG13	2.07	0.54
1:B:44:CYS:HB3	1:B:268:LEU:HD22	1.89	0.53
1:B:536:LEU:HA	1:B:539:MET:HE2	1.90	0.53
1:A:338:PHE:O	1:A:342:ILE:HG12	2.09	0.52
1:B:275:PHE:HA	1:B:278:PHE:HD2	1.74	0.52
1:A:345:LEU:HD23	1:A:525:VAL:HG21	1.92	0.52
1:A:541:LEU:HD11	1:A:553:ILE:HD11	1.92	0.52
1:B:79:ILE:HG23	1:B:83:ILE:HD13	1.92	0.52
1:A:44:CYS:HB3	1:A:268:LEU:HD22	1.92	0.51
1:A:275:PHE:HA	1:A:278:PHE:HD2	1.74	0.51
1:B:188:GLN:O	1:B:192:ILE:HG12	2.11	0.51
1:B:338:PHE:O	1:B:342:ILE:HG12	2.09	0.51
1:B:372:ASN:O	1:B:376:ALA:N	2.38	0.51
1:B:195:VAL:HG21	1:B:211:LEU:HD21	1.92	0.51
1:B:345:LEU:HD23	1:B:525:VAL:HG21	1.92	0.50
1:B:541:LEU:HD11	1:B:553:ILE:HD11	1.93	0.50
1:A:79:ILE:HG23	1:A:83:ILE:HD13	1.91	0.50
1:B:107:PHE:HD1	1:B:179:LEU:HD11	1.76	0.50
1:A:210:ILE:HG13	1:A:381:LEU:HD21	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:525:VAL:HA	1:A:528:ILE:HG22	1.94	0.50
1:B:194:TYR:OH	1:B:279:PRO:O	2.30	0.49
1:A:558:LEU:O	1:A:562:LEU:HG	2.12	0.49
1:A:194:TYR:OH	1:A:279:PRO:O	2.31	0.49
1:B:525:VAL:HA	1:B:528:ILE:HG22	1.94	0.49
1:A:77:ASN:ND2	1:A:177:GLN:OE1	2.46	0.49
1:B:77:ASN:ND2	1:B:177:GLN:OE1	2.46	0.48
1:B:373:LEU:HB3	1:B:374:PRO:HD3	1.95	0.48
1:A:331:VAL:HG13	1:A:539:MET:HE3	1.96	0.48
1:B:568:SER:OG	1:B:569:PRO:HD3	2.13	0.47
1:A:373:LEU:HB3	1:A:374:PRO:HD3	1.95	0.47
1:B:28:PHE:HA	1:B:33:VAL:HG11	1.96	0.47
1:B:362:ALA:HA	1:B:365:ASN:HD21	1.80	0.47
1:A:568:SER:OG	1:A:569:PRO:HD3	2.14	0.47
1:B:398:PRO:O	1:B:402:THR:HG23	2.15	0.47
1:A:234:VAL:O	1:A:258:TRP:NE1	2.44	0.47
1:A:380:MET:HE3	1:A:380:MET:HB2	1.76	0.47
1:A:372:ASN:O	1:A:376:ALA:N	2.38	0.46
1:B:47:LEU:HD12	1:B:221:PHE:HB3	1.96	0.46
1:A:28:PHE:HA	1:A:33:VAL:HG11	1.98	0.46
1:A:198:PHE:CZ	1:A:281:ALA:HA	2.51	0.46
1:B:198:PHE:CZ	1:B:281:ALA:HA	2.51	0.46
1:A:398:PRO:O	1:A:402:THR:HG23	2.15	0.46
1:A:362:ALA:HA	1:A:365:ASN:HD21	1.81	0.46
1:B:107:PHE:CD1	1:B:179:LEU:HD11	2.50	0.46
1:B:196:ASP:OD2	1:B:541:LEU:HD23	2.16	0.46
1:A:47:LEU:HD12	1:A:221:PHE:HB3	1.96	0.45
1:B:56:LEU:HD21	1:B:70:SER:HA	1.98	0.45
1:B:86:ILE:HD12	1:B:86:ILE:H	1.82	0.45
1:A:56:LEU:HD21	1:A:70:SER:HA	1.98	0.45
1:A:375:ALA:HB1	1:A:527:LEU:HD21	1.99	0.45
1:A:188:GLN:HB3	1:A:189:PRO:HD3	1.99	0.45
1:B:234:VAL:O	1:B:258:TRP:NE1	2.44	0.45
1:A:192:ILE:HG22	1:A:541:LEU:HD21	1.99	0.45
1:B:375:ALA:HB1	1:B:527:LEU:HD21	1.99	0.45
1:B:210:ILE:HG13	1:B:381:LEU:HD21	1.98	0.44
1:A:196:ASP:OD2	1:A:541:LEU:HD23	2.17	0.44
1:B:188:GLN:HB3	1:B:189:PRO:HD3	1.99	0.44
1:A:204:SER:OG	1:A:205:PRO:HD3	2.17	0.44
1:A:85:ILE:HA	1:A:185:VAL:HG13	1.99	0.44
1:B:192:ILE:HG13	1:B:537:TYR:OH	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:389:ARG:HD3	1:A:389:ARG:HA	1.76	0.44
1:B:331:VAL:HG13	1:B:539:MET:HE3	2.00	0.44
1:B:85:ILE:HA	1:B:185:VAL:HG13	1.99	0.44
1:A:213:ALA:O	1:A:216:VAL:HG12	2.19	0.43
1:A:86:ILE:H	1:A:86:ILE:HD12	1.82	0.43
1:B:389:ARG:HD3	1:B:389:ARG:HA	1.76	0.43
1:B:204:SER:OG	1:B:205:PRO:HD3	2.18	0.43
1:B:264:SER:O	1:B:268:LEU:HD23	2.20	0.42
1:A:327:LEU:O	1:A:331:VAL:HG23	2.19	0.42
1:A:541:LEU:CD1	1:A:553:ILE:HD11	2.49	0.42
1:B:206:LEU:O	1:B:210:ILE:HD12	2.19	0.42
1:B:555:VAL:O	1:B:559:LEU:HG	2.19	0.42
1:A:335:GLN:HG2	1:A:536:LEU:HB3	2.00	0.42
1:A:264:SER:O	1:A:268:LEU:HD23	2.20	0.42
1:A:555:VAL:O	1:A:559:LEU:HG	2.18	0.42
1:B:335:GLN:HG2	1:B:536:LEU:HB3	2.00	0.42
1:A:192:ILE:HG13	1:A:537:TYR:OH	2.19	0.42
1:B:399:ARG:HA	1:B:399:ARG:HD2	1.91	0.42
1:A:86:ILE:HD11	1:A:558:LEU:HD22	2.02	0.42
1:B:541:LEU:CD1	1:B:553:ILE:HD11	2.49	0.42
1:B:327:LEU:O	1:B:331:VAL:HG23	2.19	0.41
1:B:192:ILE:HG22	1:B:541:LEU:HD21	2.02	0.41
1:B:213:ALA:O	1:B:216:VAL:HG12	2.20	0.41
1:B:523:SER:O	1:B:527:LEU:HD23	2.21	0.41
1:A:52:PHE:HE2	1:A:73:ILE:HG21	1.85	0.40
1:A:92:GLY:HA3	1:A:550:SER:OG	2.21	0.40
1:B:331:VAL:O	1:B:335:GLN:HG3	2.21	0.40
1:A:329:VAL:HG13	1:A:330:LEU:HD12	2.03	0.40
1:A:331:VAL:O	1:A:335:GLN:HG3	2.22	0.40
1:B:329:VAL:HG13	1:B:330:LEU:HD12	2.04	0.40
1:B:52:PHE:HE2	1:B:73:ILE:HG21	1.85	0.40
1:A:62:ARG:HA	1:A:62:ARG:HD2	1.88	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	383/643 (60%)	375 (98%)	8 (2%)	0	100	100
1	B	383/643 (60%)	375 (98%)	8 (2%)	0	100	100
All	All	766/1286 (60%)	750 (98%)	16 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	292/541 (54%)	292 (100%)	0	100	100
1	B	292/541 (54%)	292 (100%)	0	100	100
All	All	584/1082 (54%)	584 (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 (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	77	ASN
1	A	350	ASN
1	A	356	GLN
1	B	77	ASN
1	B	350	ASN
1	B	356	GLN

5.3.3 RNA ⓘ

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](#)

There are no ligands in this entry.

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.